# Speech and Motor Speech Assessment Findings

# In Eight Complex Neurodevelopmental Disorders

## Technical Report No. 24

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# PART I

# BACKGROUND

## The Phonology Project

The Phonology Project is a research program in Speech Sound Disorders (SSD) of known and unknown origin. The primary goal of the Phonology Project is to identify risk factors and develop diagnostic measures and behavioral (speech-prosody-voice) classification markers for five types of speech disorders and four types of motor speech disorders. Each of the nine speech and motor speech disorders can occur in idiopathic contexts (Idiopathic Speech Sound Disorders; ISSD) or in the context of Complex Neurodevelopmental Disorders (CND). The conceptual plan for the Phonology Project is a four-level framework termed the Speech Disorders Classification System (SDCS). All data reduction and analyses of SDCS measures and analytics are completed in a software environment termed PEPPER: Programs to Examine Phonetic and Phonologic Evaluation Records (PEPPER, 2018). PEPPER is scheduled to be made freely available for download in 2018.

## Phonology Project Technical Reports

Phonology Project Technical Reports provide technical information and reference data on measures and analyses available in the PEPPER software suite that were used in research presentations, publications, and other technical reports. The present technical report provides additional information on the eight groups of participants with complex neurodevelopmental disorders described in Shriberg, Strand, Jakielski, and Mabie (2018). As is customary in this laboratory series, information in this report is presented without interpretive analyses or comment. Constraints on the internal and external validity of information include the possibility of sampling errors due to limitations in the number and diversity of participants, and potential

limitations in the research design and statistical methods. We invite questions and correspondence on any aspect of the information in this report that may be helpful to researchers, instructors, and clinicians.

**The Speech Disorders Classification System (SDCS)**

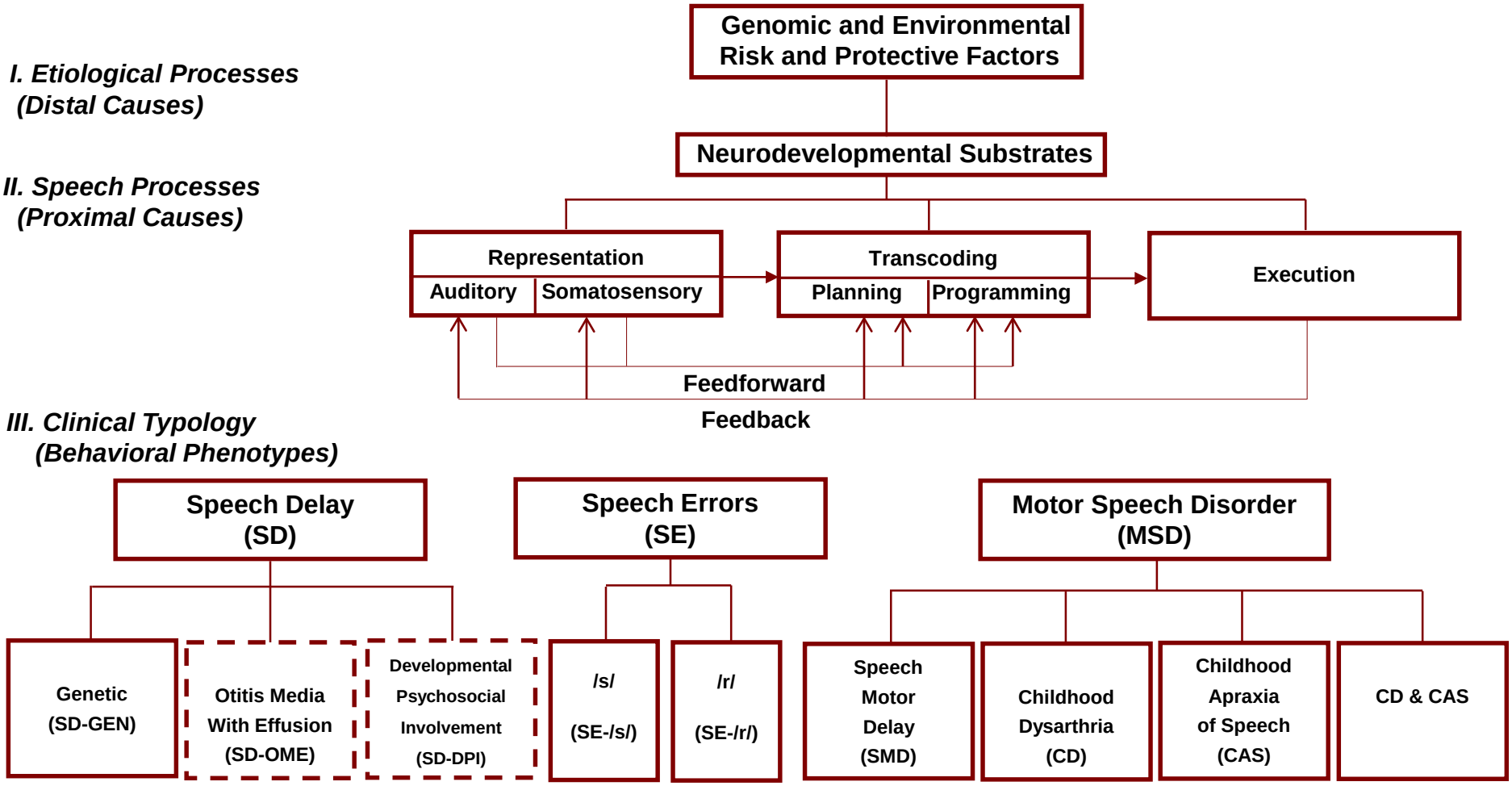
Figure 1 is a graphic description of the finalized version of the SDCS, the conceptual framework for the research and clinical goals of the Phonology Project. In addition to preliminary versions of the SDCS in the 1980s, papers that include revisions and extensions of the SDCS and citations to other developmental SDCS research include Shriberg (1993, 1994, 2010); Shriberg, Austin, Lewis, McSweeny, and Wilson (1997); Shriberg et al. (2010); and Shriberg, Strand, and Mabie (2018). A number of Phonology Project technical reports include descriptions of methods and measures using the SDCS framework, and additional tabular and graphic reference data and findings. The following brief description of the SDCS in Figure 1 focuses only on terms and concepts relevant for the present technical report.

Level III within Figure 1, termed Clinical Typology, depicts the three classes of SSD, including the nine types of speech and motor speech disorders that may or may not be comorbid in a given speaker historically or at a given point in time. The first class of SSD, Speech Delay (SD), posits three risk factors for early and possibly persistent SD —genetic risks, early fluctuant conductive hearing loss, and psychosocial risk factors. The solid line around genetic risks indicates that research progress in speech genetics and other verbal trait disorders since the 1980's supports genomic risk factors for SSD. As indicated by the dashes for SD-GEN in Figure 1, Level IV, Phonology Project research has not developed diagnostic markers with sufficient sensitivity and specificity to identify children with SD-GEN (see Table 1-4 in Shriberg [2010]

*I. Etiological Processes (Distal Causes)*

*II. Speech Processes (Proximal Causes)*

*III. Clinical Typology (Behavioral Phenotypes)*




| – | – | – | M1 | $F_3$-$F_2$ | PSI | DI | PM | DI & PM |
|---|---|---|---|---|---|---|---|---|

[a] M1: First Spectral Moment; $F_3/F_2$: Format 3/Formant 2; PSI: Precision-Stability Index; DI/DSI: Dysarthria Index/Dysarthria Subtype Indices; PM: Pause Marker

for promising speech-prosody-voice markers). The dashed borders for the other two risk factors at Level II indicate that although research findings in otitis media with effusion and developmental psychosocial involvement since the 1980s have provided statistical support for their association with early and persistent SD, research has not yielded sufficient, cross-validated support for SD-OME and SD-DPI as subtypes of SD.

The second class of SSD shown in Figure 1, Speech Errors (SE), includes two subtypes associated with phonetically challenging manner classes in languages of the world: a subtype limited to distortions of sibilants (SE-/s/) and a subtype limited to distortions of rhotic vowels and rhotic consonants (SE-/r/).

The third class of SSD, Motor Speech Disorders (MSD), includes the four remaining subtypes of SSD proposed in recent research using a finalized version of the SDCS referenced previously: Speech Motor Delay (SMD), Childhood Dysarthria (CD), and Childhood Apraxia of Speech (CAS).

**Reference Databases, Standardization Criteria, and SDCS Classification Procedures**

Phonology Project Technical Report 23 (Mabie & Shriberg, 2017) includes information on the reference databases, standardization criteria, and SDCS classification procedures used to obtain scores on the measures of speech and motor speech disorders described in Table 1 of Technical Report 23. Additional information on the 200 typically-speaking participants assessed on a two-hour speech-assessment protocol is described in Potter et al. (2012) and Scheer-Cohen et al. (2013). The latter two Phonology Project Technical Reports include information on the sociodemographic composition of the sample and methods for speech sampling and data reduction using narrow phonetic transcription, prosody-voice coding, and acoustic analyses. They also include descriptive statistics for each age x sex group from 3-80 years of age.

**Description of Participants in Eight Complex Neurodevelopmental Disorders (CND)**

Table 1 of the present report includes brief descriptions of the participants in eight groups of children, youth, and adults with Complex Neurodevelopmental Disorders (CND). The publications listed in the right-most column include additional participant and assessment information. Table 2 includes age and sex information for the 346 participants who met SDCS criteria for classification of their motor speech status. Chronological age, rather than a variant of mental age, language age, or an age-equivalent score was used for all standardization and classification procedures (excepting an articulatory rate variable described in Shriberg, Strand, Fourakis et al., 2017). As shown in Table 2, where relevant in the findings to follow, data are subgrouped by participant age group (younger or older than 9 years of age).

Table 1. Brief description of participants in the eight Complex Neurodevelopmental Disorder groups in Shriberg, Strand, Jakielski, and Mabie (2018).

| Group | Abbreviation | *n* | *n* Eligible for Classification | Brief Description | Reference |
|---|---|---|---|---|---|
| 16p11.2 Deletion and Duplication Syndrome | 16p | 111 | 108 | Participant ages ranged from 3;2 to 62;0 (yrs;mos), with approximately equal numbers of males (56) and females (55). The overall percentage of 16p11.2 variants included 54.1% deletions and 45.9% duplications. A total of 23 of the 111 participants (20.7%) were classified with Autism Spectrum Disorder. | Simons Foundation. (2015). https://www.sfari.org/funded-project/speech-disorders-in-individuals-with-16p11-2-deletion-or-duplication/ |
| 22q11.2 Deletion Syndrome | 22q | 18 | 17 | Inclusionary criteria included: (a) diagnosis of 22q11.2 deletion syndrome by Fluorescence In Situ Hybridization (FISH) testing or microarray, (b) 6-18 years of age, (c) English as the participant's primary language, and (d) no history of permanent bilateral hearing loss. | Baylis and Shriberg (2017) |
| Autism Spectrum Disorder | ASD | 42 | 42 | Inclusionary criteria included: (a) a previous diagnosis of autism, PDD-NOS, ASD, or Asperger syndrome from a qualified clinician; (b) full scale IQ $\geq$ 70; (c) mean length of utterance of at least 3.0, based on transcription of a 3–5 min conversational sample; (d) > 70% of words intelligible in the language sample; and (e) normal hearing and vision (or corrected with glasses) on standard screening. Exclusionary criteria included known craniofacial or neurological impairment or bilingual background. | Shriberg, Paul, Black, and van Santen (2011) |
| Down Syndrome | DS | 50 | 45 | Three samples of participants: (1) 29 participants, 10-18 years of age with a confirmed diagnosis of Trisomy 21 and no diagnosis of autism spectrum disorders; (2) 17 participants, 8-18 years of age, | Wilson, Abbeduto, Camarata, and Shriberg (2017); Camarata, Yoder, and Camarata (2006); Davis, |

| | | | | | |
|---|---|---|---|---|---|
| | | | | with a confirmed diagnosis of Trisomy 21 and no diagnosis of autism spectrum disorders; (3) 4 male participants, ages 13-20 years, with a confirmed diagnosis of Trisomy 21 | Camarata, and Camarata (2016) |
| Fragile X Syndrome | FXS | 30 | 28 | Males ranging in age from 11-22 years. | Abbeduto et al. (2003); Abbeduto et al. (2008); Keller-Bell and Abbeduto (2007) |
| Galactosemia | GAL | 31 | 31 | Inclusionary/exclusionary criteria: (a) a diagnosis of classic (full expression) galactosemia; ( b) prior or persistent SSD, as documented by a history of treatment for SSDs; (c) 4–17 years of age; (d) residence in the United States; (e) English as the only or first language; and (f ) no history of significant hearing loss or craniofacial disorder affecting speech. | Shriberg, Potter, and Strand (2011) |
| Idiopathic Intellectual Disability | IID | 26 | 23 | Adults with intellectual disability living in the Madison, Wisconsin, area. Participants were non-institutionalized, working at settings ranging from work activity centers to independent jobs in the community. | Shriberg and Widder (1990) |
| Traumatic Brain Injury | TBI | 54 | 52 | Subsample of 56 children sustaining severe pediatric traumatic brain injury (TBI) between age 1 month and 11 years. Inclusionary criteria: (a) severe TBI, defined as a Glasgow Coma Scale score ≤ 8 and a positive CT scan; (b) age at injury < 11 years; (c) injury not known or suspected to have resulted from abuse; and (d) monolingual English home environment and no previously diagnosed neurodevelopmental, speech, or language deficits according to parent report. | Campbell and Dollaghan (1995); Campbell et al. (2013); Campbell, Dollaghan, and Shriberg (2017) |
| | Total: | 362 | 346 | | |

Table 2. Age and sex characteristics of SDCS classified participants in the eight Complex Neurodevelopmental Disorders groups.

| Group | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Younger (<9 years; 107 mos) | | | | | | Older (>9 years; 108 mos) | | | | | | All | | | | | |
| Complex Neurodevelopmental Disorders (*n*=8) | | Age | | | Sex | | | Age | | | Sex | | | Age | | | Sex | |
| | *n* | *M* | *SD* | *Range* | % Male | % Female | *n* | *M* | *SD* | *Range* | % Male | % Female | *n* | *M* | *SD* | *Range* | % Male | % Female |
| | | | | | | | | | | | | | | | | | | |
| 16p11.2 Deletion and Duplication syndrome | 43 | 6.2 | 1.7 | 3-8 | 60.5 | 39.5 | 65 | 20.3 | 13.3 | 9-62 | 41.5 | 58.5 | 108 | 14.7 | 12.4 | 3-62 | 49.1 | 50.9 |
| 22q11.2 Deletion syndrome | 7 | 7.4 | 1.4 | 5-8 | 71.4 | 28.6 | 10 | 12.1 | 2.8 | 9-18 | 60.0 | 40.0 | 17 | 10.2 | 3.3 | 5-18 | 64.7 | 35.3 |
| Autism Spectrum Disorder | 42 | 6.0 | 1.2 | 4-8 | 78.6 | 21.4 | 0 | – | – | – | – | – | 42 | 6.0 | 1.2 | 4-8 | 78.6 | 21.4 |
| Down syndrome | 0 | – | – | – | – | – | 45 | 14.2 | 2.3 | 11-18 | 55.6 | 44.4 | 45 | 14.2 | 2.3 | 11-18 | 55.6 | 44.4 |
| Fragile X syndrome | 0 | – | – | – | – | – | 28 | 16.0 | 3.2 | 11-22 | 100.0 | 0.0 | 28 | 16.0 | 3.2 | 11-22 | 100.0 | 0.0 |
| Galactosemia | 20 | 7.1 | 1.3 | 5-8 | 65.0 | 35.0 | 11 | 11.9 | 2.2 | 9-16 | 63.6 | 36.4 | 31 | 8.8 | 2.9 | 5-16 | 64.5 | 35.5 |
| Idiopathic Intellectual Disability | 0 | – | – | – | – | – | 23 | 36.4 | 7.0 | 26-45 | 47.8 | 52.2 | 23 | 36.4 | 7.0 | 26-45 | 47.8 | 52.2 |
| Traumatic Brain Injury | 31 | 5.2 | 1.7 | 3-8 | 61.3 | 38.7 | 21 | 10.3 | 1.0 | 9-12 | 47.6 | 52.4 | 52 | 7.3 | 2.9 | 3-12 | 57.7 | 42.3 |
| | | | | | | | | | | | | | | | | | | |
| ALL | 144 | 6.1 | 1.6 | 3-8 | 69.4 | 30.6 | 202 | 18.3 | 10.9 | 9-62 | 55.0 | 45.0 | 346 | 13.3 | 10.3 | 3-62 | 61.0 | 39.0 |

## Abbreviations

**Units and Symbols**. The following abbreviations for measurement units and characters are used in the sample measures and summaries and reference data in Parts II and III.

dB = decibel

ms = milliseconds

*n* = count

% = percentage

* = no data

**Measures and Classifications.**

CAS = Childhood Apraxia of Speech

CD = Childhood Dysarthria

CD & CAS = Childhood Dysarthria and Childhood Dysarthria of Speech

CMS = Competence Measures Summary

CND = Complex Neurodevelopmental Disorders

DI = Dysarthria Index

DSI = Dysarthria Subtypes Indices

II = Intelligibility Index

ISSD = Idiopathic Speech Sound Disorders

MSD = Motor Speech Disorder

No MSD = No Motor Speech Disorder

NSA = Normal(ized) Speech Acquisition

OII = Ordinal Intelligibility Index

PCC = Percentage Consonants Correct

PM = Pause Marker

PMI = Pause Marker Index

PMS = Pause Marker Summary

PSD = Persistent Speech Delay

PSE = Persistent Speech Errors

PSI = Precision-Stability Index

PVSP = Prosody-Voice Screening Profile

SCI = Speech Competence Index

SD = Speech Delay

SD-DPI = Speech Delay-Developmental Psychosocial Disorder

SD-GEN = Speech Delay-Genetic

SD-OME = Speech Delay-Otitis Media with Effusion

SDCS = Speech Disorders Classification System

SDCSS = Speech Disorders Classification System Summary

SE = Speech Errors

SMD = Speech Motor Delay

SRT = Syllable Repetition Task

SSD = Speech Sound Disorders

## PART II

## SDCS FINDINGS IN EIGHT COMPLEX NEURODEVELOPMENTAL DISORDERS

The following outline describes the format of outputs for each of the participant groups with one of the eight complex neurodevelopmental disorders described in Shriberg, Strand, Jakielski, and Mabie (2018). Note that for two of the measures, detailed outputs are not available; summative findings are available in the Competence Measures Summary (CMS).

**[Complex Neurodevelopmental Disorder]**

**Speech Measures and Summaries**

**Percentage Consonants Correct (PCC)**

**Intelligibility Index (II) and Ordinal Intelligibility Index (OII)**
**The II findings are in the Competence Measures Summary**

**Prosody-Voice Screening Profile (PVSP)**

**Speech Competence Index (SCI)**

**Syllable Repetition Task (SRT)**
**The SRT findings are in the Competence Measures Summary**

**Competence Measures Summary (CMS)**

**Motor Speech Measures and Summaries**

**Speech Motor Delay (SMD) Measure:**
**The Precision-Stability Index (PSI)**

**Childhood Dysarthria (CD) Measure:**
**The Dysarthria Index (DI) & Dysarthria Subtypes Indices (DSI)**

**Childhood Apraxia of Speech (CAS) Measure:**
**The Pause Marker (PM) and Pause Marker Index (PMI)**

**Summary Speech and Motor Speech Classifications**

**Speech Disorders Classification System Summary (SDCSS)**

## SPEECH MEASURES AND SUMMARIES:

## 16p11.2 Deletion and Duplication Syndrome (16p)

## PERCENTAGE CONSONANTS CORRECT (PCC)

16p: Younger Group

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 347 | 3 | 149 | 5 | 285 | 3 | 781 | 792 | 5.82 | 98.61 |
| | n | 408 | 5 | 239 | 6 | 1056 | 17 | 1703 | 1731 | 12.72 | 98.38 |
| | ŋ | 0 | 0 | 30 | 0 | 190 | 6 | 220 | 226 | 1.66 | 97.35 |
| Glides | w | 598 | 35 | 29 | 4 | 0 | 0 | 627 | 666 | 4.89 | 94.14 |
| | j | 439 | 11 | 2 | 2 | 0 | 0 | 441 | 454 | 3.34 | 97.14 |
| Stops | p | 219 | 6 | 78 | 3 | 112 | 0 | 409 | 418 | 3.07 | 97.85 |
| | b | 331 | 9 | 93 | 8 | 11 | 0 | 435 | 452 | 3.32 | 96.24 |
| | t | 294 | 15 | 171 | 14 | 1132 | 48 | 1597 | 1674 | 12.30 | 95.40 |
| | d | 338 | 5 | 92 | 8 | 316 | 21 | 746 | 780 | 5.73 | 95.64 |
| | k | 272 | 17 | 154 | 13 | 268 | 27 | 694 | 751 | 5.52 | 92.41 |
| | g | 274 | 31 | 36 | 0 | 33 | 5 | 343 | 379 | 2.79 | 90.50 |
| Fricatives and Affricates | f | 170 | 9 | 22 | 0 | 32 | 3 | 224 | 236 | 1.73 | 94.92 |
| | v | 3 | 0 | 56 | 3 | 74 | 6 | 133 | 142 | 1.04 | 93.66 |
| | θ | 34 | 19 | 26 | 8 | 40 | 22 | 100 | 149 | 1.10 | 67.11 |
| | ð | 505 | 233 | 8 | 13 | 1 | 0 | 514 | 760 | 5.59 | 67.63 |
| | s | 327 | 28 | 94 | 11 | 472 | 96 | 893 | 1028 | 7.55 | 86.87 |
| | z | 27 | 1 | 16 | 2 | 535 | 52 | 578 | 633 | 4.65 | 91.31 |
| | ʃ | 72 | 6 | 19 | 4 | 21 | 6 | 112 | 128 | 0.94 | 87.50 |
| | ʒ | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 3 | 0.02 | 33.33 |
| | h | 430 | 30 | 47 | 0 | 0 | 0 | 477 | 507 | 3.73 | 94.08 |
| | tʃ | 23 | 7 | 9 | 2 | 21 | 5 | 53 | 67 | 0.49 | 79.10 |
| | ʤ | 38 | 10 | 9 | 5 | 13 | 1 | 60 | 76 | 0.56 | 78.95 |
| Liquids | l | 316 | 72 | 134 | 26 | 248 | 35 | 698 | 831 | 6.11 | 84.00 |
| | r | 161 | 101 | 62 | 61 | 233 | 106 | 456 | 724 | 5.32 | 62.98 |
| Percent Correct | | 89.60 | | 88.74 | | 91.73 | | 12295 | 13607 | | |
| | | | | | | | | Correct | Total | | |

| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 9042 | 100.00 |
| "Words" used | 7925 | 87.65 |
| Disregard | 651 | 7.20 |
| Either/Or | 0 | 0.00 |
| Unsure | 83 | 0.92 |
| Unintelligible | 383 | 4.24 |
| INTELLIGIBILITY INDEX | | 94.45 |

**90.36**

Percentage Consonants Correct (PCC)

Severity Adjective

**MILD**

## PERCENTAGE CONSONANTS CORRECT (PCC)

### 16p: Older Group

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 444 | 1 | 302 | 0 | 462 | 6 | 1208 | 1215 | 5.48 | 99.42 |
| | n | 394 | 3 | 508 | 3 | 1737 | 12 | 2639 | 2657 | 11.99 | 99.32 |
| | ŋ | 0 | 0 | 37 | 0 | 323 | 0 | 360 | 360 | 1.62 | 100.00 |
| Glides | w | 992 | 26 | 57 | 2 | 0 | 0 | 1049 | 1077 | 4.86 | 97.40 |
| | j | 533 | 3 | 27 | 2 | 0 | 0 | 560 | 565 | 2.55 | 99.12 |
| Stops | p | 328 | 5 | 137 | 1 | 134 | 0 | 599 | 605 | 2.73 | 99.01 |
| | b | 522 | 3 | 146 | 4 | 28 | 0 | 696 | 703 | 3.17 | 99.00 |
| | t | 596 | 13 | 439 | 14 | 1541 | 35 | 2576 | 2638 | 11.90 | 97.65 |
| | d | 436 | 10 | 238 | 12 | 561 | 13 | 1235 | 1270 | 5.73 | 97.24 |
| | k | 465 | 4 | 291 | 15 | 584 | 14 | 1340 | 1373 | 6.19 | 97.60 |
| | g | 366 | 20 | 67 | 2 | 71 | 1 | 504 | 527 | 2.38 | 95.64 |
| Fricatives and Affricates | f | 336 | 5 | 89 | 1 | 105 | 0 | 530 | 536 | 2.42 | 98.88 |
| | v | 32 | 0 | 153 | 2 | 243 | 5 | 428 | 435 | 1.96 | 98.39 |
| | θ | 119 | 2 | 54 | 13 | 78 | 10 | 251 | 276 | 1.25 | 90.94 |
| | ð | 887 | 90 | 24 | 6 | 1 | 0 | 912 | 1008 | 4.55 | 90.48 |
| | s | 663 | 35 | 279 | 7 | 744 | 38 | 1686 | 1766 | 7.97 | 95.47 |
| | z | 20 | 0 | 62 | 1 | 912 | 28 | 994 | 1023 | 4.62 | 97.17 |
| | ʃ | 95 | 1 | 70 | 3 | 34 | 1 | 199 | 204 | 0.92 | 97.55 |
| | ʒ | 0 | 0 | 8 | 0 | 0 | 0 | 8 | 8 | 0.04 | 100.00 |
| | h | 687 | 10 | 105 | 0 | 0 | 0 | 792 | 802 | 3.62 | 98.75 |
| | tʃ | 40 | 1 | 24 | 2 | 46 | 14 | 110 | 127 | 0.57 | 86.61 |
| | ʤ | 98 | 8 | 33 | 1 | 23 | 0 | 154 | 163 | 0.74 | 94.48 |
| Liquids | l | 622 | 18 | 290 | 14 | 484 | 35 | 1396 | 1463 | 6.60 | 95.42 |
| | r | 442 | 69 | 290 | 35 | 452 | 75 | 1184 | 1363 | 6.15 | 86.87 |
| Percent Correct | | 96.54 | | 96.38 | | 96.76 | | 21410 | 22164 | | |
| | | | | | | | | Correct | Total | | |

| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 12978 | 100.00 |
| "Words" used | 11909 | 91.76 |
| Disregard | 856 | 6.60 |
| Either/Or | 0 | 0.00 |
| Unsure | 63 | 0.49 |
| Unintelligible | 150 | 1.16 |
| INTELLIGIBILITY INDEX | | 98.24 |

96.60

Percentage Consonants Correct (PCC)

Severity Adjective

MILD

## PERCENTAGE CONSONANTS CORRECT (PCC)

### 16p: Combined

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 791 | 4 | 451 | 5 | 747 | 9 | 1989 | 2007 | 5.61 | 99.10 |
| | n | 802 | 8 | 747 | 9 | 2793 | 29 | 4342 | 4388 | 12.27 | 98.95 |
| | ŋ | 0 | 0 | 67 | 0 | 513 | 6 | 580 | 586 | 1.64 | 98.98 |
| Glides | w | 1590 | 61 | 86 | 6 | 0 | 0 | 1676 | 1743 | 4.87 | 96.16 |
| | j | 972 | 14 | 29 | 4 | 0 | 0 | 1001 | 1019 | 2.85 | 98.23 |
| Stops | p | 547 | 11 | 215 | 4 | 246 | 0 | 1008 | 1023 | 2.86 | 98.53 |
| | b | 853 | 12 | 239 | 12 | 39 | 0 | 1131 | 1155 | 3.23 | 97.92 |
| | t | 890 | 28 | 610 | 28 | 2673 | 83 | 4173 | 4312 | 12.05 | 96.78 |
| | d | 774 | 15 | 330 | 20 | 877 | 34 | 1981 | 2050 | 5.73 | 96.63 |
| | k | 737 | 21 | 445 | 28 | 852 | 41 | 2034 | 2124 | 5.94 | 95.76 |
| | g | 640 | 51 | 103 | 2 | 104 | 6 | 847 | 906 | 2.53 | 93.49 |
| Fricatives and Affricates | f | 506 | 14 | 111 | 1 | 137 | 3 | 754 | 772 | 2.16 | 97.67 |
| | v | 35 | 0 | 209 | 5 | 317 | 11 | 561 | 577 | 1.61 | 97.23 |
| | θ | 153 | 21 | 80 | 21 | 118 | 32 | 351 | 425 | 1.19 | 82.59 |
| | ð | 1392 | 323 | 32 | 19 | 2 | 0 | 1426 | 1768 | 4.94 | 80.66 |
| | s | 990 | 63 | 373 | 18 | 1216 | 134 | 2579 | 2794 | 7.81 | 92.30 |
| | z | 47 | 1 | 78 | 3 | 1447 | 80 | 1572 | 1656 | 4.63 | 94.93 |
| | ʃ | 167 | 7 | 89 | 7 | 55 | 7 | 311 | 332 | 0.93 | 93.67 |
| | ʒ | 0 | 0 | 9 | 2 | 0 | 0 | 9 | 11 | 0.03 | 81.82 |
| | h | 1117 | 40 | 152 | 0 | 0 | 0 | 1269 | 1309 | 3.66 | 96.94 |
| | tʃ | 63 | 8 | 33 | 4 | 67 | 19 | 163 | 194 | 0.54 | 84.02 |
| | ʤ | 136 | 18 | 42 | 6 | 36 | 1 | 214 | 239 | 0.67 | 89.54 |
| Liquids | l | 938 | 90 | 424 | 40 | 732 | 70 | 2094 | 2294 | 6.41 | 91.28 |
| | r | 603 | 170 | 352 | 96 | 685 | 181 | 1640 | 2087 | 5.83 | 78.58 |
| Percent Correct | | 93.77 | | 93.98 | | 94.82 | | 33705 | 35771 | | |
| | | | | | | | | Correct | Total | | |

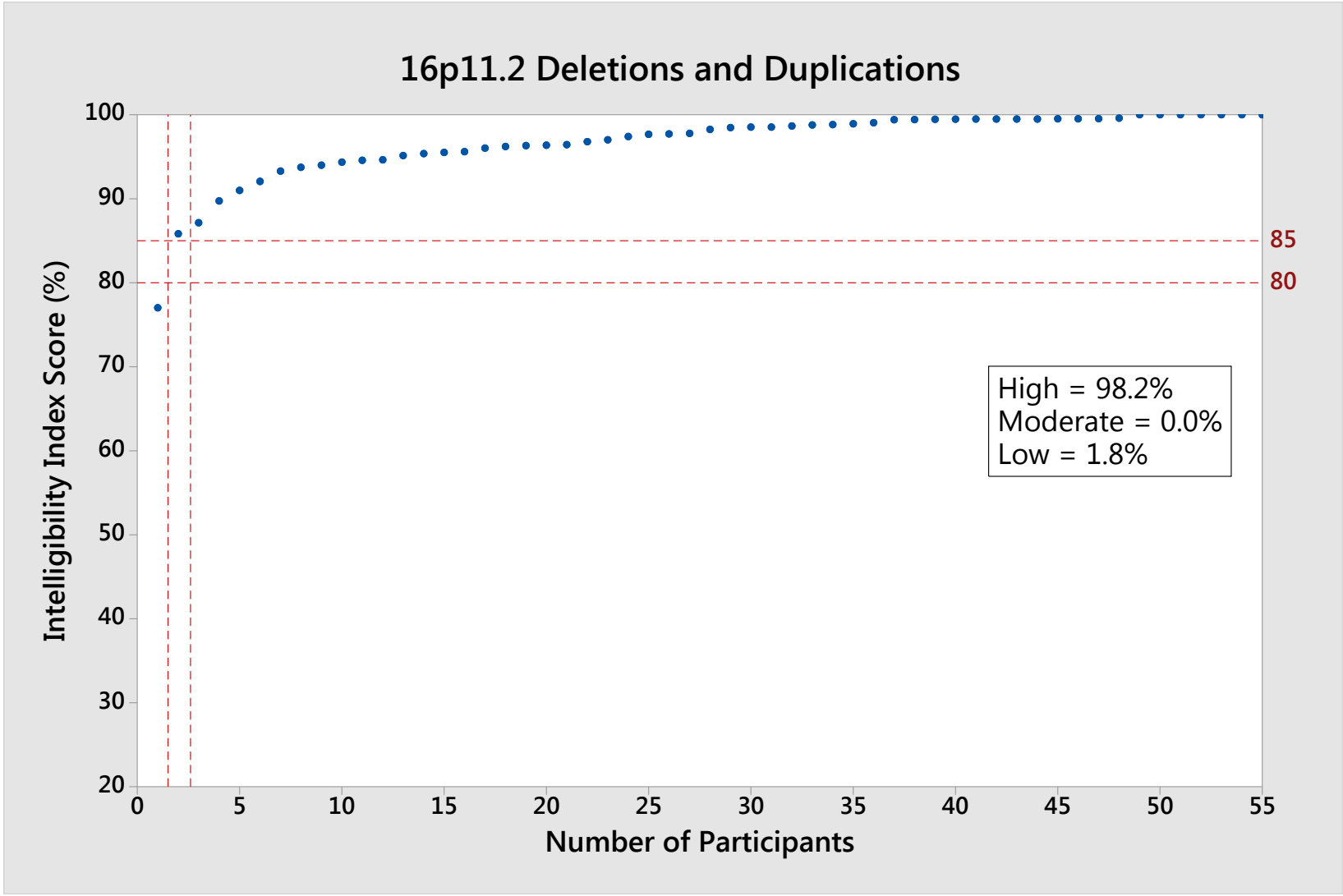
| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 22020 | 100.00 |
| "Words" used | 19834 | 90.07 |
| Disregard | 1507 | 6.84 |
| Either/Or | 0 | 0.00 |
| Unsure | 146 | 0.66 |
| Unintelligible | 533 | 2.42 |
| INTELLIGIBILITY INDEX | | 96.69 |

94.22

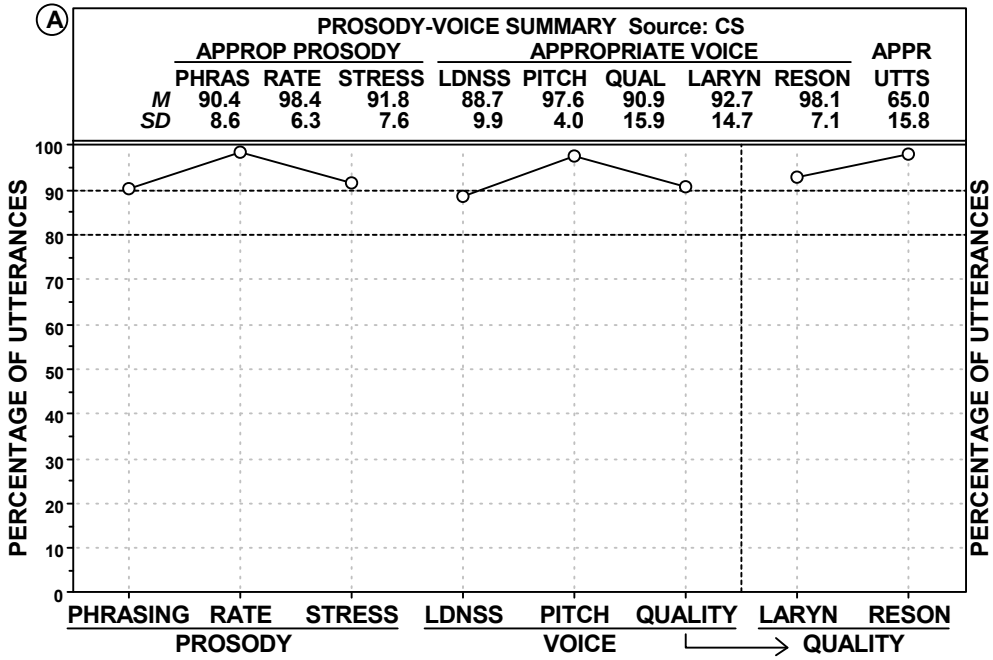
Percentage Consonants Correct (PCC)

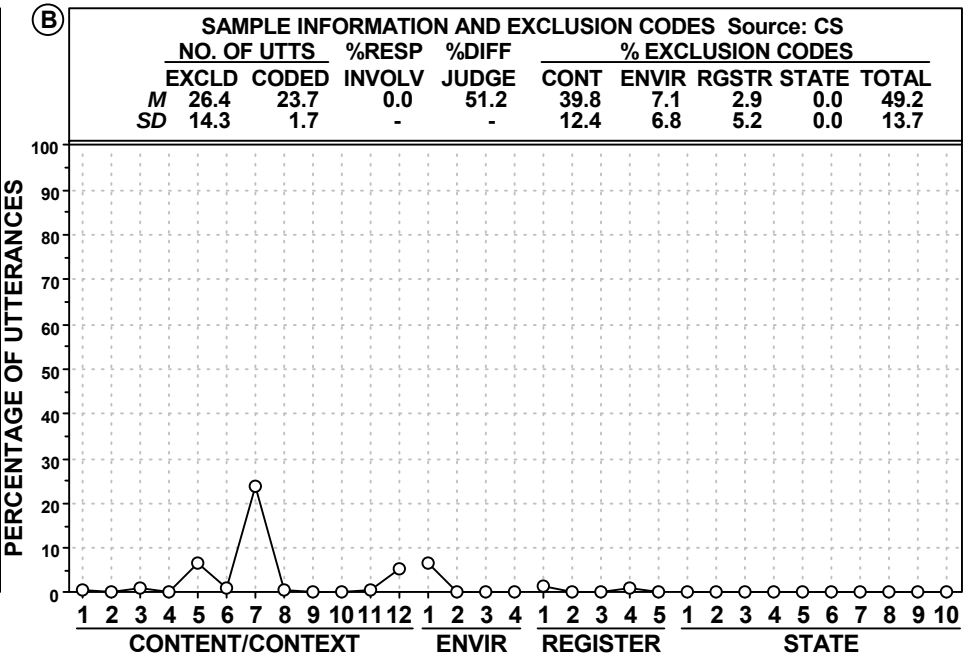
Severity Adjective

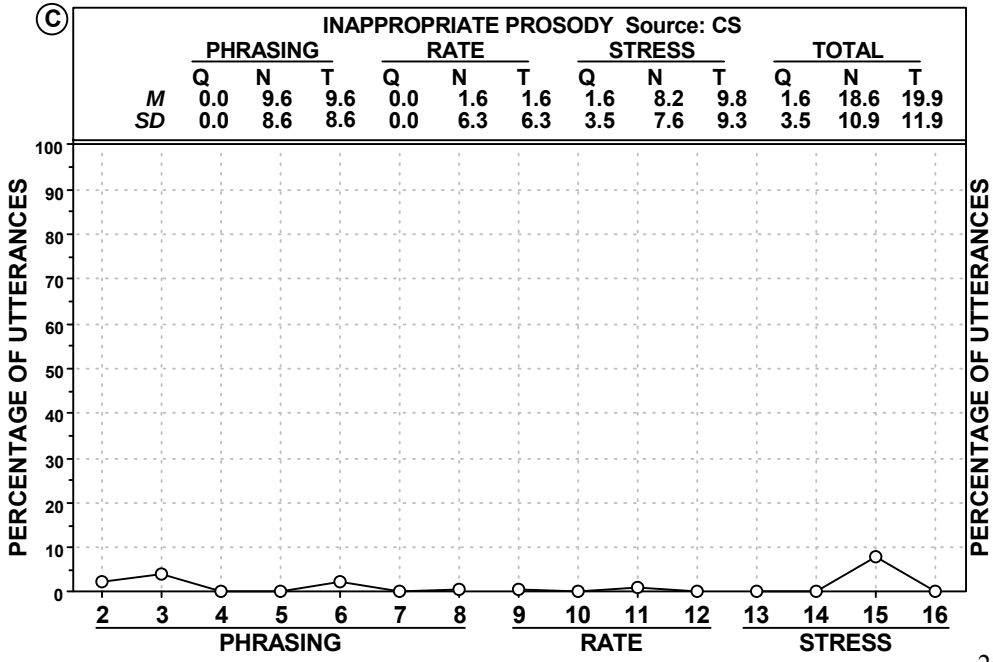
MILD

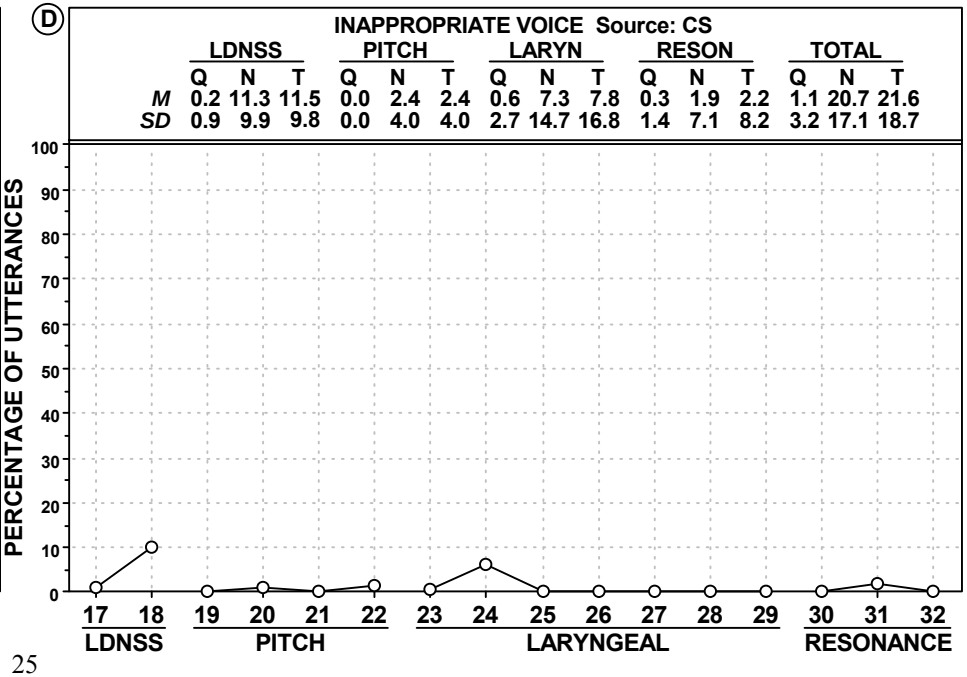

16p11.2 Deletions and Duplications
Intelligibility Index Score (%)
100
90
80
70
60
50
40
30
20
0
5
10
15
20
25
30
35
40
45
50
55
Number of Participants
85
80
High = 98.2%
Moderate = 0.0%
Low = 1.8%

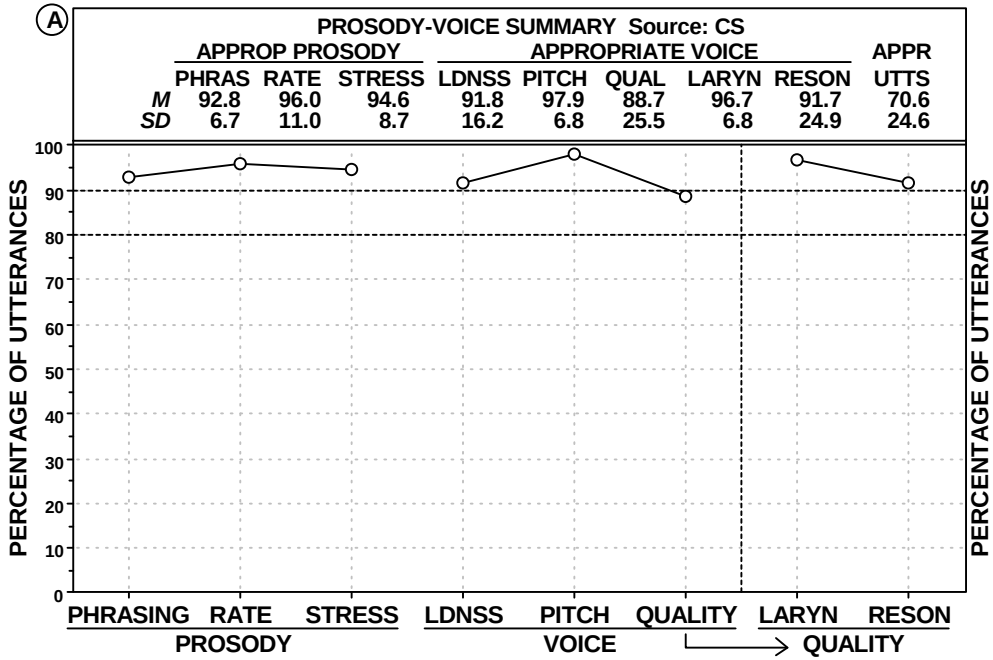
Younger Group

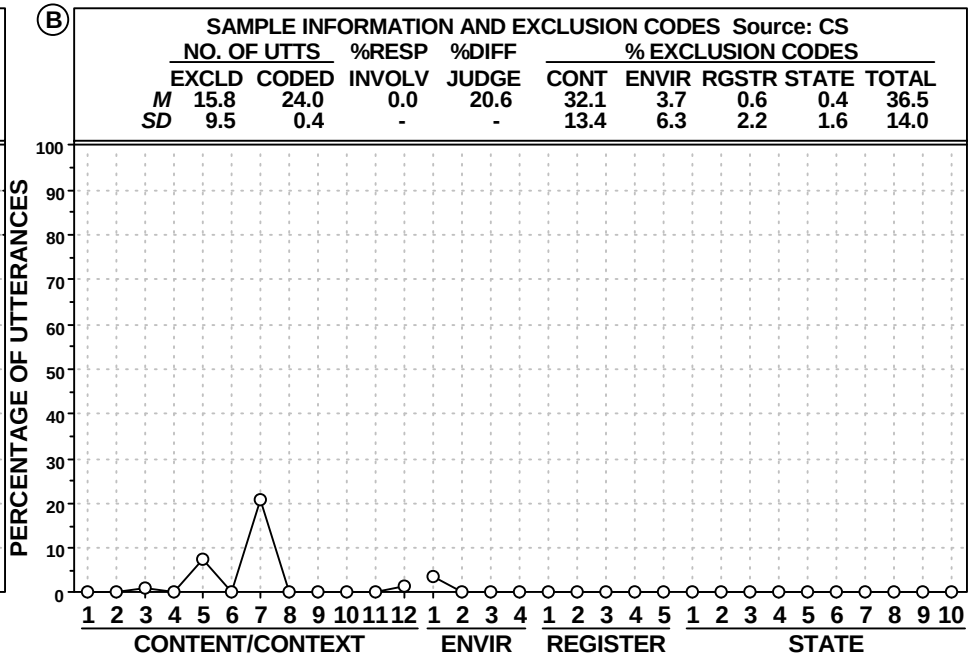


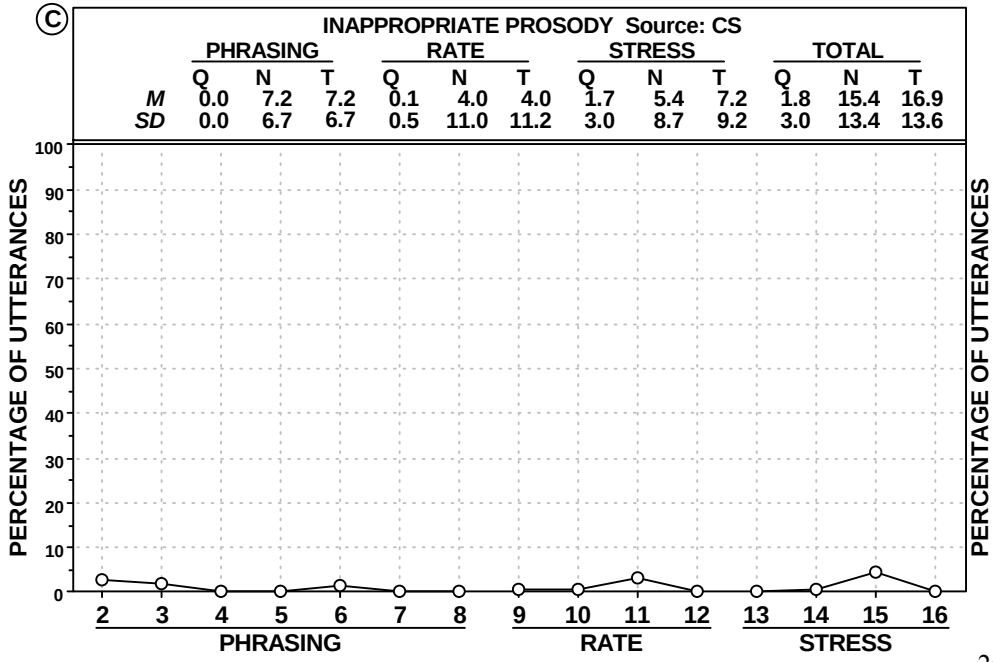



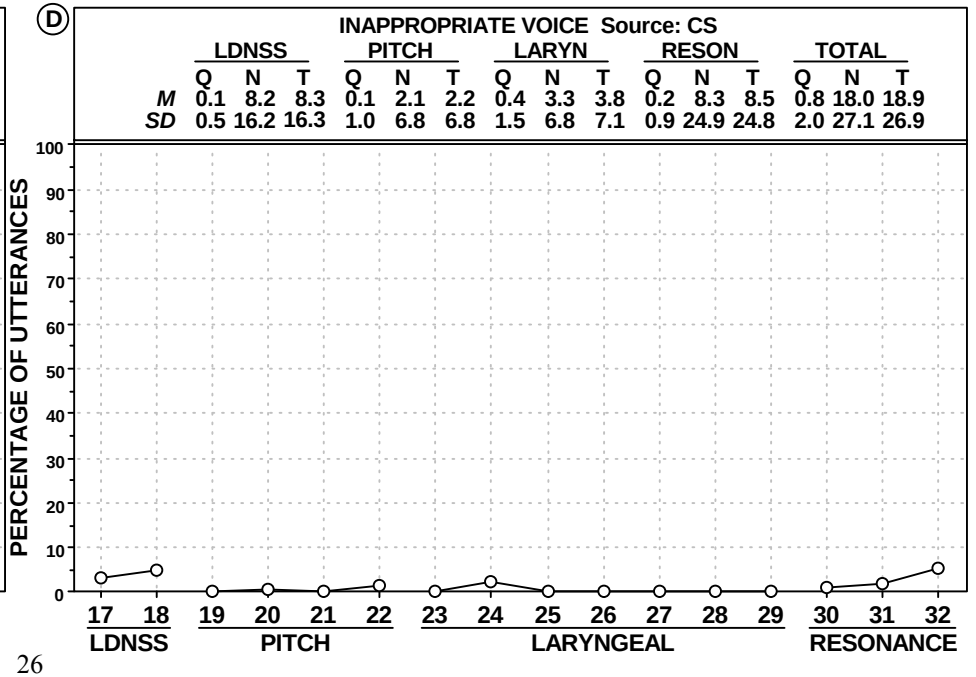



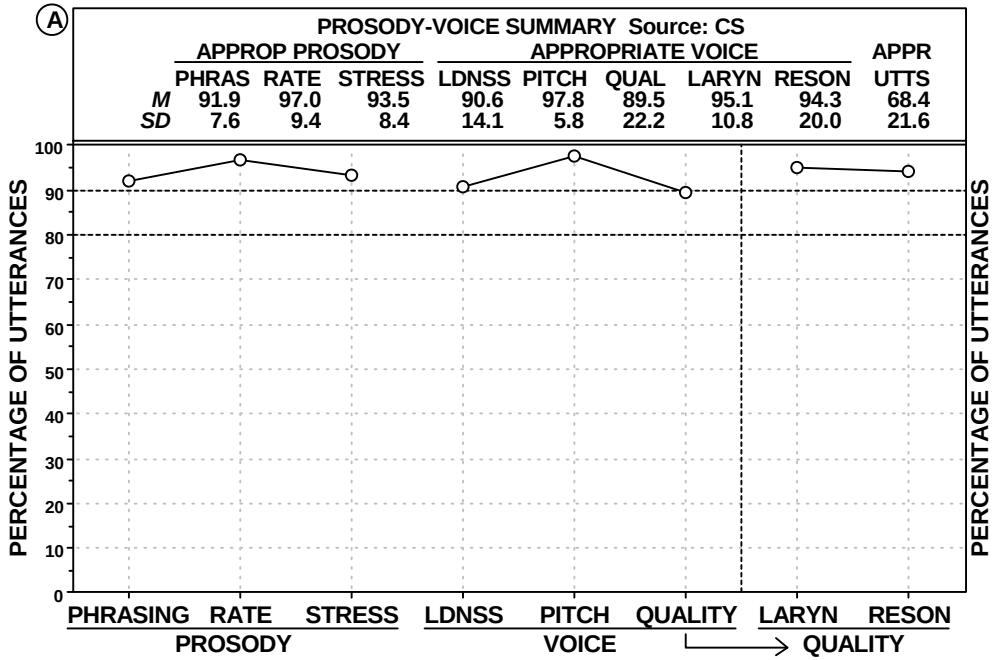



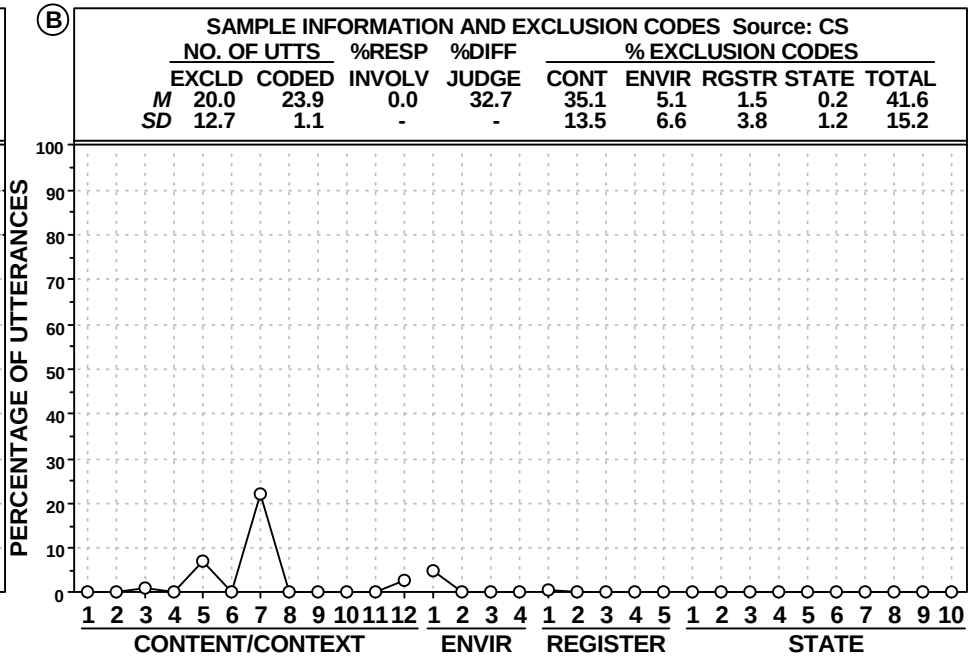

A
PROSODY-VOICE SUMMARY Source: CS
APPROP PROSODY
APPROPRIATE VOICE
APPR
PHRAS RATE STRESS LDNSS PITCH QUAL LARYN RESON UTTS
M 92.8 96.0 94.6 91.8 97.9 88.7 96.7 91.7 70.6
SD 6.7 11.0 8.7 16.2 6.8 25.5 6.8 24.9 24.6
PERCENTAGE OF UTTERANCES
PHRASING RATE STRESS LDNSS PITCH QUALITY LARYN RESON
PROSODY
VOICE
QUALITY

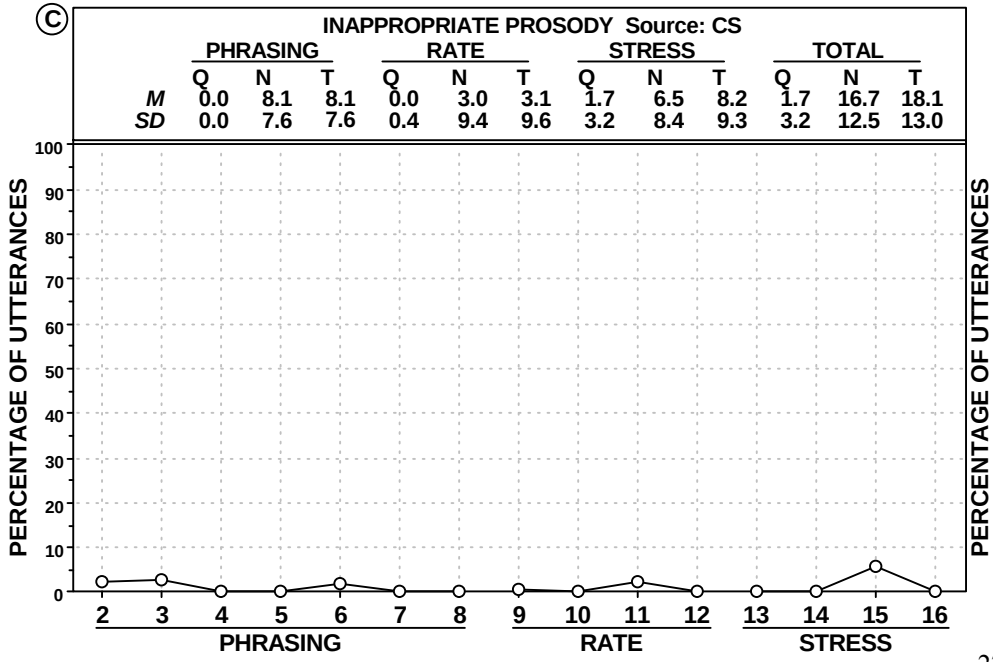

B
SAMPLE INFORMATION AND EXCLUSION CODES Source: CS
NO. OF UTTS
%RESP
%DIFF
% EXCLUSION CODES
EXCLD CODED INVOLV JUDGE CONT ENVIR RGSTR STATE TOTAL
M 15.8 24.0 0.0 20.6 32.1 3.7 0.6 0.4 36.5
SD 9.5 0.4 - - 13.4 6.3 2.2 1.6 14.0
PERCENTAGE OF UTTERANCES
CONTENT/CONTEXT
ENVIR
REGISTER
STATE

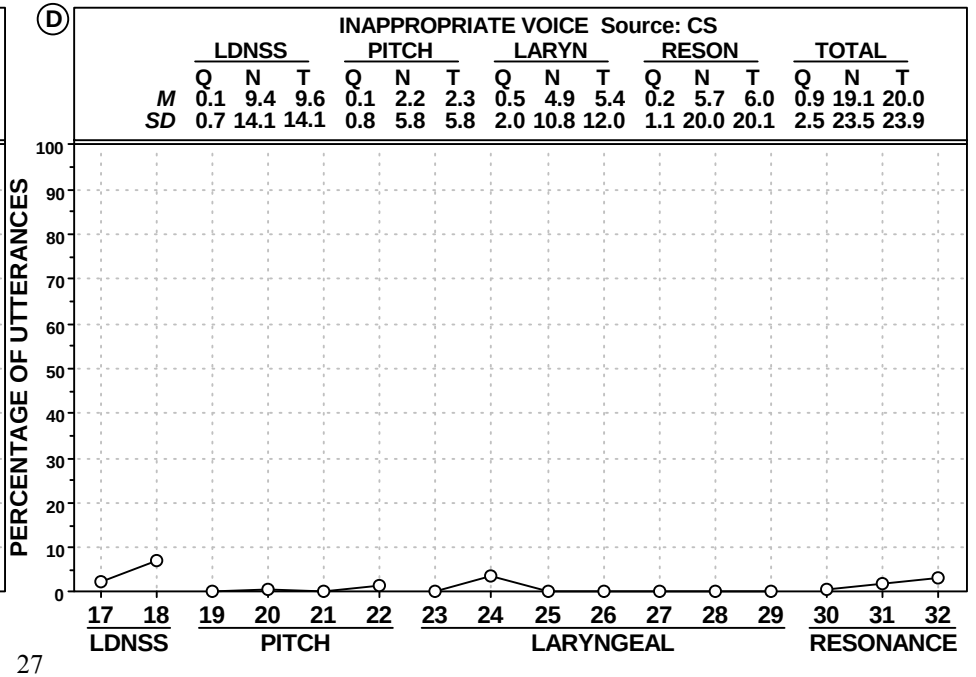

C
INAPPROPRIATE PROSODY Source: CS
PHRASING
RATE
STRESS
TOTAL
Q N T Q N T Q N T Q N T
M 0.0 7.2 7.2 0.1 4.0 4.0 1.7 5.4 7.2 1.8 15.4 16.9
SD 0.0 6.7 6.7 0.5 11.0 11.2 3.0 8.7 9.2 3.0 13.4 13.6
PERCENTAGE OF UTTERANCES
PHRASING
RATE
STRESS


D
INAPPROPRIATE VOICE Source: CS
LDNSS
PITCH
LARYN
RESON
TOTAL
Q N T Q N T Q N T Q N T Q N T
M 0.1 8.2 8.3 0.1 2.1 2.2 0.4 3.3 3.8 0.2 8.3 8.5 0.8 18.0 18.9
SD 0.5 16.2 16.3 1.0 6.8 6.8 1.5 6.8 7.1 0.9 24.9 24.8 2.0 27.1 26.9
PERCENTAGE OF UTTERANCES
LDNSS
PITCH
LARYNGEAL
RESONANCE


A
PROSODY-VOICE SUMMARY Source: CS
APPROP PROSODY
APPROPRIATE VOICE
APPR
PHRAS RATE STRESS LDNSS PITCH QUAL LARYN RESON UTTS
M 91.9 97.0 93.5 90.6 97.8 89.5 95.1 94.3 68.4
SD 7.6 9.4 8.4 14.1 5.8 22.2 10.8 20.0 21.6
PERCENTAGE OF UTTERANCES
PHRASING RATE STRESS LDNSS PITCH QUALITY LARYN RESON
PROSODY
VOICE
QUALITY


B
SAMPLE INFORMATION AND EXCLUSION CODES Source: CS
NO. OF UTTS
%RESP
%DIFF
% EXCLUSION CODES
EXCLD CODED INVOLV JUDGE CONT ENVIR RGSTR STATE TOTAL
M 20.0 23.9 0.0 32.7 35.1 5.1 1.5 0.2 41.6
SD 12.7 1.1 - - 13.5 6.6 3.8 1.2 15.2
PERCENTAGE OF UTTERANCES
CONTENT/CONTEXT
ENVIR
REGISTER
STATE


C
INAPPROPRIATE PROSODY Source: CS
PHRASING
RATE
STRESS
TOTAL
Q N T Q N T Q N T Q N T
M 0.0 8.1 8.1 0.0 3.0 3.1 1.7 6.5 8.2 1.7 16.7 18.1
SD 0.0 7.6 7.6 0.4 9.4 9.6 3.2 8.4 9.3 3.2 12.5 13.0
PERCENTAGE OF UTTERANCES
PHRASING
RATE
STRESS


D
INAPPROPRIATE VOICE Source: CS
LDNSS
PITCH
LARYN
RESON
TOTAL
Q N T Q N T Q N T Q N T Q N T
M 0.1 9.4 9.6 0.1 2.2 2.3 0.5 4.9 5.4 0.2 5.7 6.0 0.9 19.1 20.0
SD 0.7 14.1 14.1 0.8 5.8 5.8 2.0 10.8 12.0 1.1 20.0 20.1 2.5 23.5 23.9
PERCENTAGE OF UTTERANCES
LDNSS
PITCH
LARYNGEAL
RESONANCE

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| **Vowels** | | | | | |
| | **1** | **Decreased Percent vowels correct** | **14/43** | **32.6** | **SI** |
| | **2** | **Decreased Percent vowels correct non-rhotic** | **22/43** | **51.2** | **SF** |
| | **3** | **Decreased Percent vowels correct revised** | **22/43** | **51.2** | **SF** |
| **Consonants** | | | | | |
| | **4** | **Decreased Percent consonants correct** | **16/43** | **37.2** | **SI** |
| | **5** | **Decreased Percent consonants correct - early** | **17/43** | **39.5** | **SI** |
| | **6** | **Decreased Percent consonants correct - middle** | **16/43** | **37.2** | **SI** |
| | **7** | **Decreased Percent consonants correct - late** | **16/43** | **37.2** | **SI** |
| | **8** | **Decreased Percent consonants correct adjusted** | **21/43** | **48.8** | **SF** |
| | **9** | **Decreased Percent consonants correct revised** | **22/43** | **51.2** | **SF** |
| | **10** | **Decreased Percent consonants correct revised - early** | **16/43** | **37.2** | **SI** |
| | **11** | **Decreased Percent consonants correct revised - middle** | **17/43** | **39.5** | **SI** |
| | **12** | **Decreased Percent consonants correct revised - late** | **24/43** | **55.8** | **SF** |
| | **13** | **Decreased Percent consonants in the inventory** | **8/43** | **18.6** | **I** |
| | **14** | **Decreased Percent consonants in the inventory - early** | **1/43** | **2.3** | **I** |
| | **15** | **Decreased Percent consonants in the inventory - middle** | **12/43** | **27.9** | **SI** |
| | **16** | **Decreased Percent consonants in the inventory - late** | **9/43** | **20.9** | **SI** |
| | **17** | **Increased Absolute omission index** | **29/43** | **67.4** | **F** |
| | **18** | **Increased Absolute omission index - early** | **20/43** | **46.5** | **SF** |
| | **19** | **Increased Absolute omission index - middle** | **17/43** | **39.5** | **SI** |
| | **20** | **Increased Absolute omission index - late** | **25/43** | **58.1** | **SF** |
| | **21** | **Increased Absolute substitution index** | **18/43** | **41.9** | **SF** |
| | **22** | **Increased Absolute substitution index - early** | **10/43** | **23.3** | **SI** |
| | **23** | **Increased Absolute substitution index - middle** | **18/43** | **41.9** | **SF** |
| | **24** | **Increased Absolute substitution index - late** | **19/43** | **44.2** | **SF** |
| | **25** | **Increased Absolute distortion index** | **11/43** | **25.6** | **SI** |
| | **26** | **Increased Absolute distortion index - early** | **7/43** | **16.3** | **I** |
| | **27** | **Increased Absolute distortion index - middle** | **3/43** | **7.0** | **I** |
| | **28** | **Increased Absolute distortion index - late** | **10/43** | **23.3** | **SI** |
| **Vowels and Consonants** | | | | | |
| | **29** | **Decreased Intelligibility index** | **31/43** | **72.1** | **F** |
| | **30** | **Decreased Percentage of phonemes correct** | **18/43** | **41.9** | **SF** |
| | **31** | **Decreased Percentage of phonemes correct revised** | **22/43** | **51.2** | **SF** |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **5/43** | **11.6** | **I** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **3/43** | **7.0** | **I** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **3/43** | **7.0** | **I** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **11/43** | **25.6** | **SI** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **2/43** | **4.7** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **4/43** | **9.3** | **I** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **0/43** | **0.0** | **I** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **43** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **67.0** | | **Frequent (F): 60.0-79.9%** | **2** |
| **Standard Deviation** | **24.7** | | **Somewhat Frequent (SF): 40.0-59.9%** | **12** |
| **Range** | **28.9 - 100.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **14** |
| | | | **Infrequent (I): 0.0-19.9%** | **10** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**16p: Older Group**

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| **Vowels** | | | | | |
| | **1** | **Decreased Percent vowels correct** | **35/65** | **53.8** | **SF** |
| | **2** | **Decreased Percent vowels correct non-rhotic** | **28/65** | **43.1** | **SF** |
| | **3** | **Decreased Percent vowels correct revised** | **34/65** | **52.3** | **SF** |
| **Consonants** | | | | | |
| | **4** | **Decreased Percent consonants correct** | **31/65** | **47.7** | **SF** |
| | **5** | **Decreased Percent consonants correct - early** | **24/65** | **36.9** | **SI** |
| | **6** | **Decreased Percent consonants correct - middle** | **32/65** | **49.2** | **SF** |
| | **7** | **Decreased Percent consonants correct - late** | **26/65** | **40.0** | **SF** |
| | **8** | **Decreased Percent consonants correct adjusted** | **31/65** | **47.7** | **SF** |
| | **9** | **Decreased Percent consonants correct revised** | **31/65** | **47.7** | **SF** |
| | **10** | **Decreased Percent consonants correct revised - early** | **25/65** | **38.5** | **SI** |
| | **11** | **Decreased Percent consonants correct revised - middle** | **31/65** | **47.7** | **SF** |
| | **12** | **Decreased Percent consonants correct revised - late** | **28/65** | **43.1** | **SF** |
| | **13** | **Decreased Percent consonants in the inventory** | **16/65** | **24.6** | **SI** |
| | **14** | **Decreased Percent consonants in the inventory - early** | **1/65** | **1.5** | **I** |
| | **15** | **Decreased Percent consonants in the inventory - middle** | **10/65** | **15.4** | **I** |
| | **16** | **Decreased Percent consonants in the inventory - late** | **8/65** | **12.3** | **I** |
| | **17** | **Increased Absolute omission index** | **36/65** | **55.4** | **SF** |
| | **18** | **Increased Absolute omission index - early** | **27/65** | **41.5** | **SF** |
| | **19** | **Increased Absolute omission index - middle** | **25/65** | **38.5** | **SI** |
| | **20** | **Increased Absolute omission index - late** | **30/65** | **46.2** | **SF** |
| | **21** | **Increased Absolute substitution index** | **25/65** | **38.5** | **SI** |
| | **22** | **Increased Absolute substitution index - early** | **15/65** | **23.1** | **SI** |
| | **23** | **Increased Absolute substitution index - middle** | **25/65** | **38.5** | **SI** |
| | **24** | **Increased Absolute substitution index - late** | **24/65** | **36.9** | **SI** |
| | **25** | **Increased Absolute distortion index** | **22/65** | **33.8** | **SI** |
| | **26** | **Increased Absolute distortion index - early** | **2/65** | **3.1** | **I** |
| | **27** | **Increased Absolute distortion index - middle** | **4/65** | **6.2** | **I** |
| | **28** | **Increased Absolute distortion index - late** | **21/65** | **32.3** | **SI** |
| **Vowels and Consonants** | | | | | |
| | **29** | **Decreased Intelligibility index** | **43/65** | **66.2** | **F** |
| | **30** | **Decreased Percentage of phonemes correct** | **34/65** | **52.3** | **SF** |
| | **31** | **Decreased Percentage of phonemes correct revised** | **37/65** | **56.9** | **SF** |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **3/65** | **4.6** | **I** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **13/65** | **20.0** | **SI** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **9/65** | **13.8** | **I** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **32/65** | **49.2** | **SF** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **5/65** | **7.7** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **4/65** | **6.2** | **I** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **6/65** | **9.2** | **I** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **65** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **66.3** | | **Frequent (F): 60.0-79.9%** | **1** |
| **Standard Deviation** | **24.2** | | **Somewhat Frequent (SF): 40.0-59.9%** | **16** |
| **Range** | **15.8 - 100.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **11** |
| | | | **Infrequent (I): 0.0-19.9%** | **10** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| Vowels | | | | | |
| | 1 | Decreased Percent vowels correct | 49/108 | 45.4 | SF |
| | 2 | Decreased Percent vowels correct non-rhotic | 50/108 | 46.3 | SF |
| | 3 | Decreased Percent vowels correct revised | 56/108 | 51.9 | SF |
| Consonants | | | | | |
| | 4 | Decreased Percent consonants correct | 47/108 | 43.5 | SF |
| | 5 | Decreased Percent consonants correct - early | 41/108 | 38.0 | SI |
| | 6 | Decreased Percent consonants correct - middle | 48/108 | 44.4 | SF |
| | 7 | Decreased Percent consonants correct - late | 42/108 | 38.9 | SI |
| | 8 | Decreased Percent consonants correct adjusted | 52/108 | 48.1 | SF |
| | 9 | Decreased Percent consonants correct revised | 53/108 | 49.1 | SF |
| | 10 | Decreased Percent consonants correct revised - early | 41/108 | 38.0 | SI |
| | 11 | Decreased Percent consonants correct revised - middle | 48/108 | 44.4 | SF |
| | 12 | Decreased Percent consonants correct revised - late | 52/108 | 48.1 | SF |
| | 13 | Decreased Percent consonants in the inventory | 24/108 | 22.2 | SI |
| | 14 | Decreased Percent consonants in the inventory - early | 2/108 | 1.9 | I |
| | 15 | Decreased Percent consonants in the inventory - middle | 22/108 | 20.4 | SI |
| | 16 | Decreased Percent consonants in the inventory - late | 17/108 | 15.7 | I |
| | 17 | Increased Absolute omission index | 65/108 | 60.2 | F |
| | 18 | Increased Absolute omission index - early | 47/108 | 43.5 | SF |
| | 19 | Increased Absolute omission index - middle | 42/108 | 38.9 | SI |
| | 20 | Increased Absolute omission index - late | 55/108 | 50.9 | SF |
| | 21 | Increased Absolute substitution index | 43/108 | 39.8 | SI |
| | 22 | Increased Absolute substitution index - early | 25/108 | 23.1 | SI |
| | 23 | Increased Absolute substitution index - middle | 43/108 | 39.8 | SI |
| | 24 | Increased Absolute substitution index - late | 43/108 | 39.8 | SI |
| | 25 | Increased Absolute distortion index | 33/108 | 30.6 | SI |
| | 26 | Increased Absolute distortion index - early | 9/108 | 8.3 | I |
| | 27 | Increased Absolute distortion index - middle | 7/108 | 6.5 | I |
| | 28 | Increased Absolute distortion index - late | 31/108 | 28.7 | SI |
| Vowels and Consonants | | | | | |
| | 29 | Decreased Intelligibility index | 74/108 | 68.5 | F |
| | 30 | Decreased Percentage of phonemes correct | 52/108 | 48.1 | SF |
| | 31 | Decreased Percentage of phonemes correct revised | 59/108 | 54.6 | SF |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **8/108** | **7.4** | **I** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **16/108** | **14.8** | **I** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **12/108** | **11.1** | **I** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **43/108** | **39.8** | **SI** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **7/108** | **6.5** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **8/108** | **7.4** | **I** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **6/108** | **5.6** | **I** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **108** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **66.6** | | **Frequent (F): 60.0-79.9%** | **2** |
| **Standard Deviation** | **24.3** | | **Somewhat Frequent (SF): 40.0-59.9%** | **13** |
| **Range** | **15.8 - 100.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **13** |
| | | | **Infrequent (I): 0.0-19.9%** | **10** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 43 | 94.6 | -2.80 | 5.4 | 2.24 | 75.1 | -5.00 | 100.0 | 0.89 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | 41 | 95.3 | 0 | 0.0 | 2 | 4.7 | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 43 | 89.9 | -1.37 | 6.6 | 1.81 | 74.8 | -5.00 | 99.5 | 1.14 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 43 | 67.0 | | 24.7 | | 28.9 | | 100.0 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 43 | 16.3 |
| Rate | | 43 | 4.7 |
| Stress | | 43 | 7.0 |
| Loudness | | 43 | 25.6 |
| Pitch | | 43 | 0.0 |
| Laryngeal Quality | | 43 | 14.0 |
| Resonance Quality | | 43 | 2.3 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | | | | | | | | | |
| Encoding | | | | | | | | | | |
| Memory | | | | | | | | | | |
| Transcoding | | | | | | | | | | |

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 65 | 98.2 | -2.75 | 2.1 | 2.18 | 87.1 | -5.00 | 100.0 | 0.90 |

| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | n | % | n | % | n | % | |
| | | | 65 | 100.0 | 0 | 0.0 | 0 | 0.0 | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 65 | 96.3 | -1.86 | 6.4 | 2.34 | 61.4 | -5.00 | 100.0 | 1.28 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 65 | 66.3 | | 24.2 | | 15.8 | | 100.0 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 65 | 7.7 |
| Rate | | 65 | 6.2 |
| Stress | | 65 | 6.2 |
| Loudness | | 65 | 7.7 |
| Pitch | | 65 | 3.1 |
| Laryngeal Quality | | 65 | 3.1 |
| Resonance Quality | | 65 | 10.8 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | | | | | | | | | |
| Encoding | | | | | | | | | | |
| Memory | | | | | | | | | | |
| Transcoding | | | | | | | | | | |

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 108 | 96.8 | -2.77 | 4.2 | 2.20 | 75.1 | -5.00 | 100.0 | 0.90 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | | | | | | | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 108 | 93.7 | -1.66 | 7.2 | 2.15 | 61.4 | -5.00 | 100.0 | 1.28 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 108 | 66.6 | | 24.3 | | 15.8 | | 100.0 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | | |
| Rate | | | |
| Stress | | | |
| Loudness | | | |
| Pitch | | | |
| Laryngeal Quality | | | |
| Resonance Quality | | | |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | | | | | | | | | |
| Encoding | | | | | | | | | | |
| Memory | | | | | | | | | | |
| Transcoding | | | | | | | | | | |

## MOTOR SPEECH MEASURES AND SUMMARIES:

## 16p11.2 Deletion and Duplication Syndrome (16p)

**16p: Younger Group**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| **Vowels** | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 2/37 | 5.4 | I |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 6/36 | 16.7 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 3/37 | 8.1 | I |
| | 4 | Increased Duration of Corner Vowels | | X | 11/43 | 25.6 | SI |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 18/43 | 41.9 | SF |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 4/9 | 44.4 | SF |
| | 7 | Reduced % Vowel Target Consistency | X | | 3/10 | 30.0 | SI |
| **Consonants** | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 13/43 | 30.2 | SI |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/42 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 5/41 | 12.2 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 0/38 | 0.0 | I |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 12/36 | 33.3 | SI |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 12/36 | 33.3 | SI |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 11/42 | 26.2 | SI |
| | 15 | Increased All Consonant-Consonant Duration | | X | 8/41 | 19.5 | I |
| **Vowels and Consonants** | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 9/43 | 20.9 | SI |
| | 17 | Increased DMI Class: Duration % | X | | 3/43 | 7.0 | I |
| | 18 | Increased % of Epenthesis Errors | X | | 7/43 | 16.3 | I |
| **Phrasing** | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 14/43 | 32.6 | SI |
| **Rate** | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 13/43 | 30.2 | SI |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 12/43 | 27.9 | SI |
| **Stress** | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 7/43 | 16.3 | I |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 5/35 | 14.3 | I |
| **Loudness** | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 9/42 | 21.4 | SI |
| **Pitch** | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 0/43 | 0.0 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 0/43 | 0.0 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **13/43** | **30.2** | **SI** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **24/43** | **55.8** | **SF** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **39/43** | **90.7** | **VF** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **0/43** | **0.0** | **I** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **13/42** | **31.0** | **SI** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **7/43** | **16.3** | **I** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **43** | | **Very Frequent (VF): 80.0-100%** | **1** |
| **Mean** | **77.2** | | **Frequent (F): 60.0-79.9%** | **0** |
| **Standard Deviation** | **11.0** | | **Somewhat Frequent (SF): 40.0-59.9%** | **3** |
| **Range** | **51.9 - 100.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **13** |
| | | | **Infrequent (I): 0.0-19.9%** | **15** |
| | | | **Not Used** | **0** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**16p: Older Group**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| Vowels | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 17/58 | 29.3 | SI |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 11/57 | 19.3 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 16/58 | 27.6 | SI |
| | 4 | Increased Duration of Corner Vowels | | X | 19/65 | 29.2 | SI |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 25/65 | 38.5 | SI |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 0/0 | | |
| | 7 | Reduced % Vowel Target Consistency | X | | 0/0 | | |
| Consonants | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 10/65 | 15.4 | I |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/34 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 0/33 | 0.0 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 2/33 | 6.1 | I |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 17/61 | 27.9 | SI |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 26/61 | 42.6 | SF |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 30/64 | 46.9 | SF |
| | 15 | Increased All Consonant-Consonant Duration | | X | 10/63 | 15.9 | I |
| Vowels and Consonants | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 30/65 | 46.2 | SF |
| | 17 | Increased DMI Class: Duration % | X | | 6/65 | 9.2 | I |
| | 18 | Increased % of Epenthesis Errors | X | | 27/65 | 41.5 | SF |
| Phrasing | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 16/65 | 24.6 | SI |
| Rate | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 23/65 | 35.4 | SI |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 21/65 | 32.3 | SI |
| Stress | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 9/65 | 13.8 | I |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 8/39 | 20.5 | SI |
| Loudness | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 24/65 | 36.9 | SI |
| Pitch | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 0/65 | 0.0 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 1/65 | 1.5 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **11/65** | **16.9** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **33/65** | **50.8** | **SF** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **46/65** | **70.8** | **F** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **7/65** | **10.8** | **I** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **19/65** | **29.2** | **SI** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **13/65** | **20.0** | **SI** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **65** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **73.6** | | **Frequent (F): 60.0-79.9%** | **1** |
| **Standard Deviation** | **11.3** | | **Somewhat Frequent (SF): 40.0-59.9%** | **5** |
| **Range** | **42.3 - 92.3** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **12** |
| | | | **Infrequent (I): 0.0-19.9%** | **12** |
| | | | **Not Used** | **2** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| **Vowels** | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 19/95 | 20.0 | SI |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 17/93 | 18.3 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 19/95 | 20.0 | SI |
| | 4 | Increased Duration of Corner Vowels | | X | 30/108 | 27.8 | SI |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 43/108 | 39.8 | SI |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 4/9 | 44.4 | SF |
| | 7 | Reduced % Vowel Target Consistency | X | | 3/10 | 30.0 | SI |
| **Consonants** | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 23/108 | 21.3 | SI |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/76 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 5/74 | 6.8 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 2/71 | 2.8 | I |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 29/97 | 29.9 | SI |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 38/97 | 39.2 | SI |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 41/106 | 38.7 | SI |
| | 15 | Increased All Consonant-Consonant Duration | | X | 18/104 | 17.3 | I |
| **Vowels and Consonants** | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 39/108 | 36.1 | SI |
| | 17 | Increased DMI Class: Duration % | X | | 9/108 | 8.3 | I |
| | 18 | Increased % of Epenthesis Errors | X | | 34/108 | 31.5 | SI |
| **Phrasing** | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 30/108 | 27.8 | SI |
| **Rate** | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 36/108 | 33.3 | SI |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 33/108 | 30.6 | SI |
| **Stress** | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 16/108 | 14.8 | I |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 13/74 | 17.6 | I |
| **Loudness** | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 33/107 | 30.8 | SI |
| **Pitch** | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 0/108 | 0.0 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 1/108 | 0.9 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **24/108** | **22.2** | **SI** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **57/108** | **52.8** | **SF** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **85/108** | **78.7** | **F** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **7/108** | **6.5** | **I** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **32/107** | **29.9** | **SI** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **20/108** | **18.5** | **I** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **108** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **75.1** | | **Frequent (F): 60.0-79.9%** | **1** |
| **Standard Deviation** | **11.3** | | **Somewhat Frequent (SF): 40.0-59.9%** | **2** |
| **Range** | **42.3 - 100.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **17** |
| | | | **Infrequent (I): 0.0-19.9%** | **12** |
| | | | **Not Used** | **0** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**16p: Younger Group**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **5** | **11.6** | **I** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **6** | **14.0** | **I** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **4** | **9.3** | **I** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **1** | **2.3** | **I** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **1** | **2.3** | **I** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **5** | **11.6** | **I** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **6** | **14.0** | **I** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **3** | **7.0** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **4** | **9.3** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **2** | **4.7** | **I** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **0** | **0.0** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **8** | **18.6** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **4** | **9.3** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **0** | **0.0** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **6** | **14.0** | **I** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **2** | **4.7** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **16** | **37.2** | **SI** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **2** | **4.7** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **3** | **7.0** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **2** | **4.7** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **0** | **0.0** | **I** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **1** | **2.3** | **I** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **1** | **2.3** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **11** | **25.6** | **SI** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **20** | **46.5** | **SF** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **1** | **2.3** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **7** | **16.7** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **43** |
| **Mean Percentage Score** | **91.7** |
| **Standard Deviation** | **5.9** |
| **Range** | **79.4 - 100.0** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **85.6** | **94.8** | **93.3** | **94.3** | **94.3** |
| **Mean DSI Percentile Score** | **68.3** | **73.9** | **76.0** | **65.5** | **66.6** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **2.3** | **0.0** | **0.0** | **0.0** | **0.0** |

**16p: Older Group**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **13** | **20.0** | **SI** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **6** | **9.2** | **I** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **5** | **7.7** | **I** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **1** | **1.5** | **I** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **2** | **3.1** | **I** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **12** | **18.5** | **I** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **16** | **24.6** | **SI** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **11** | **16.9** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **3** | **4.6** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **6** | **9.2** | **I** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **1** | **1.5** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **17** | **27.4** | **SI** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **1** | **1.6** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **11** | **16.9** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **24** | **36.9** | **SI** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **1** | **1.5** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **3** | **4.6** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **1** | **1.5** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **16** | **24.6** | **SI** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **2** | **3.1** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **2** | **3.1** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **1** | **1.5** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **0** | **0.0** | **I** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **4** | **6.2** | **I** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **0** | **0.0** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **9** | **13.8** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **3** | **4.6** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **28** | **43.1** | **SF** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **2** | **3.1** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **15** | **23.1** | **SI** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **65** |
| **Mean Percentage Score** | **90.2** |
| **Standard Deviation** | **5.5** |
| **Range** | **67.6 - 100.0** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **83.2** | **93.0** | **91.0** | **89.8** | **91.7** |
| **Mean DSI Percentile Score** | **64.0** | **69.9** | **70.2** | **52.9** | **57.4** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **1.5** | **0.0** | **0.0** | **7.7** | **7.7** |

**16p: Combined**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **18** | **16.7** | **I** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **12** | **11.1** | **I** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **9** | **8.3** | **I** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **2** | **1.9** | **I** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **3** | **2.8** | **I** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **17** | **15.7** | **I** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **22** | **20.4** | **SI** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **14** | **13.0** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **7** | **6.5** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **8** | **7.4** | **I** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **1** | **0.9** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **25** | **23.8** | **SI** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **5** | **4.8** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **11** | **10.2** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **30** | **27.8** | **SI** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **1** | **0.9** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **5** | **4.6** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **1** | **0.9** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **32** | **29.6** | **SI** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **4** | **3.7** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **5** | **4.6** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **3** | **2.8** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **0** | **0.0** | **I** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **5** | **4.6** | **I** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **1** | **0.9** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **20** | **18.5** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **3** | **2.8** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **48** | **44.4** | **SF** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **3** | **2.8** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **22** | **20.6** | **SI** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **108** |
| **Mean Percentage Score** | **90.8** |
| **Standard Deviation** | **5.7** |
| **Range** | **67.6 - 100.0** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **84.1** | **93.8** | **91.9** | **91.6** | **92.7** |
| **Mean DSI Percentile Score** | **65.7** | **71.5** | **72.5** | **57.9** | **61.1** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **1.9** | **0.0** | **0.0** | **4.6** | **4.6** |

**16p: Younger Group**

**Pause Marker Summary (PMS): Group**

**Group: 1 *n*: 43**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 43 | 100.0 | Abrupt | 43 | 0.1 | Long | 43 | 0.4 |
| PM+ | 0 | 0.0 | 0 | 0.0 | Code 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | Mild-Moderate | 0 | 0.0 | Alone | 43 | 0.7 | Repeat/Revise | 43 | 0.4 |
| PM- | 42 | 97.7 | 43 | 100.0 | Code 0 | 1 | 100.0 | 1 | 100.0 | 0 | 0.0 | Moderate-Severe | 0 | 0.0 | Change | 43 | 0.1 | Breath | 43 | 0.3 |
| ?[a] | 1 | 2.3 | 0 | 0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 43 | 0.1 | Addition | 43 | 0.0 |

[a] **? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)**

[b] **Mild = ≥90.0**
**Mild-Moderate = 85.0-89.9**
**Moderate-Severe = 80.0-84.9**
**Severe = <80.0**

## 16p: Older Group

### Pause Marker Summary (PMS): Group

**Group: 2 *n*: 65**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 64 | 98.5 | Abrupt | 65 | 0.2 | Long | 65 | 0.3 |
| PM+ | 1 | 1.5 | 2 | 3.1 | Code 1 | 1 | 100.0 | 1 | 100.0 | 0 | 0.0 | Mild-Moderate | 1 | 1.5 | Alone | 65 | 0.4 | Repeat/Revise | 65 | 0.1 |
| PM- | 63 | 96.9 | 63 | 96.9 | Code 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | Moderate-Severe | 0 | 0.0 | Change | 65 | 0.1 | Breath | 65 | 0.4 |
| ?[a] | 1 | 1.5 | 0 | 0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 65 | 0.1 | Addition | 65 | 0.0 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

**16p: Combined**

**Pause Marker Summary (PMS): Group**

**Group: All *n*: 108**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 107 | 99.1 | Abrupt | 108 | 0.2 | Long | 108 | 0.3 |
| PM+ | 1 | 0.9 | 2 | 1.9 | Code 1 | 1 | 50.0 | 1 | 50.0 | 0 | 0.0 | Mild-Moderate | 1 | 0.9 | Alone | 108 | 0.5 | Repeat/Revise | 108 | 0.2 |
| PM- | 105 | 97.2 | 106 | 98.1 | Code 0 | 1 | 50.0 | 1 | 50.0 | 0 | 0.0 | Moderate-Severe | 0 | 0.0 | Change | 108 | 0.1 | Breath | 108 | 0.3 |
| ?[a] | 2 | 1.9 | 0 | 0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 108 | 0.1 | Addition | 108 | 0.0 |

[a] **? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)**

[b] **Mild = ≥90.0**
**Mild-Moderate = 85.0-89.9**
**Moderate-Severe = 80.0-84.9**
**Severe = <80.0**

**SUMMARY SPEECH AND MOTOR SPEECH CLASSIFICATIONS:**

**16p11.2 Deletion and Duplication Syndrome (16p)**

**16p: Younger Group**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Speech Classification | | Motor Speech Classification | | | | | | Totals | |
| | | No Motor Speech Disorder (NO MSD) | Speech Motor Delay (SMD) | Childhood Dysarthria (CD) | Childhood Apraxia of Speech (CAS) | Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS) | | n | % |
| Normal(ized) Speech Aquisition (NSA)[a] | | 22 | 3 | 0 | 0 | 0 | | 25 | 58.1 |
| Speech Errors (SE) | | 2 | 1 | 0 | 0 | 0 | | 3 | 7.0 |
| Persistent Speech Errors (PSE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| (SE/PSE) | | 2 | 1 | 0 | 0 | 0 | | 3 | 7.0 |
| Speech Delay (SD) | | 9 | 6 | 0 | 0 | 0 | | 15 | 34.9 |
| Persistent Speech Delay (PSD) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| (SD/PSD) | | 9 | 6 | 0 | 0 | 0 | | 15 | 34.9 |
| | | | | | | | | | |
| Totals | n | 33 | 10 | 0 | 0 | 0 | | 43 | |
| | % | 76.7 | 23.3 | 0.0 | 0.0 | 0.0 | | | 100.0 |

[a] Includes children younger than 9 years old with age-appropriate distortions

**16p: Older Group**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Speech Classification** | | **Motor Speech Classification** | | | | | | **Totals** | |
| | | **No Motor Speech Disorder (NO MSD)** | **Speech Motor Delay (SMD)** | **Childhood Dysarthria (CD)** | **Childhood Apraxia of Speech (CAS)** | **Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS)** | | **n** | **%** |
| **Normal(ized) Speech Aquisition (NSA)[a]** | | **34** | **13** | **0** | **1** | **0** | | **48** | **73.8** |
| **Speech Errors (SE)** | | **0** | **0** | **0** | **0** | **0** | | **0** | **0.0** |
| **Persistent Speech Errors (PSE)** | | **5** | **5** | **2** | **0** | **0** | | **12** | **18.5** |
| **(SE/PSE)** | | **5** | **5** | **2** | **0** | **0** | | **12** | **18.5** |
| **Speech Delay (SD)** | | **0** | **0** | **0** | **0** | **0** | | **0** | **0.0** |
| **Persistent Speech Delay (PSD)** | | **2** | **2** | **0** | **1** | **0** | | **5** | **7.7** |
| **(SD/PSD)** | | **2** | **2** | **0** | **1** | **0** | | **5** | **7.7** |
| | | | | | | | | | |
| **Totals** | **n** | **41** | **20** | **2** | **2** | **0** | | **65** | |
| | **%** | **63.1** | **30.8** | **3.1** | **3.1** | **0.0** | | | **100.0** |

**[a] Includes children younger than 9 years old with age-appropriate distortions**

**16p: Combined**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Speech Classification | | Motor Speech Classification | | | | | Totals | |
| | | No Motor Speech Disorder (NO MSD) | Speech Motor Delay (SMD) | Childhood Dysarthria (CD) | Childhood Apraxia of Speech (CAS) | Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS) | n | % |
| Normal(ized) Speech Aquisition (NSA)[a] | | 56 | 16 | 0 | 1 | 0 | 73 | 67.6 |
| Speech Errors (SE) | | 2 | 1 | 0 | 0 | 0 | 3 | 2.8 |
| Persistent Speech Errors (PSE) | | 5 | 5 | 2 | 0 | 0 | 12 | 11.1 |
| (SE/PSE) | | 7 | 6 | 2 | 0 | 0 | 15 | 13.9 |
| Speech Delay (SD) | | 9 | 6 | 0 | 0 | 0 | 15 | 13.9 |
| Persistent Speech Delay (PSD) | | 2 | 2 | 0 | 1 | 0 | 5 | 4.6 |
| (SD/PSD) | | 11 | 8 | 0 | 1 | 0 | 20 | 18.5 |
| | | | | | | | | |
| Totals | n | 74 | 30 | 2 | 2 | 0 | 108 | |
| | % | 68.5 | 27.8 | 1.9 | 1.9 | 0.0 | | 100.0 |

[a] Includes children younger than 9 years old with age-appropriate distortions

**SPEECH MEASURES AND SUMMARIES:**

**22q11.2 Deletion Syndrome (22q)**

## PERCENTAGE CONSONANTS CORRECT (PCC)

22q: Younger Group

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 55 | 1 | 31 | 0 | 41 | 3 | 127 | 131 | 6.32 | 96.95 |
| | n | 62 | 0 | 33 | 3 | 212 | 6 | 307 | 316 | 15.24 | 97.15 |
| | ŋ | 0 | 0 | 3 | 0 | 19 | 0 | 22 | 22 | 1.06 | 100.00 |
| Glides | w | 71 | 9 | 4 | 0 | 0 | 0 | 75 | 84 | 4.05 | 89.29 |
| | j | 27 | 5 | 0 | 0 | 0 | 0 | 27 | 32 | 1.54 | 84.38 |
| Stops | p | 52 | 1 | 7 | 0 | 11 | 0 | 70 | 71 | 3.42 | 98.59 |
| | b | 55 | 4 | 35 | 1 | 1 | 0 | 91 | 96 | 4.63 | 94.79 |
| | t | 57 | 8 | 42 | 5 | 109 | 30 | 208 | 251 | 12.11 | 82.87 |
| | d | 45 | 10 | 20 | 7 | 44 | 7 | 109 | 133 | 6.42 | 81.95 |
| | k | 43 | 11 | 19 | 4 | 31 | 9 | 93 | 117 | 5.64 | 79.49 |
| | g | 43 | 1 | 3 | 6 | 13 | 1 | 59 | 67 | 3.23 | 88.06 |
| Fricatives and Affricates | f | 23 | 2 | 2 | 0 | 7 | 1 | 32 | 35 | 1.69 | 91.43 |
| | v | 5 | 0 | 4 | 0 | 6 | 1 | 15 | 16 | 0.77 | 93.75 |
| | θ | 1 | 0 | 3 | 0 | 6 | 2 | 10 | 12 | 0.58 | 83.33 |
| | ð | 63 | 17 | 3 | 0 | 0 | 0 | 66 | 83 | 4.00 | 79.52 |
| | s | 32 | 27 | 17 | 10 | 42 | 30 | 91 | 158 | 7.62 | 57.59 |
| | z | 1 | 1 | 4 | 4 | 39 | 45 | 44 | 94 | 4.53 | 46.81 |
| | ʃ | 8 | 1 | 3 | 2 | 5 | 1 | 16 | 20 | 0.96 | 80.00 |
| | ʒ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 | * |
| | h | 31 | 0 | 4 | 0 | 0 | 0 | 35 | 35 | 1.69 | 100.00 |
| | tʃ | 3 | 3 | 1 | 0 | 7 | 6 | 11 | 20 | 0.96 | 55.00 |
| | ʤ | 5 | 5 | 1 | 0 | 2 | 1 | 8 | 14 | 0.68 | 57.14 |
| Liquids | l | 38 | 21 | 31 | 9 | 34 | 16 | 103 | 149 | 7.19 | 69.13 |
| | r | 33 | 16 | 17 | 14 | 23 | 14 | 73 | 117 | 5.64 | 62.39 |
| Percent Correct | | 84.04 | | 81.53 | | 79.03 | | 1692 | 2073 | | |
| | | | | | | | | Correct | Total | | |

| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 1406 | 100.00 |
| "Words" used | 1117 | 79.45 |
| Disregard | 248 | 17.64 |
| Either/Or | 1 | 0.07 |
| Unsure | 16 | 1.14 |
| Unintelligible | 24 | 1.71 |
| INTELLIGIBILITY INDEX | | 96.46 |

**81.62**

Percentage Consonants Correct (PCC)

Severity Adjective

**MILD-MODERATE**

## PERCENTAGE CONSONANTS CORRECT (PCC)

22q: Older Group

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 112 | 1 | 79 | 2 | 85 | 6 | 276 | 285 | 7.73 | 96.84 |
| | n | 112 | 6 | 48 | 16 | 285 | 50 | 445 | 517 | 14.02 | 86.07 |
| | ŋ | 0 | 0 | 3 | 2 | 24 | 3 | 27 | 32 | 0.87 | 84.38 |
| Glides | w | 165 | 16 | 10 | 4 | 0 | 0 | 175 | 195 | 5.29 | 89.74 |
| | j | 64 | 8 | 6 | 7 | 0 | 0 | 70 | 85 | 2.30 | 82.35 |
| Stops | p | 61 | 0 | 14 | 6 | 20 | 0 | 95 | 101 | 2.74 | 94.06 |
| | b | 80 | 2 | 41 | 4 | 4 | 1 | 125 | 132 | 3.58 | 94.70 |
| | t | 106 | 4 | 67 | 18 | 173 | 74 | 346 | 442 | 11.98 | 78.28 |
| | d | 73 | 2 | 21 | 7 | 47 | 21 | 141 | 171 | 4.64 | 82.46 |
| | k | 78 | 1 | 53 | 4 | 103 | 3 | 234 | 242 | 6.56 | 96.69 |
| | g | 66 | 1 | 7 | 1 | 4 | 4 | 77 | 83 | 2.25 | 92.77 |
| Fricatives and Affricates | f | 55 | 1 | 11 | 0 | 25 | 1 | 91 | 93 | 2.52 | 97.85 |
| | v | 9 | 0 | 16 | 0 | 23 | 4 | 48 | 52 | 1.41 | 92.31 |
| | θ | 12 | 3 | 11 | 10 | 12 | 3 | 35 | 51 | 1.38 | 68.63 |
| | ð | 61 | 63 | 5 | 1 | 0 | 0 | 66 | 130 | 3.52 | 50.77 |
| | s | 99 | 37 | 44 | 18 | 78 | 21 | 221 | 297 | 8.05 | 74.41 |
| | z | 1 | 0 | 11 | 3 | 83 | 43 | 95 | 141 | 3.82 | 67.38 |
| | ʃ | 5 | 9 | 5 | 3 | 5 | 0 | 15 | 27 | 0.73 | 55.56 |
| | ʒ | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 0.05 | 50.00 |
| | h | 72 | 0 | 13 | 0 | 0 | 0 | 85 | 85 | 2.30 | 100.00 |
| | tʃ | 1 | 2 | 5 | 0 | 7 | 6 | 13 | 21 | 0.57 | 61.90 |
| | ʤ | 10 | 7 | 1 | 0 | 2 | 2 | 13 | 22 | 0.60 | 59.09 |
| Liquids | l | 83 | 28 | 44 | 15 | 68 | 41 | 195 | 279 | 7.57 | 69.89 |
| | r | 52 | 7 | 36 | 18 | 61 | 29 | 149 | 203 | 5.50 | 73.40 |
| Percent Correct | | 87.43 | | 79.77 | | 78.04 | | 3038 | 3688 | | |
| | | | | | | | | Correct | Total | | |

| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 2583 | 100.00 |
| "Words" used | 1946 | 75.34 |
| Disregard | 429 | 16.61 |
| Either/Or | 3 | 0.12 |
| Unsure | 61 | 2.36 |
| Unintelligible | 144 | 5.57 |
| INTELLIGIBILITY INDEX | | 90.34 |

82.38

Percentage Consonants Correct (PCC)

Severity Adjective

MILD-MODERATE

## PERCENTAGE CONSONANTS CORRECT (PCC)

22q: Combined

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 167 | 2 | 110 | 2 | 126 | 9 | 403 | 416 | 7.22 | 96.88 |
| | n | 174 | 6 | 81 | 19 | 497 | 56 | 752 | 833 | 14.46 | 90.28 |
| | ŋ | 0 | 0 | 6 | 2 | 43 | 3 | 49 | 54 | 0.94 | 90.74 |
| Glides | w | 236 | 25 | 14 | 4 | 0 | 0 | 250 | 279 | 4.84 | 89.61 |
| | j | 91 | 13 | 6 | 7 | 0 | 0 | 97 | 117 | 2.03 | 82.91 |
| Stops | p | 113 | 1 | 21 | 6 | 31 | 0 | 165 | 172 | 2.99 | 95.93 |
| | b | 135 | 6 | 76 | 5 | 5 | 1 | 216 | 228 | 3.96 | 94.74 |
| | t | 163 | 12 | 109 | 23 | 282 | 104 | 554 | 693 | 12.03 | 79.94 |
| | d | 118 | 12 | 41 | 14 | 91 | 28 | 250 | 304 | 5.28 | 82.24 |
| | k | 121 | 12 | 72 | 8 | 134 | 12 | 327 | 359 | 6.23 | 91.09 |
| | g | 109 | 2 | 10 | 7 | 17 | 5 | 136 | 150 | 2.60 | 90.67 |
| Fricatives and Affricates | f | 78 | 3 | 13 | 0 | 32 | 2 | 123 | 128 | 2.22 | 96.09 |
| | v | 14 | 0 | 20 | 0 | 29 | 5 | 63 | 68 | 1.18 | 92.65 |
| | θ | 13 | 3 | 14 | 10 | 18 | 5 | 45 | 63 | 1.09 | 71.43 |
| | ð | 124 | 80 | 8 | 1 | 0 | 0 | 132 | 213 | 3.70 | 61.97 |
| | s | 131 | 64 | 61 | 28 | 120 | 51 | 312 | 455 | 7.90 | 68.57 |
| | z | 2 | 1 | 15 | 7 | 122 | 88 | 139 | 235 | 4.08 | 59.15 |
| | ʃ | 13 | 10 | 8 | 5 | 10 | 1 | 31 | 47 | 0.82 | 65.96 |
| | ʒ | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 0.03 | 50.00 |
| | h | 103 | 0 | 17 | 0 | 0 | 0 | 120 | 120 | 2.08 | 100.00 |
| | tʃ | 4 | 5 | 6 | 0 | 14 | 12 | 24 | 41 | 0.71 | 58.54 |
| | ʤ | 15 | 12 | 2 | 0 | 4 | 3 | 21 | 36 | 0.62 | 58.33 |
| Liquids | l | 121 | 49 | 75 | 24 | 102 | 57 | 298 | 428 | 7.43 | 69.63 |
| | r | 85 | 23 | 53 | 32 | 84 | 43 | 222 | 320 | 5.55 | 69.38 |
| Percent Correct | | 86.20 | | 80.36 | | 78.41 | | 4730 | 5761 | | |
| | | | | | | | | Correct | Total | | |

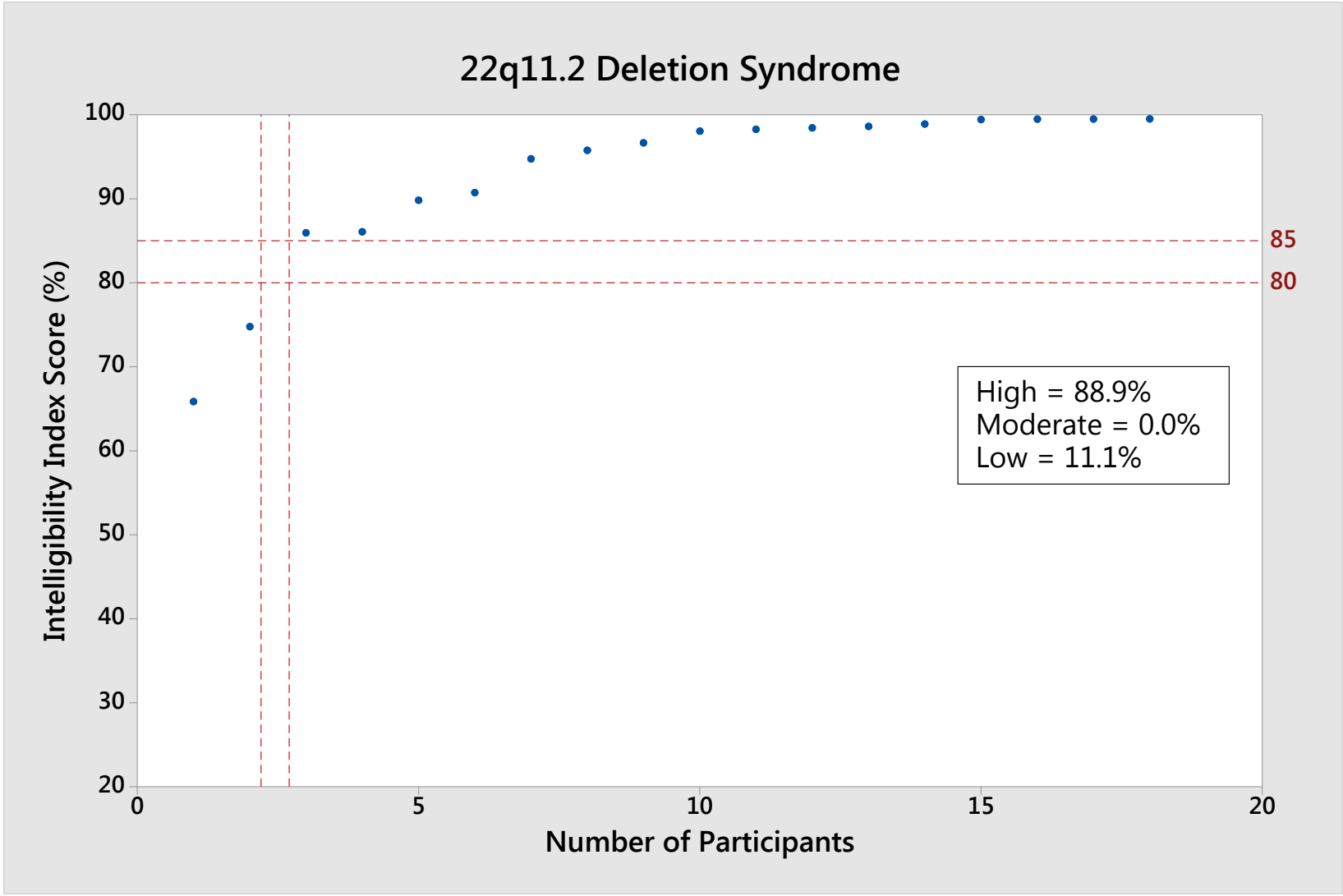
| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 3989 | 100.00 |
| "Words" used | 3063 | 76.79 |
| Disregard | 677 | 16.97 |
| Either/Or | 4 | 0.10 |
| Unsure | 77 | 1.93 |
| Unintelligible | 168 | 4.21 |
| INTELLIGIBILITY INDEX | | 92.48 |

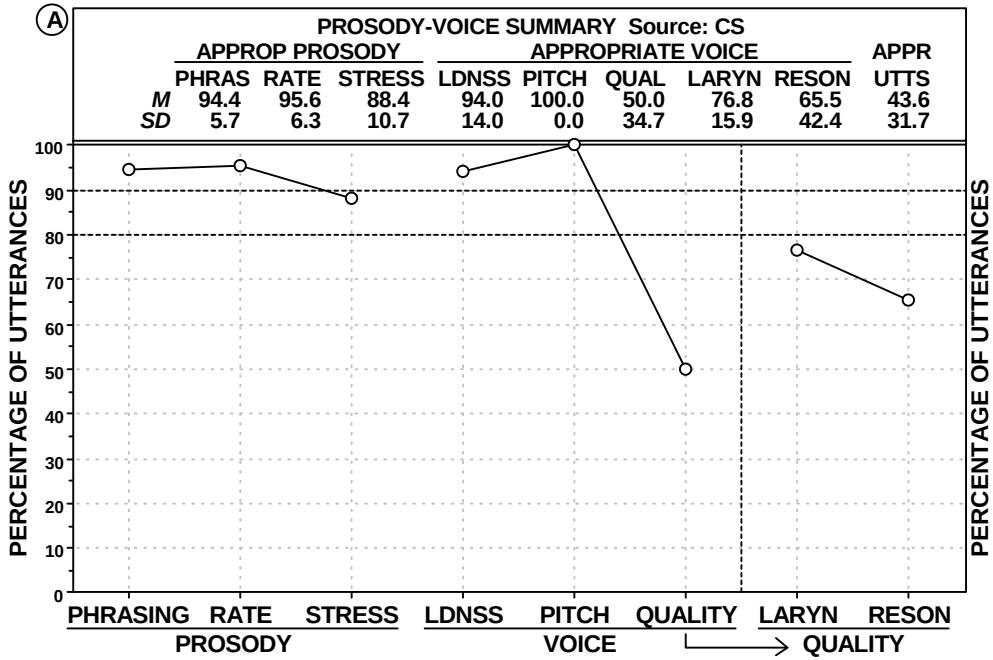
82.10

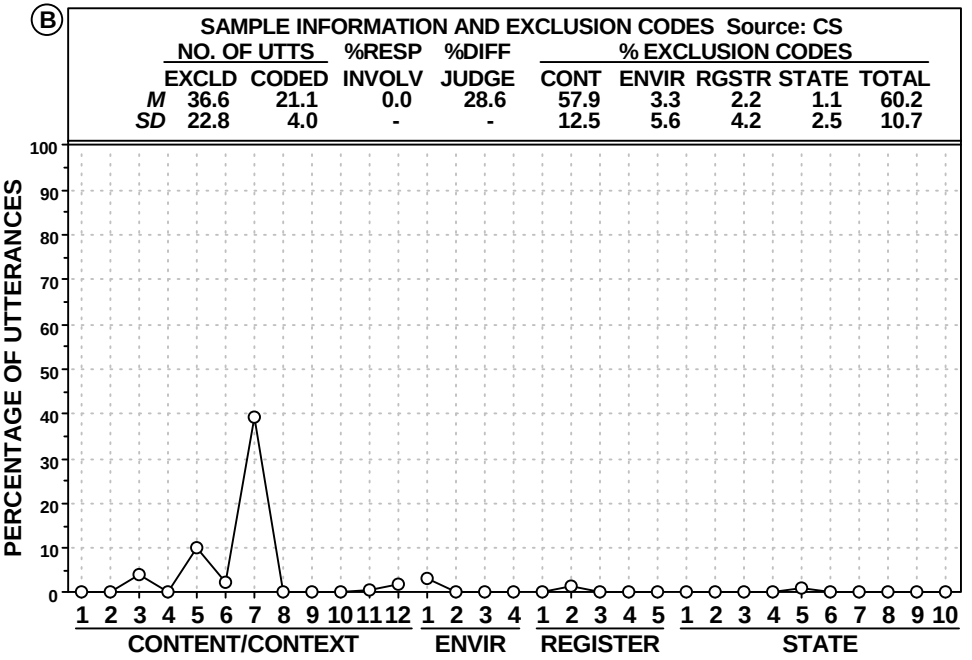
Percentage Consonants Correct (PCC)

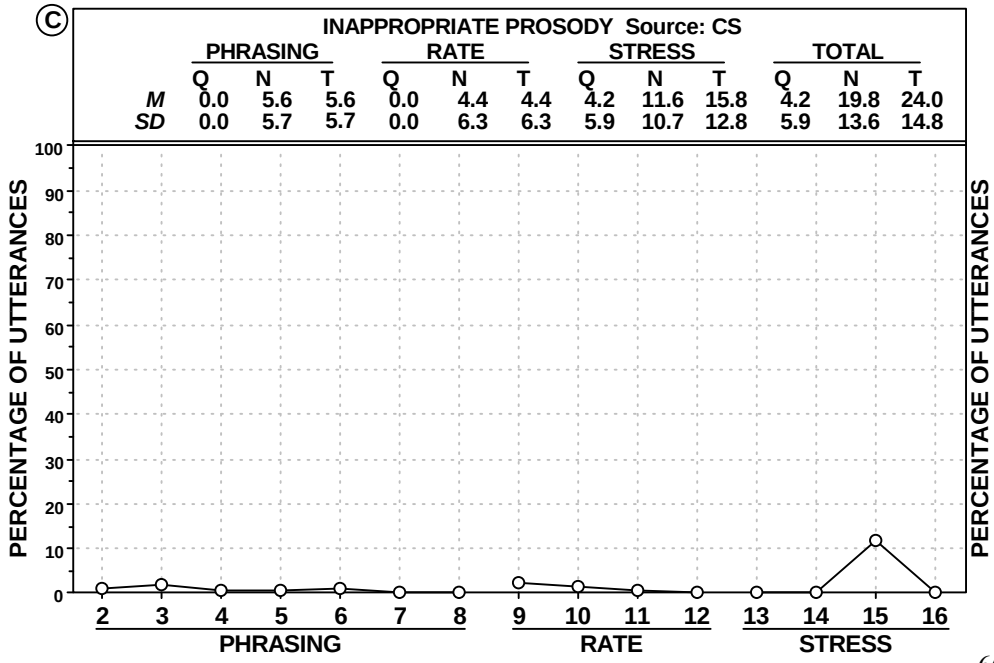
Severity Adjective

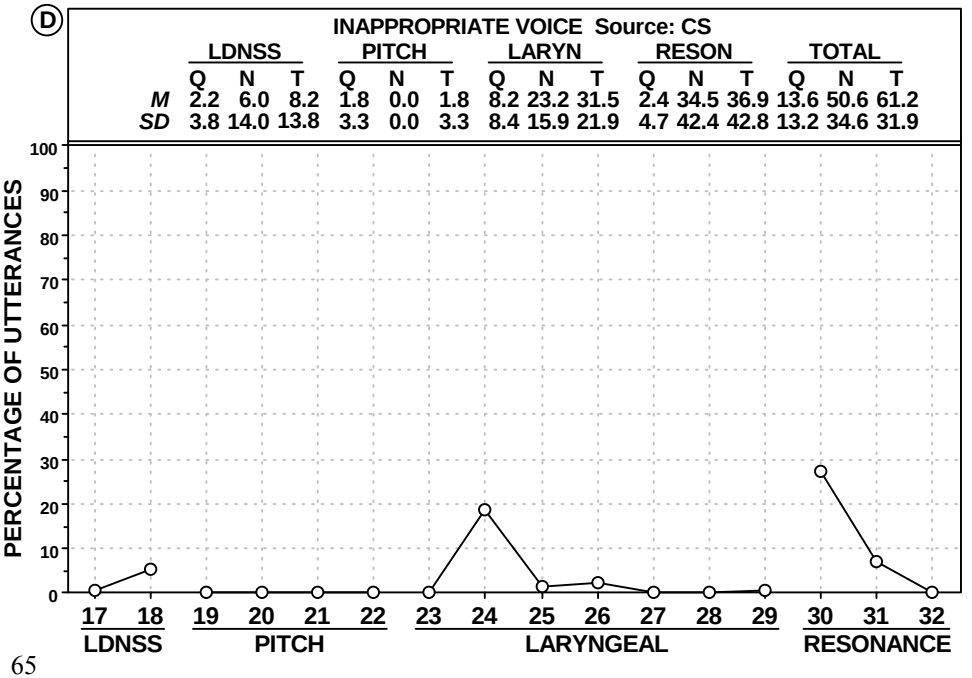
MILD-MODERATE

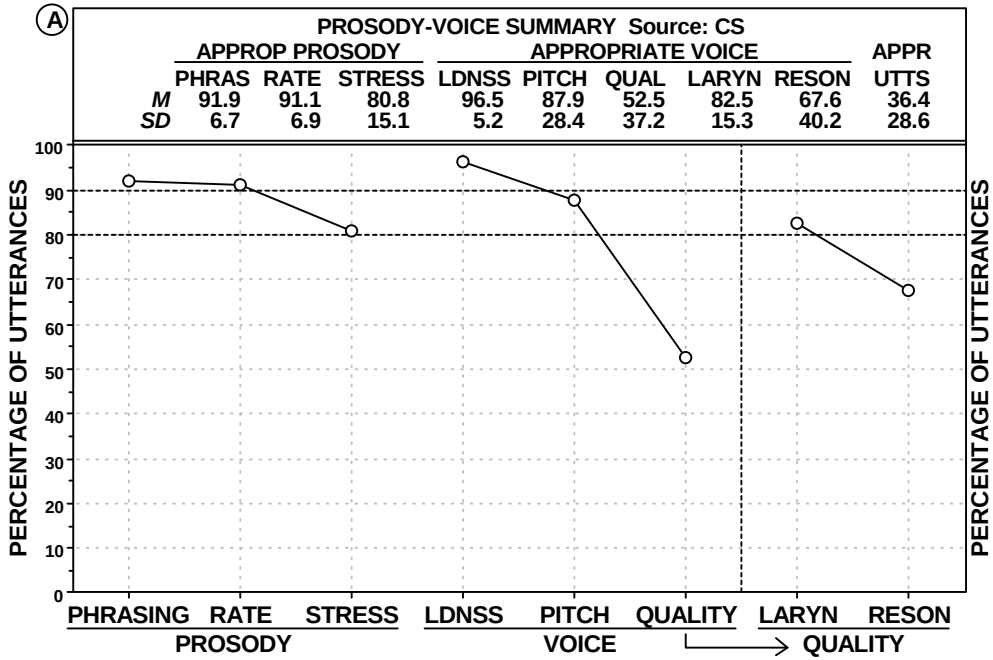

22q11.2 Deletion Syndrome
Intelligibility Index Score (%)
100
90
80
70
60
50
40
30
20
0
5
10
15
20
Number of Participants
85
80
High = 88.9%
Moderate = 0.0%
Low = 11.1%

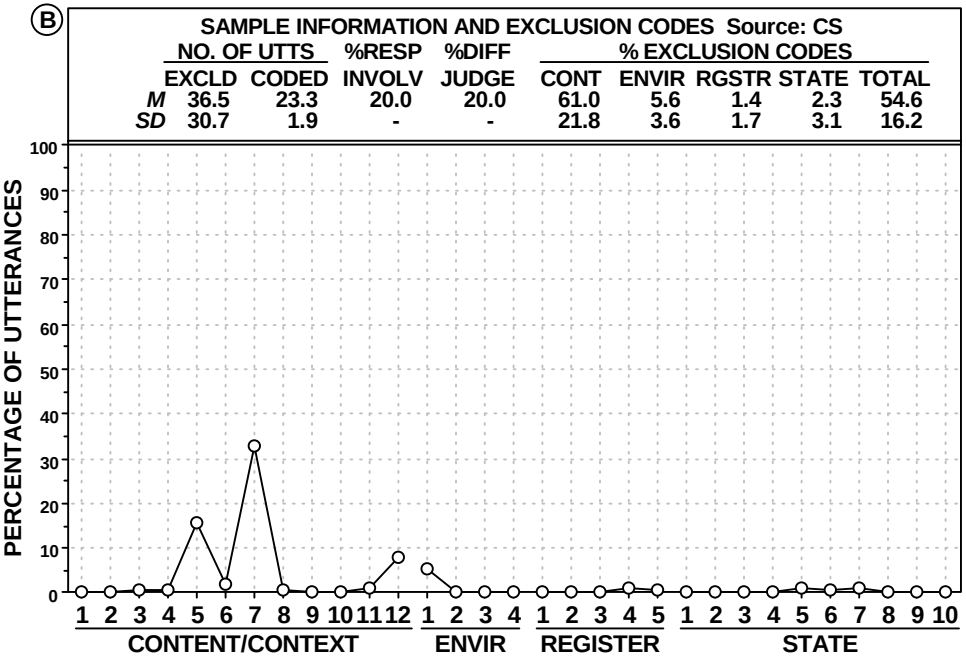

A
PROSODY-VOICE SUMMARY Source: CS
APPROP PROSODY
APPROPRIATE VOICE
APPR
PHRAS RATE STRESS LDNSS PITCH QUAL LARYN RESON UTTS
M 94.4 95.6 88.4 94.0 100.0 50.0 76.8 65.5 43.6
SD 5.7 6.3 10.7 14.0 0.0 34.7 15.9 42.4 31.7
PERCENTAGE OF UTTERANCES
PHRASING RATE STRESS LDNSS PITCH QUALITY LARYN RESON
PROSODY
VOICE
QUALITY

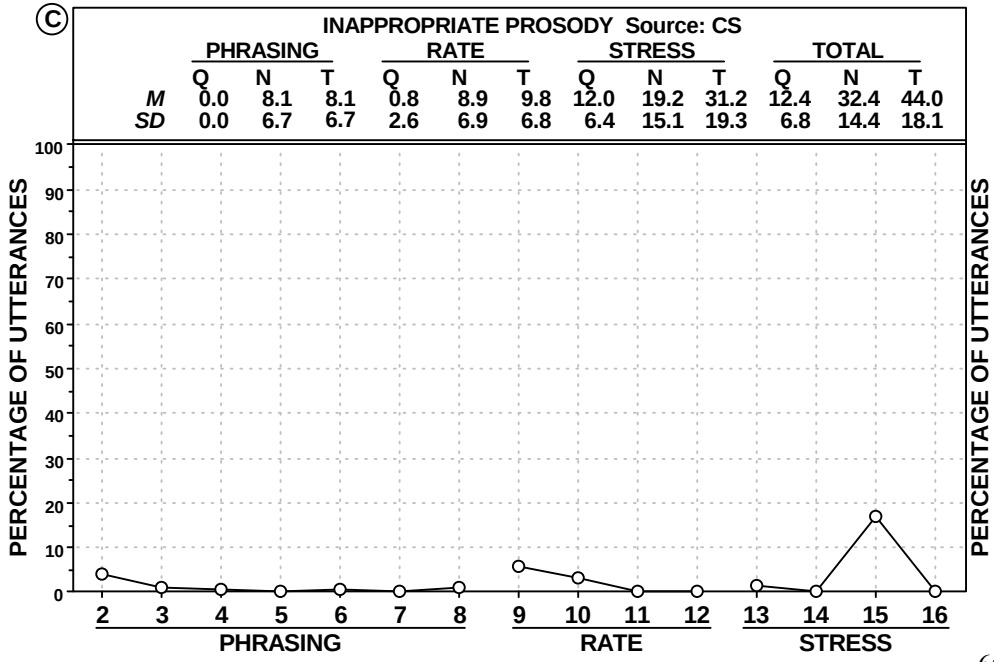

B
SAMPLE INFORMATION AND EXCLUSION CODES Source: CS
NO. OF UTTS
%RESP
%DIFF
% EXCLUSION CODES
EXCLD CODED INVOLV JUDGE CONT ENVIR RGSTR STATE TOTAL
M 36.6 21.1 0.0 28.6 57.9 3.3 2.2 1.1 60.2
SD 22.8 4.0 - - 12.5 5.6 4.2 2.5 10.7
PERCENTAGE OF UTTERANCES
CONTENT/CONTEXT
ENVIR
REGISTER
STATE

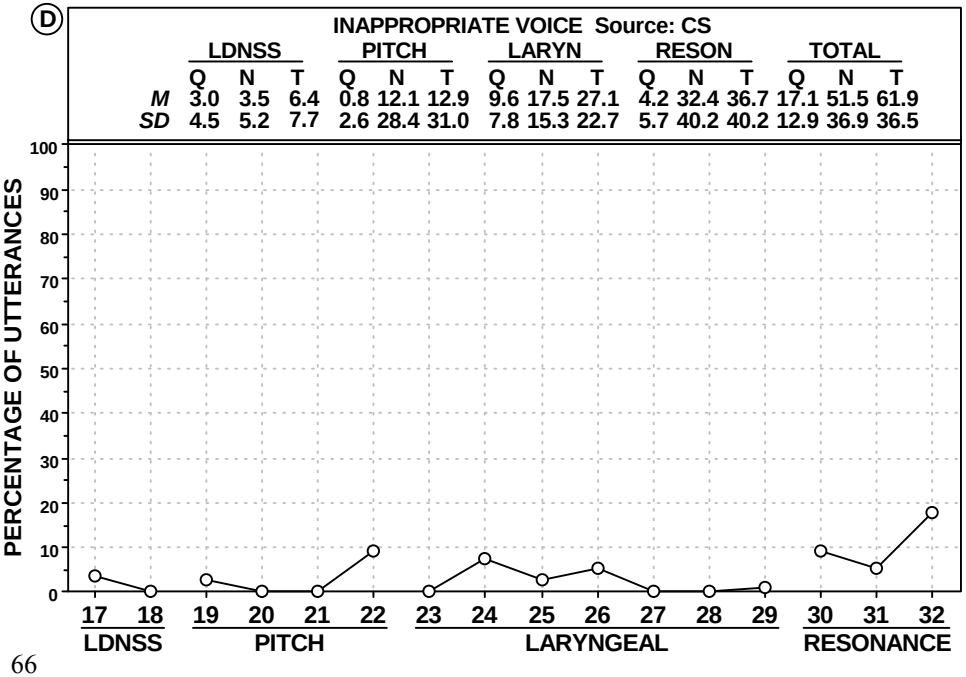

C
INAPPROPRIATE PROSODY Source: CS
PHRASING
RATE
STRESS
TOTAL
Q N T Q N T Q N T Q N T
M 0.0 5.6 5.6 0.0 4.4 4.4 4.2 11.6 15.8 4.2 19.8 24.0
SD 0.0 5.7 5.7 0.0 6.3 6.3 5.9 10.7 12.8 5.9 13.6 14.8
PERCENTAGE OF UTTERANCES
PHRASING
RATE
STRESS


D
INAPPROPRIATE VOICE Source: CS
LDNSS
PITCH
LARYN
RESON
TOTAL
Q N T Q N T Q N T Q N T Q N T
M 2.2 6.0 8.2 1.8 0.0 1.8 8.2 23.2 31.5 2.4 34.5 36.9 13.6 50.6 61.2
SD 3.8 14.0 13.8 3.3 0.0 3.3 8.4 15.9 21.9 4.7 42.4 42.8 13.2 34.6 31.9
PERCENTAGE OF UTTERANCES
LDNSS
PITCH
LARYNGEAL
RESONANCE

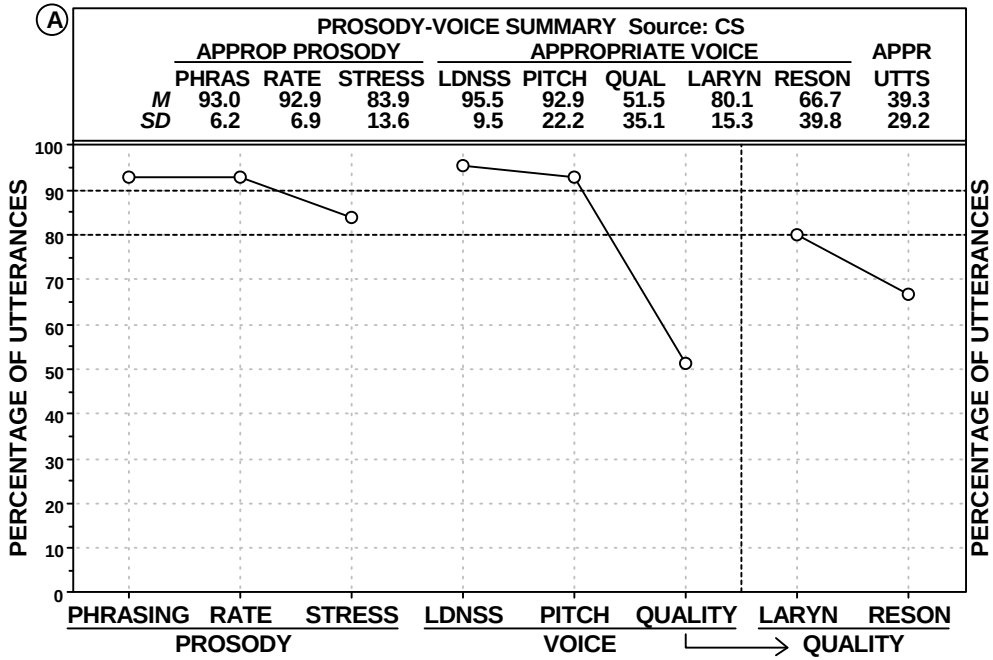

A
PROSODY-VOICE SUMMARY Source: CS
APPROP PROSODY
APPROPRIATE VOICE
APPR
PHRAS RATE STRESS LDNSS PITCH QUAL LARYN RESON UTTS
M 91.9 91.1 80.8 96.5 87.9 52.5 82.5 67.6 36.4
SD 6.7 6.9 15.1 5.2 28.4 37.2 15.3 40.2 28.6
PERCENTAGE OF UTTERANCES
PHRASING RATE STRESS LDNSS PITCH QUALITY LARYN RESON
PROSODY
VOICE
QUALITY

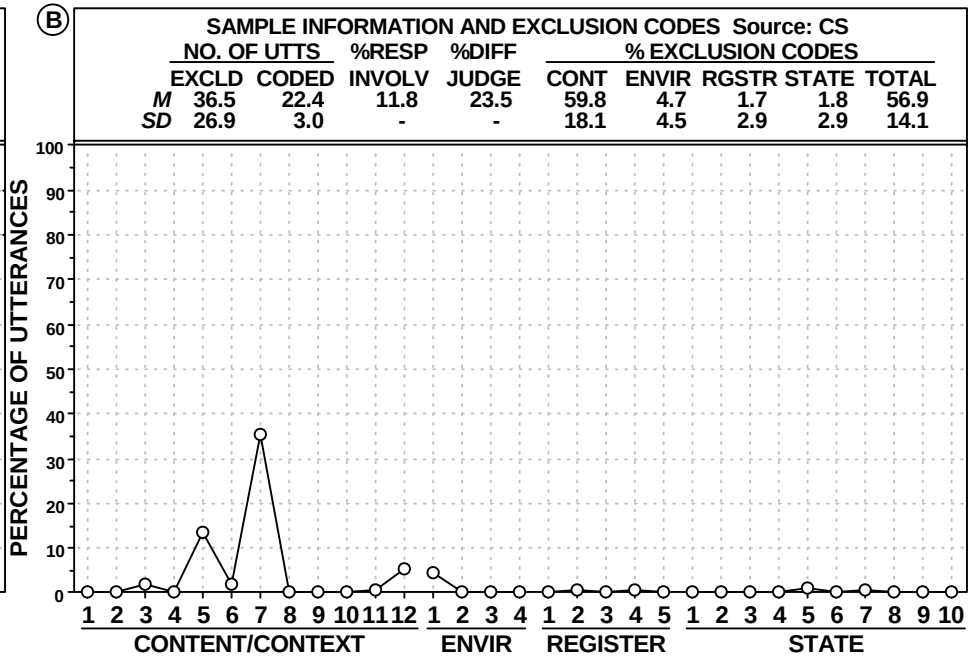

B
SAMPLE INFORMATION AND EXCLUSION CODES Source: CS
NO. OF UTTS
%RESP
%DIFF
% EXCLUSION CODES
EXCLD CODED INVOLV JUDGE CONT ENVIR RGSTR STATE TOTAL
M 36.5 23.3 20.0 20.0 61.0 5.6 1.4 2.3 54.6
SD 30.7 1.9 - - 21.8 3.6 1.7 3.1 16.2
PERCENTAGE OF UTTERANCES
CONTENT/CONTEXT
ENVIR
REGISTER
STATE

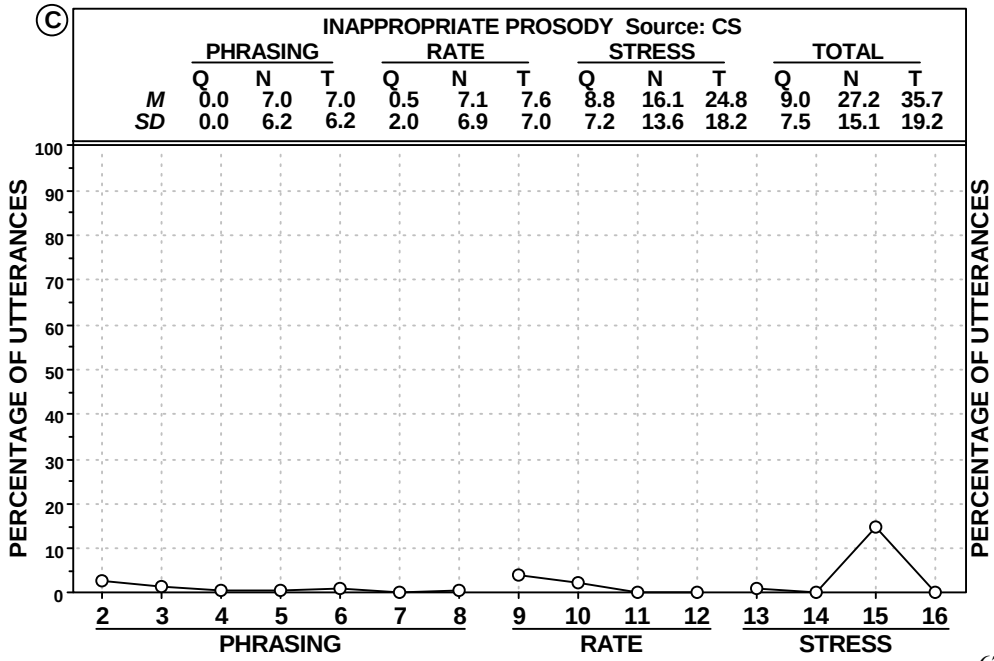

C
INAPPROPRIATE PROSODY Source: CS
PHRASING
RATE
STRESS
TOTAL
Q N T Q N T Q N T Q N T
M 0.0 8.1 8.1 0.8 8.9 9.8 12.0 19.2 31.2 12.4 32.4 44.0
SD 0.0 6.7 6.7 2.6 6.9 6.8 6.4 15.1 19.3 6.8 14.4 18.1
PERCENTAGE OF UTTERANCES
PHRASING
RATE
STRESS

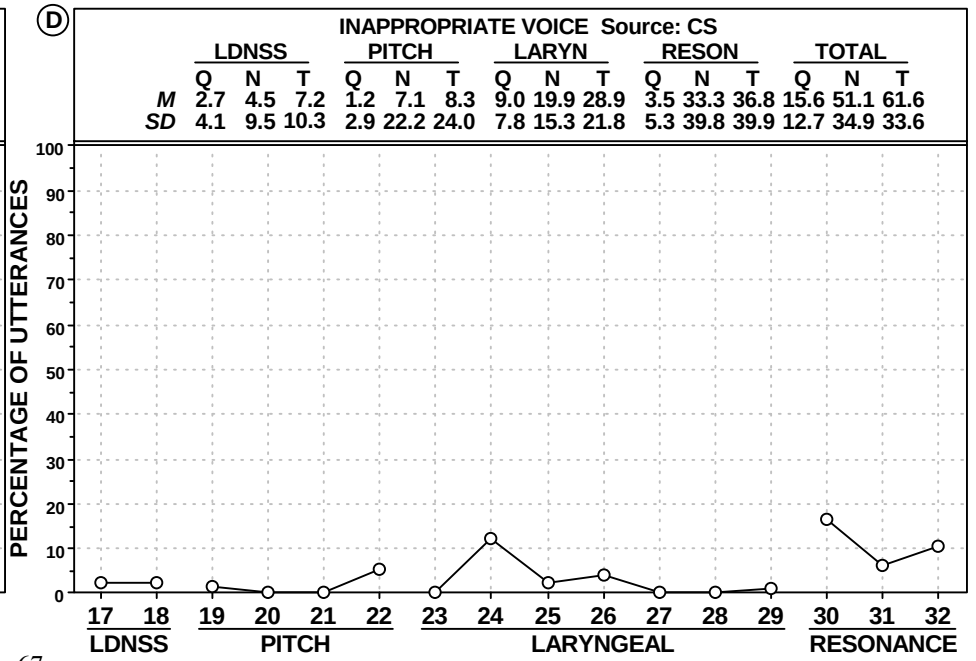

D
INAPPROPRIATE VOICE Source: CS
LDNSS
PITCH
LARYN
RESON
TOTAL
Q N T Q N T Q N T Q N T Q N T
M 3.0 3.5 6.4 0.8 12.1 12.9 9.6 17.5 27.1 4.2 32.4 36.7 17.1 51.5 61.9
SD 4.5 5.2 7.7 2.6 28.4 31.0 7.8 15.3 22.7 5.7 40.2 40.2 12.9 36.9 36.5
PERCENTAGE OF UTTERANCES
LDNSS
PITCH
LARYNGEAL
RESONANCE

**22q: PVSP**
**Combined**



# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| **Vowels** | | | | | |
| | **1** | **Decreased Percent vowels correct** | **5/7** | **71.4** | **F** |
| | **2** | **Decreased Percent vowels correct non-rhotic** | **7/7** | **100.0** | **VF** |
| | **3** | **Decreased Percent vowels correct revised** | **5/7** | **71.4** | **F** |
| **Consonants** | | | | | |
| | **4** | **Decreased Percent consonants correct** | **6/7** | **85.7** | **VF** |
| | **5** | **Decreased Percent consonants correct - early** | **5/7** | **71.4** | **F** |
| | **6** | **Decreased Percent consonants correct - middle** | **6/7** | **85.7** | **VF** |
| | **7** | **Decreased Percent consonants correct - late** | **5/7** | **71.4** | **F** |
| | **8** | **Decreased Percent consonants correct adjusted** | **6/7** | **85.7** | **VF** |
| | **9** | **Decreased Percent consonants correct revised** | **6/7** | **85.7** | **VF** |
| | **10** | **Decreased Percent consonants correct revised - early** | **5/7** | **71.4** | **F** |
| | **11** | **Decreased Percent consonants correct revised - middle** | **6/7** | **85.7** | **VF** |
| | **12** | **Decreased Percent consonants correct revised - late** | **5/7** | **71.4** | **F** |
| | **13** | **Decreased Percent consonants in the inventory** | **4/7** | **57.1** | **SF** |
| | **14** | **Decreased Percent consonants in the inventory - early** | **2/7** | **28.6** | **SI** |
| | **15** | **Decreased Percent consonants in the inventory - middle** | **4/7** | **57.1** | **SF** |
| | **16** | **Decreased Percent consonants in the inventory - late** | **3/7** | **42.9** | **SF** |
| | **17** | **Increased Absolute omission index** | **6/7** | **85.7** | **VF** |
| | **18** | **Increased Absolute omission index - early** | **4/7** | **57.1** | **SF** |
| | **19** | **Increased Absolute omission index - middle** | **6/7** | **85.7** | **VF** |
| | **20** | **Increased Absolute omission index - late** | **4/7** | **57.1** | **SF** |
| | **21** | **Increased Absolute substitution index** | **6/7** | **85.7** | **VF** |
| | **22** | **Increased Absolute substitution index - early** | **5/7** | **71.4** | **F** |
| | **23** | **Increased Absolute substitution index - middle** | **5/7** | **71.4** | **F** |
| | **24** | **Increased Absolute substitution index - late** | **4/7** | **57.1** | **SF** |
| | **25** | **Increased Absolute distortion index** | **4/7** | **57.1** | **SF** |
| | **26** | **Increased Absolute distortion index - early** | **4/7** | **57.1** | **SF** |
| | **27** | **Increased Absolute distortion index - middle** | **1/7** | **14.3** | **I** |
| | **28** | **Increased Absolute distortion index - late** | **4/7** | **57.1** | **SF** |
| **Vowels and Consonants** | | | | | |
| | **29** | **Decreased Intelligibility index** | **5/7** | **71.4** | **F** |
| | **30** | **Decreased Percentage of phonemes correct** | **6/7** | **85.7** | **VF** |
| | **31** | **Decreased Percentage of phonemes correct revised** | **6/7** | **85.7** | **VF** |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **0/7** | **0.0** | **I** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **3/7** | **42.9** | **SF** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **1/7** | **14.3** | **I** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **1/7** | **14.3** | **I** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **0/7** | **0.0** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **2/7** | **28.6** | **SI** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **3/7** | **42.9** | **SF** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **7** | | **Very Frequent (VF): 80.0-100%** | **11** |
| **Mean** | **39.8** | | **Frequent (F): 60.0-79.9%** | **9** |
| **Standard Deviation** | **28.5** | | **Somewhat Frequent (SF): 40.0-59.9%** | **11** |
| **Range** | **13.2 - 97.4** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **2** |
| | | | **Infrequent (I): 0.0-19.9%** | **5** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| Vowels | | | | | |
| | 1 | Decreased Percent vowels correct | 10/10 | 100.0 | VF |
| | 2 | Decreased Percent vowels correct non-rhotic | 10/10 | 100.0 | VF |
| | 3 | Decreased Percent vowels correct revised | 10/10 | 100.0 | VF |
| Consonants | | | | | |
| | 4 | Decreased Percent consonants correct | 10/10 | 100.0 | VF |
| | 5 | Decreased Percent consonants correct - early | 10/10 | 100.0 | VF |
| | 6 | Decreased Percent consonants correct - middle | 9/10 | 90.0 | VF |
| | 7 | Decreased Percent consonants correct - late | 9/10 | 90.0 | VF |
| | 8 | Decreased Percent consonants correct adjusted | 10/10 | 100.0 | VF |
| | 9 | Decreased Percent consonants correct revised | 10/10 | 100.0 | VF |
| | 10 | Decreased Percent consonants correct revised - early | 8/10 | 80.0 | VF |
| | 11 | Decreased Percent consonants correct revised - middle | 9/10 | 90.0 | VF |
| | 12 | Decreased Percent consonants correct revised - late | 10/10 | 100.0 | VF |
| | 13 | Decreased Percent consonants in the inventory | 6/10 | 60.0 | F |
| | 14 | Decreased Percent consonants in the inventory - early | 0/10 | 0.0 | I |
| | 15 | Decreased Percent consonants in the inventory - middle | 4/10 | 40.0 | SF |
| | 16 | Decreased Percent consonants in the inventory - late | 4/10 | 40.0 | SF |
| | 17 | Increased Absolute omission index | 10/10 | 100.0 | VF |
| | 18 | Increased Absolute omission index - early | 8/10 | 80.0 | VF |
| | 19 | Increased Absolute omission index - middle | 8/10 | 80.0 | VF |
| | 20 | Increased Absolute omission index - late | 8/10 | 80.0 | VF |
| | 21 | Increased Absolute substitution index | 10/10 | 100.0 | VF |
| | 22 | Increased Absolute substitution index - early | 8/10 | 80.0 | VF |
| | 23 | Increased Absolute substitution index - middle | 8/10 | 80.0 | VF |
| | 24 | Increased Absolute substitution index - late | 10/10 | 100.0 | VF |
| | 25 | Increased Absolute distortion index | 8/10 | 80.0 | VF |
| | 26 | Increased Absolute distortion index - early | 7/10 | 70.0 | F |
| | 27 | Increased Absolute distortion index - middle | 1/10 | 10.0 | I |
| | 28 | Increased Absolute distortion index - late | 6/10 | 60.0 | F |
| Vowels and Consonants | | | | | |
| | 29 | Decreased Intelligibility index | 8/10 | 80.0 | VF |
| | 30 | Decreased Percentage of phonemes correct | 10/10 | 100.0 | VF |
| | 31 | Decreased Percentage of phonemes correct revised | 10/10 | 100.0 | VF |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **0/10** | **0.0** | **I** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **8/10** | **80.0** | **VF** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **5/10** | **50.0** | **SF** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **2/10** | **20.0** | **SI** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **2/10** | **20.0** | **SI** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **2/10** | **20.0** | **SI** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **4/10** | **40.0** | **SF** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **10** | | **Very Frequent (VF): 80.0-100%** | **25** |
| **Mean** | **28.4** | | **Frequent (F): 60.0-79.9%** | **3** |
| **Standard Deviation** | **11.7** | | **Somewhat Frequent (SF): 40.0-59.9%** | **4** |
| **Range** | **13.2 - 44.7** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **3** |
| | | | **Infrequent (I): 0.0-19.9%** | **3** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| Vowels | | | | | |
| | 1 | Decreased Percent vowels correct | 15/17 | 88.2 | VF |
| | 2 | Decreased Percent vowels correct non-rhotic | 17/17 | 100.0 | VF |
| | 3 | Decreased Percent vowels correct revised | 15/17 | 88.2 | VF |
| Consonants | | | | | |
| | 4 | Decreased Percent consonants correct | 16/17 | 94.1 | VF |
| | 5 | Decreased Percent consonants correct - early | 15/17 | 88.2 | VF |
| | 6 | Decreased Percent consonants correct - middle | 15/17 | 88.2 | VF |
| | 7 | Decreased Percent consonants correct - late | 14/17 | 82.4 | VF |
| | 8 | Decreased Percent consonants correct adjusted | 16/17 | 94.1 | VF |
| | 9 | Decreased Percent consonants correct revised | 16/17 | 94.1 | VF |
| | 10 | Decreased Percent consonants correct revised - early | 13/17 | 76.5 | F |
| | 11 | Decreased Percent consonants correct revised - middle | 15/17 | 88.2 | VF |
| | 12 | Decreased Percent consonants correct revised - late | 15/17 | 88.2 | VF |
| | 13 | Decreased Percent consonants in the inventory | 10/17 | 58.8 | SF |
| | 14 | Decreased Percent consonants in the inventory - early | 2/17 | 11.8 | I |
| | 15 | Decreased Percent consonants in the inventory - middle | 8/17 | 47.1 | SF |
| | 16 | Decreased Percent consonants in the inventory - late | 7/17 | 41.2 | SF |
| | 17 | Increased Absolute omission index | 16/17 | 94.1 | VF |
| | 18 | Increased Absolute omission index - early | 12/17 | 70.6 | F |
| | 19 | Increased Absolute omission index - middle | 14/17 | 82.4 | VF |
| | 20 | Increased Absolute omission index - late | 12/17 | 70.6 | F |
| | 21 | Increased Absolute substitution index | 16/17 | 94.1 | VF |
| | 22 | Increased Absolute substitution index - early | 13/17 | 76.5 | F |
| | 23 | Increased Absolute substitution index - middle | 13/17 | 76.5 | F |
| | 24 | Increased Absolute substitution index - late | 14/17 | 82.4 | VF |
| | 25 | Increased Absolute distortion index | 12/17 | 70.6 | F |
| | 26 | Increased Absolute distortion index - early | 11/17 | 64.7 | F |
| | 27 | Increased Absolute distortion index - middle | 2/17 | 11.8 | I |
| | 28 | Increased Absolute distortion index - late | 10/17 | 58.8 | SF |
| Vowels and Consonants | | | | | |
| | 29 | Decreased Intelligibility index | 13/17 | 76.5 | F |
| | 30 | Decreased Percentage of phonemes correct | 16/17 | 94.1 | VF |
| | 31 | Decreased Percentage of phonemes correct revised | 16/17 | 94.1 | VF |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **0/17** | **0.0** | **I** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **11/17** | **64.7** | **F** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **6/17** | **35.3** | **SI** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **3/17** | **17.6** | **I** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **2/17** | **11.8** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **4/17** | **23.5** | **SI** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **7/17** | **41.2** | **SF** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **17** | | **Very Frequent (VF): 80.0-100%** | **17** |
| **Mean** | **33.1** | | **Frequent (F): 60.0-79.9%** | **9** |
| **Standard Deviation** | **20.4** | | **Somewhat Frequent (SF): 40.0-59.9%** | **5** |
| **Range** | **13.2 - 97.4** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **2** |
| | | | **Infrequent (I): 0.0-19.9%** | **5** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

## 22q: Younger Group

| Measure | | | | | | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 7 | 96.5 | -2.72 | 3.4 | 1.84 | 89.8 | -5.00 | 99.5 | -0.14 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | 7 | 100.0 | 0 | 0.0 | 0 | 0.0 | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 7 | 81.9 | -3.70 | 12.8 | 1.98 | 63.5 | -5.00 | 96.7 | -0.19 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 7 | 39.8 | | 28.5 | | 13.2 | | 97.4 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 7 | 0.0 |
| Rate | | 7 | 0.0 |
| Stress | | 7 | 28.6 |
| Loudness | | 7 | 14.3 |
| Pitch | | 7 | 0.0 |
| Laryngeal Quality | | 7 | 57.1 |
| Resonance Quality | | 7 | 42.9 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | 7 | 86.0 | -0.26 | 7.9 | 1.02 | 74.0 | -1.69 | 94.0 | 0.76 |
| Encoding | | 7 | 65.3 | -0.11 | 33.4 | 1.29 | 25.0 | -1.70 | 100.0 | 1.19 |
| Memory | | 7 | 84.6 | -0.51 | 19.4 | 2.10 | 50.8 | -5.00 | 100.0 | 1.01 |
| Transcoding | | 7 | 89.7 | -0.65 | 6.7 | 1.21 | 83.3 | -2.48 | 100.0 | 1.19 |

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 10 | 92.0 | -3.56 | 10.7 | 1.81 | 65.8 | -5.00 | 99.5 | -0.22 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | 9 | 90.0 | 0 | 0.0 | 1 | 10.0 | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 10 | 82.8 | -4.67 | 14.2 | 1.04 | 61.1 | -5.00 | 97.2 | -1.72 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 10 | 28.4 | | 11.7 | | 13.2 | | 44.7 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 10 | 10.0 |
| Rate | | 10 | 10.0 |
| Stress | | 10 | 40.0 |
| Loudness | | 10 | 0.0 |
| Pitch | | 10 | 10.0 |
| Laryngeal Quality | | 10 | 30.0 |
| Resonance Quality | | 10 | 40.0 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | 10 | 74.4 | -2.77 | 12.9 | 1.61 | 46.0 | -5.00 | 96.0 | -0.11 |
| Encoding | | 10 | 39.6 | -1.26 | 19.4 | 0.65 | 0.0 | -2.06 | 63.6 | -0.24 |
| Memory | | 10 | 78.8 | -1.70 | 12.5 | 1.61 | 59.5 | -5.00 | 100.0 | 0.77 |
| Transcoding | | 10 | 78.3 | -3.03 | 19.1 | 1.98 | 44.4 | -5.00 | 100.0 | 0.71 |

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 17 | 93.9 | -3.22 | 8.6 | 1.82 | 65.8 | -5.00 | 99.5 | -0.14 |

| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | n | % | n | % | n | % | |
| | | | | | | | | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 17 | 82.4 | -4.27 | 13.3 | 1.52 | 61.1 | -5.00 | 97.2 | -0.19 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 17 | 33.1 | | 20.4 | | 13.2 | | 97.4 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | | |
| Rate | | | |
| Stress | | | |
| Loudness | | | |
| Pitch | | | |
| Laryngeal Quality | | | |
| Resonance Quality | | | |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | 17 | 79.2 | -1.74 | 12.3 | 1.86 | 46.0 | -5.00 | 96.0 | 0.76 |
| Encoding | | 17 | 50.2 | -0.79 | 28.2 | 1.10 | 0.0 | -2.06 | 100.0 | 1.19 |
| Memory | | 17 | 81.2 | -1.21 | 15.4 | 1.86 | 50.8 | -5.00 | 100.0 | 1.01 |
| Transcoding | | 17 | 83.0 | -2.05 | 16.0 | 2.05 | 44.4 | -5.00 | 100.0 | 1.19 |

## MOTOR SPEECH MEASURES AND SUMMARIES:

## 22q11.2 Deletion Syndrome (22q)

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| Vowels | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 2/6 | 33.3 | SI |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 3/6 | 50.0 | SF |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 2/6 | 33.3 | SI |
| | 4 | Increased Duration of Corner Vowels | | X | 4/7 | 57.1 | SF |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 3/7 | 42.9 | SF |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 0/0 | | |
| | 7 | Reduced % Vowel Target Consistency | X | | 0/1 | 0.0 | I |
| Consonants | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 5/7 | 71.4 | F |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/7 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 1/7 | 14.3 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 2/6 | 33.3 | SI |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 1/6 | 16.7 | I |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 1/6 | 16.7 | I |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 2/7 | 28.6 | SI |
| | 15 | Increased All Consonant-Consonant Duration | | X | 2/7 | 28.6 | SI |
| Vowels and Consonants | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 6/7 | 85.7 | VF |
| | 17 | Increased DMI Class: Duration % | X | | 3/7 | 42.9 | SF |
| | 18 | Increased % of Epenthesis Errors | X | | 4/7 | 57.1 | SF |
| Phrasing | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 2/7 | 28.6 | SI |
| Rate | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 3/7 | 42.9 | SF |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 3/7 | 42.9 | SF |
| Stress | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 2/7 | 28.6 | SI |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 1/6 | 16.7 | I |
| Loudness | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 0/6 | 0.0 | I |
| Pitch | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 0/7 | 0.0 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 0/7 | 0.0 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **1/7** | **14.3** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **2/7** | **28.6** | **SI** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **2/7** | **28.6** | **SI** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **3/7** | **42.9** | **SF** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **0/7** | **0.0** | **I** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **2/7** | **28.6** | **SI** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **7** | | **Very Frequent (VF): 80.0-100%** | **1** |
| **Mean** | **69.2** | | **Frequent (F): 60.0-79.9%** | **1** |
| **Standard Deviation** | **13.7** | | **Somewhat Frequent (SF): 40.0-59.9%** | **8** |
| **Range** | **51.9 - 90.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **10** |
| | | | **Infrequent (I): 0.0-19.9%** | **11** |
| | | | **Not Used** | **1** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| Vowels | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 0/9 | 0.0 | I |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 1/9 | 11.1 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 1/9 | 11.1 | I |
| | 4 | Increased Duration of Corner Vowels | | X | 8/10 | 80.0 | VF |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 9/10 | 90.0 | VF |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 0/0 | | |
| | 7 | Reduced % Vowel Target Consistency | X | | 0/0 | | |
| Consonants | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 8/10 | 80.0 | VF |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/10 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 0/10 | 0.0 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 3/9 | 33.3 | SI |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 2/9 | 22.2 | SI |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 5/9 | 55.6 | SF |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 4/9 | 44.4 | SF |
| | 15 | Increased All Consonant-Consonant Duration | | X | 5/10 | 50.0 | SF |
| Vowels and Consonants | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 9/10 | 90.0 | VF |
| | 17 | Increased DMI Class: Duration % | X | | 10/10 | 100.0 | VF |
| | 18 | Increased % of Epenthesis Errors | X | | 10/10 | 100.0 | VF |
| Phrasing | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 4/10 | 40.0 | SF |
| Rate | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 6/10 | 60.0 | F |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 6/10 | 60.0 | F |
| Stress | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 8/10 | 80.0 | VF |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 6/10 | 60.0 | F |
| Loudness | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 2/10 | 20.0 | SI |
| Pitch | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 0/10 | 0.0 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 2/10 | 20.0 | SI |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **2/10** | **20.0** | **SI** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **1/10** | **10.0** | **I** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **2/10** | **20.0** | **SI** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **4/10** | **40.0** | **SF** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **2/10** | **20.0** | **SI** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **5/10** | **50.0** | **SF** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **10** | | **Very Frequent (VF): 80.0-100%** | **7** |
| **Mean** | **57.2** | | **Frequent (F): 60.0-79.9%** | **3** |
| **Standard Deviation** | **8.3** | | **Somewhat Frequent (SF): 40.0-59.9%** | **6** |
| **Range** | **46.7 - 70.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **7** |
| | | | **Infrequent (I): 0.0-19.9%** | **7** |
| | | | **Not Used** | **2** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| Vowels | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 2/15 | 13.3 | I |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 4/15 | 26.7 | SI |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 3/15 | 20.0 | SI |
| | 4 | Increased Duration of Corner Vowels | | X | 12/17 | 70.6 | F |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 12/17 | 70.6 | F |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 0/0 | | |
| | 7 | Reduced % Vowel Target Consistency | X | | 0/1 | 0.0 | I |
| Consonants | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 13/17 | 76.5 | F |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/17 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 1/17 | 5.9 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 5/15 | 33.3 | SI |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 3/15 | 20.0 | SI |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 6/15 | 40.0 | SF |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 6/16 | 37.5 | SI |
| | 15 | Increased All Consonant-Consonant Duration | | X | 7/17 | 41.2 | SF |
| Vowels and Consonants | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 15/17 | 88.2 | VF |
| | 17 | Increased DMI Class: Duration % | X | | 13/17 | 76.5 | F |
| | 18 | Increased % of Epenthesis Errors | X | | 14/17 | 82.4 | VF |
| Phrasing | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 6/17 | 35.3 | SI |
| Rate | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 9/17 | 52.9 | SF |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 9/17 | 52.9 | SF |
| Stress | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 10/17 | 58.8 | SF |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 7/16 | 43.8 | SF |
| Loudness | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 2/16 | 12.5 | I |
| Pitch | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 0/17 | 0.0 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 2/17 | 11.8 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **3/17** | **17.6** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **3/17** | **17.6** | **I** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **4/17** | **23.5** | **SI** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **7/17** | **41.2** | **SF** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **2/17** | **11.8** | **I** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **7/17** | **41.2** | **SF** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **17** | | **Very Frequent (VF): 80.0-100%** | **2** |
| **Mean** | **62.2** | | **Frequent (F): 60.0-79.9%** | **4** |
| **Standard Deviation** | **12.1** | | **Somewhat Frequent (SF): 40.0-59.9%** | **8** |
| **Range** | **46.7 - 90.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **7** |
| | | | **Infrequent (I): 0.0-19.9%** | **10** |
| | | | **Not Used** | **1** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**22q: Younger Group**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **2** | **28.6** | **SI** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **2** | **28.6** | **SI** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **4** | **57.1** | **SF** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **1** | **14.3** | **I** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **2** | **28.6** | **SI** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **1** | **14.3** | **I** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **3** | **42.9** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **3** | **42.9** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **1** | **14.3** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **0** | **0.0** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **1** | **14.3** | **I** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **0** | **0.0** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **0** | **0.0** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **3** | **42.9** | **SF** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **0** | **0.0** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **2** | **28.6** | **SI** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **1** | **14.3** | **I** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **0** | **0.0** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **1** | **14.3** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **1** | **14.3** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **0** | **0.0** | **I** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **1** | **14.3** | **I** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **1** | **14.3** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **1** | **14.3** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **2** | **28.6** | **SI** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **3** | **42.9** | **SF** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **0** | **0.0** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **7** |
| **Mean Percentage Score** | **84.9** |
| **Standard Deviation** | **8.2** |
| **Range** | **73.5 - 97.1** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **82.9** | **83.2** | **85.1** | **85.7** | **81.9** |
| **Mean DSI Percentile Score** | **62.7** | **48.9** | **57.3** | **37.1** | **34.0** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **0.0** | **0.0** | **0.0** | **0.0** | **42.9** |

**22q: Older Group**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **5** | **50.0** | **SF** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **3** | **30.0** | **SI** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **9** | **90.0** | **VF** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **8** | **80.0** | **VF** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **4** | **40.0** | **SF** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **7** | **70.0** | **F** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **5** | **50.0** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **4** | **40.0** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **0** | **0.0** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **1** | **10.0** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **4** | **40.0** | **SF** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **1** | **10.0** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **2** | **20.0** | **SI** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **0** | **0.0** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **2** | **20.0** | **SI** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **2** | **20.0** | **SI** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **3** | **30.0** | **SI** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **2** | **20.0** | **SI** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **0** | **0.0** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **1** | **10.0** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **1** | **10.0** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **3** | **30.0** | **SI** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **5** | **50.0** | **SF** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **2** | **20.0** | **SI** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **2** | **20.0** | **SI** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **1** | **10.0** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **1** | **10.0** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **5** | **50.0** | **SF** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **1** | **10.0** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **10** |
| **Mean Percentage Score** | **75.3** |
| **Standard Deviation** | **9.9** |
| **Range** | **61.8 - 97.1** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **66.7** | **71.3** | **68.6** | **84.2** | **78.0** |
| **Mean DSI Percentile Score** | **38.1** | **30.2** | **26.9** | **39.5** | **29.1** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **20.0** | **20.0** | **40.0** | **30.0** | **50.0** |

**22q: Combined**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **7** | **41.2** | **SF** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **5** | **29.4** | **SI** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **13** | **76.5** | **F** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **9** | **52.9** | **SF** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **6** | **35.3** | **SI** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **8** | **47.1** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **8** | **47.1** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **7** | **41.2** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **1** | **5.9** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **1** | **5.9** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **5** | **29.4** | **SI** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **1** | **5.9** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **2** | **11.8** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **3** | **17.6** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **2** | **11.8** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **4** | **23.5** | **SI** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **3** | **17.6** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **2** | **11.8** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **1** | **5.9** | **I** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **0** | **0.0** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **2** | **11.8** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **2** | **11.8** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **3** | **17.6** | **I** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **6** | **35.3** | **SI** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **3** | **17.6** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **3** | **17.6** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **1** | **5.9** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **2** | **11.8** | **I** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **1** | **5.9** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **8** | **47.1** | **SF** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **1** | **5.9** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **17** |
| **Mean Percentage Score** | **79.2** |
| **Standard Deviation** | **10.2** |
| **Range** | **61.8 - 97.1** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **73.3** | **76.2** | **75.4** | **84.8** | **79.6** |
| **Mean DSI Percentile Score** | **48.2** | **37.9** | **39.4** | **38.5** | **31.1** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **11.8** | **11.8** | **23.5** | **17.6** | **47.1** |

## 22q: Younger Group

### Pause Marker Summary (PMS): Group

**Group: 1 *n*: 7**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 7 | 100.0 | Abrupt | 7 | 1.8 | Long | 7 | 0.2 |
| PM+ | 1 | 14.3 | 1 | 14.3 | Code 1 | | | | | | | Mild-Moderate | 0 | 0.0 | Alone | 7 | 0.0 | Repeat/Revise | 7 | 0.1 |
| PM- | 6 | 85.7 | 6 | 85.7 | Code 0 | | | | | | | Moderate-Severe | 0 | 0.0 | Change | 7 | 0.1 | Breath | 7 | 0.2 |
| ?[a] | 0 | 0.0 | 0 | 0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 7 | 0.0 | Addition | 7 | 0.0 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

## 22q: Older Group

### Pause Marker Summary (PMS): Group

**Group: 2 *n*: 10**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 8 | 80.0 | Abrupt | 10 | 3.2 | Long | 10 | 0.4 |
| PM+ | 2 | 20.0 | 3 | 30.0 | Code 1 | 1 | 100.0 | 0 | 0.0 | 1 | 100.0 | Mild-Moderate | 2 | 20.0 | Alone | 10 | 0.1 | Repeat/Revise | 10 | 0.3 |
| PM- | 7 | 70.0 | 7 | 70.0 | Code 0 | 0 | 0.0 | 1 | 100.0 | 0 | 0.0 | Moderate-Severe | 0 | 0.0 | Change | 10 | 1.2 | Breath | 10 | 0.0 |
| ?[a] | 1 | 10.0 | 0 | 0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 10 | 0.2 | Addition | 10 | 0.0 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

## 22q: Combined

### Pause Marker Summary (PMS): Group

**Group: All *n*: 17**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 15 | 88.2 | Abrupt | 17 | 2.6 | Long | 17 | 0.3 |
| PM+ | 3 | 17.6 | 4 | 23.5 | Code 1 | 1 | 100.0 | 0 | 0.0 | 1 | 100.0 | Mild-Moderate | 2 | 11.8 | Alone | 17 | 0.0 | Repeat/Revise | 17 | 0.2 |
| PM- | 13 | 76.5 | 13 | 76.5 | Code 0 | 0 | 0.0 | 1 | 100.0 | 0 | 0.0 | Moderate-Severe | 0 | 0.0 | Change | 17 | 0.7 | Breath | 17 | 0.1 |
| ?[a] | 1 | 5.9 | 0 | 0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 17 | 0.1 | Addition | 17 | 0.0 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

**SUMMARY SPEECH AND MOTOR SPEECH CLASSIFICATIONS:**

**22q11.2 Deletion Syndrome (22q)**

**22q: Younger Group**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Speech Classification | | Motor Speech Classification | | | | | | Totals | |
| | | No Motor Speech Disorder (NO MSD) | Speech Motor Delay (SMD) | Childhood Dysarthria (CD) | Childhood Apraxia of Speech (CAS) | Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS) | | n | % |
| Normal(ized) Speech Aquisition (NSA)[a] | | 2 | 1 | 0 | 0 | 0 | | 3 | 42.9 |
| Speech Errors (SE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Errors (PSE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| (SE/PSE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Speech Delay (SD) | | 0 | 2 | 1 | 1 | 0 | | 4 | 57.1 |
| Persistent Speech Delay (PSD) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| (SD/PSD) | | 0 | 2 | 1 | 1 | 0 | | 4 | 57.1 |
| | | | | | | | | | |
| Totals | n | 2 | 3 | 1 | 1 | 0 | | 7 | |
| | % | 28.6 | 42.9 | 14.3 | 14.3 | 0.0 | | | 100.0 |

[a] Includes children younger than 9 years old with age-appropriate distortions

**22q: Older Group**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Speech Classification** | | **Motor Speech Classification** | | | | | | **Totals** | |
| | | **No Motor Speech Disorder (NO MSD)** | **Speech Motor Delay (SMD)** | **Childhood Dysarthria (CD)** | **Childhood Apraxia of Speech (CAS)** | **Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS)** | | **n** | **%** |
| **Normal(ized) Speech Aquisition (NSA)[a]** | | **1** | **1** | **1** | **1** | **0** | | **4** | **40.0** |
| **Speech Errors (SE)** | | **0** | **0** | **0** | **0** | **0** | | **0** | **0.0** |
| **Persistent Speech Errors (PSE)** | | **0** | **0** | **0** | **0** | **0** | | **0** | **0.0** |
| **(SE/PSE)** | | **0** | **0** | **0** | **0** | **0** | | **0** | **0.0** |
| **Speech Delay (SD)** | | **0** | **0** | **0** | **0** | **0** | | **0** | **0.0** |
| **Persistent Speech Delay (PSD)** | | **0** | **1** | **3** | **0** | **2** | | **6** | **60.0** |
| **(SD/PSD)** | | **0** | **1** | **3** | **0** | **2** | | **6** | **60.0** |
| | | | | | | | | | |
| **Totals** | **n** | **1** | **2** | **4** | **1** | **2** | | **10** | |
| | **%** | **10.0** | **20.0** | **40.0** | **10.0** | **20.0** | | | **100.0** |

**[a] Includes children younger than 9 years old with age-appropriate distortions**

**22q: Combined**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Speech Classification** | | **Motor Speech Classification** | | | | | **Totals** | |
| | | **No Motor Speech Disorder (NO MSD)** | **Speech Motor Delay (SMD)** | **Childhood Dysarthria (CD)** | **Childhood Apraxia of Speech (CAS)** | **Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS)** | **n** | **%** |
| **Normal(ized) Speech Aquisition (NSA)[a]** | | **3** | **2** | **1** | **1** | **0** | **7** | **41.2** |
| **Speech Errors (SE)** | | **0** | **0** | **0** | **0** | **0** | **0** | **0.0** |
| **Persistent Speech Errors (PSE)** | | **0** | **0** | **0** | **0** | **0** | **0** | **0.0** |
| **(SE/PSE)** | | **0** | **0** | **0** | **0** | **0** | **0** | **0.0** |
| **Speech Delay (SD)** | | **0** | **2** | **1** | **1** | **0** | **4** | **23.5** |
| **Persistent Speech Delay (PSD)** | | **0** | **1** | **3** | **0** | **2** | **6** | **35.3** |
| **(SD/PSD)** | | **0** | **3** | **4** | **1** | **2** | **10** | **58.8** |
| | | | | | | | | |
| **Totals** | **n** | **3** | **5** | **5** | **2** | **2** | **17** | |
| | **%** | **17.6** | **29.4** | **29.4** | **11.8** | **11.8** | | **100.0** |

**[a] Includes children younger than 9 years old with age-appropriate distortions**

**SPEECH MEASURES AND SUMMARIES:**

**Autism Spectrum Disorder (ASD)**

## PERCENTAGE CONSONANTS CORRECT (PCC)

ASD

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 267 | 2 | 128 | 1 | 311 | 3 | 706 | 712 | 4.84 | 99.16 |
| | n | 391 | 11 | 278 | 6 | 1095 | 8 | 1764 | 1789 | 12.16 | 98.60 |
| | ŋ | 0 | 0 | 34 | 0 | 208 | 2 | 242 | 244 | 1.66 | 99.18 |
| Glides | w | 585 | 16 | 35 | 0 | 0 | 0 | 620 | 636 | 4.32 | 97.48 |
| | j | 413 | 5 | 18 | 7 | 0 | 0 | 431 | 443 | 3.01 | 97.29 |
| Stops | p | 258 | 6 | 86 | 3 | 121 | 1 | 465 | 475 | 3.23 | 97.89 |
| | b | 349 | 5 | 144 | 5 | 9 | 0 | 502 | 512 | 3.48 | 98.05 |
| | t | 394 | 8 | 255 | 9 | 1186 | 62 | 1835 | 1914 | 13.01 | 95.87 |
| | d | 324 | 11 | 126 | 6 | 318 | 11 | 768 | 796 | 5.41 | 96.48 |
| | k | 253 | 7 | 209 | 4 | 340 | 14 | 802 | 827 | 5.62 | 96.98 |
| | g | 282 | 10 | 45 | 0 | 71 | 2 | 398 | 410 | 2.79 | 97.07 |
| Fricatives and Affricates | f | 193 | 7 | 27 | 1 | 62 | 1 | 282 | 291 | 1.98 | 96.91 |
| | v | 18 | 1 | 65 | 2 | 127 | 4 | 210 | 217 | 1.47 | 96.77 |
| | θ | 34 | 25 | 35 | 20 | 34 | 13 | 103 | 161 | 1.09 | 63.98 |
| | ð | 504 | 277 | 7 | 3 | 0 | 0 | 511 | 791 | 5.38 | 64.60 |
| | s | 310 | 65 | 121 | 31 | 570 | 131 | 1001 | 1228 | 8.35 | 81.51 |
| | z | 17 | 3 | 18 | 5 | 523 | 106 | 558 | 672 | 4.57 | 83.04 |
| | ʃ | 73 | 11 | 48 | 1 | 35 | 7 | 156 | 175 | 1.19 | 89.14 |
| | ʒ | 0 | 0 | 2 | 2 | 0 | 0 | 2 | 4 | 0.03 | 50.00 |
| | h | 477 | 20 | 20 | 1 | 0 | 0 | 497 | 518 | 3.52 | 95.95 |
| | tʃ | 29 | 1 | 10 | 2 | 34 | 7 | 73 | 83 | 0.56 | 87.95 |
| | ʤ | 61 | 15 | 12 | 2 | 9 | 1 | 82 | 100 | 0.68 | 82.00 |
| Liquids | l | 381 | 18 | 183 | 10 | 299 | 23 | 863 | 914 | 6.21 | 94.42 |
| | r | 242 | 57 | 127 | 31 | 280 | 66 | 649 | 803 | 5.46 | 80.82 |
| Percent Correct | | 90.97 | | 93.04 | | 92.42 | | 13520 | 14715 | | |
| | | | | | | | | Correct | Total | | |

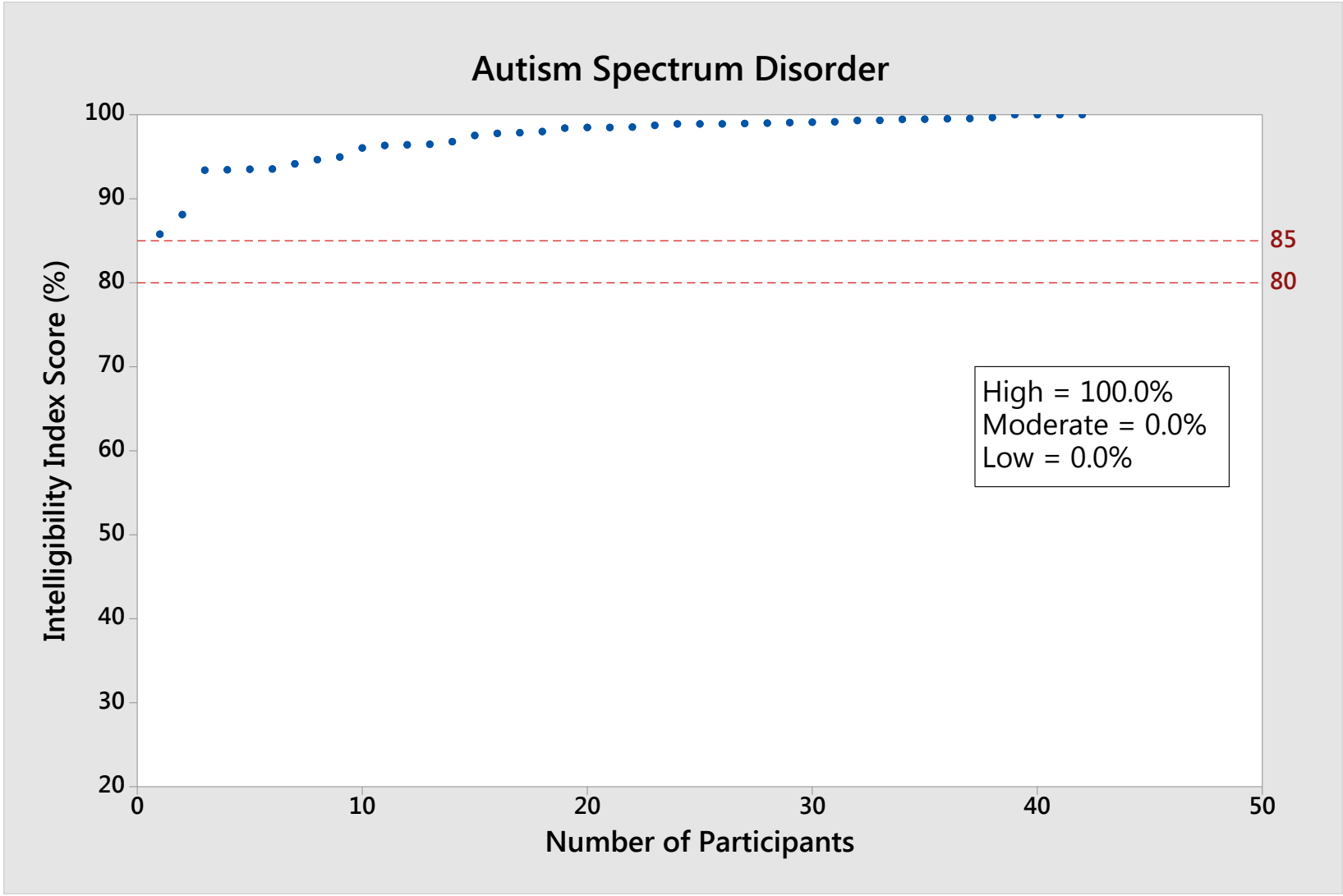
| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 9384 | 100.00 |
| "Words" used | 8107 | 86.39 |
| Disregard | 1047 | 11.16 |
| Either/Or | 0 | 0.00 |
| Unsure | 79 | 0.84 |
| Unintelligible | 151 | 1.61 |
| INTELLIGIBILITY INDEX | | 97.24 |

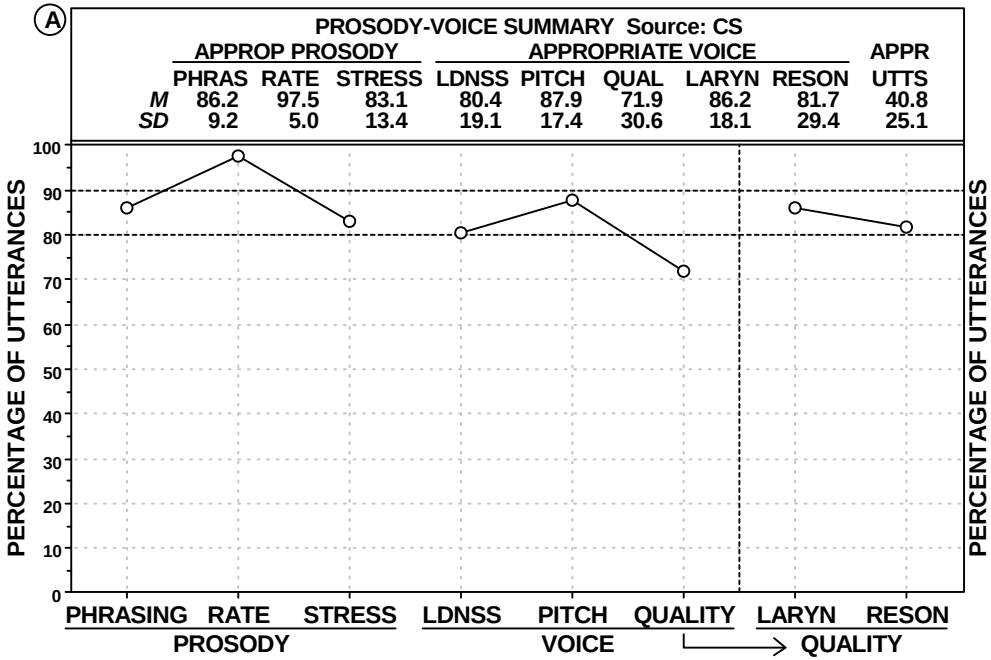
91.88

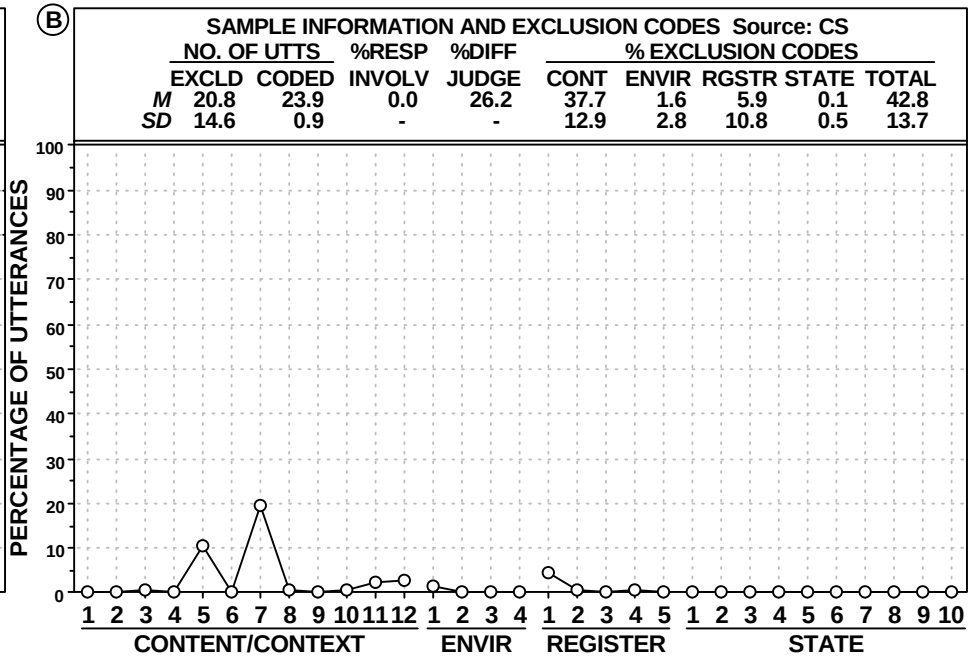
Percentage Consonants Correct (PCC)

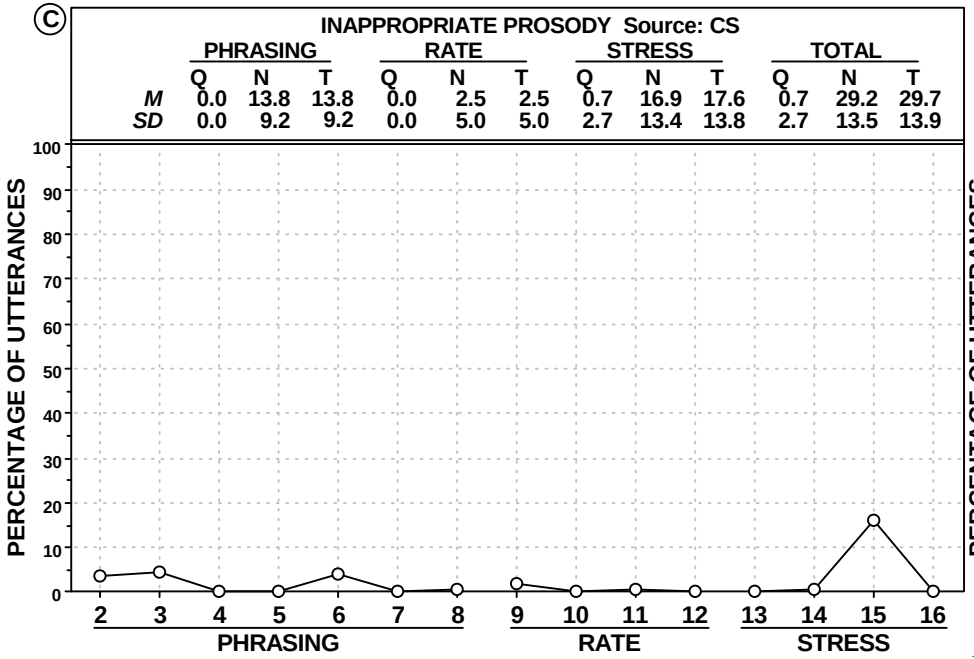
Severity Adjective

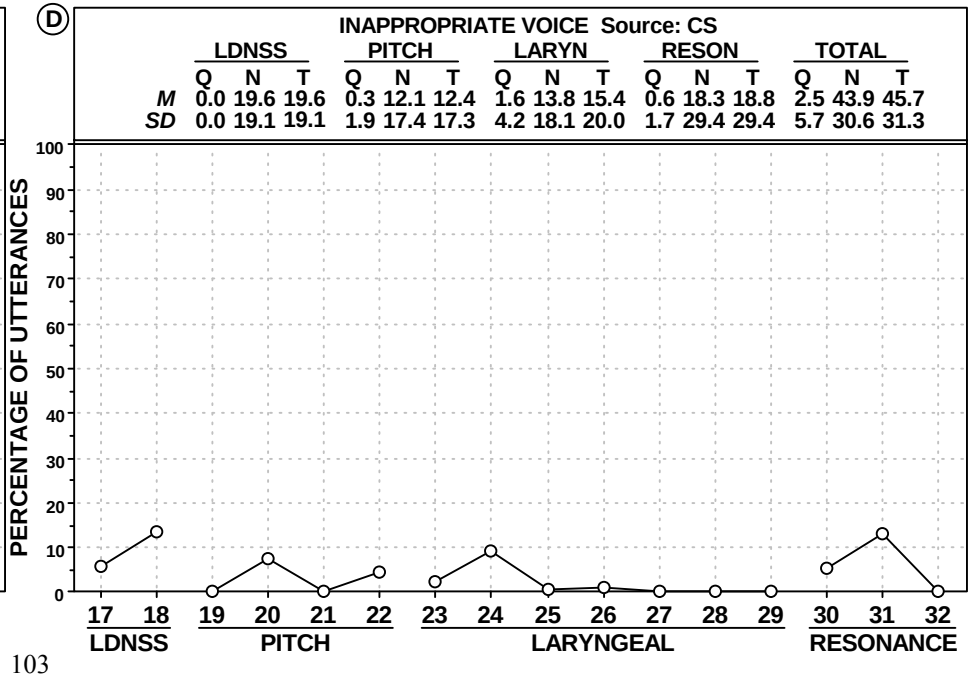
MILD


Autism Spectrum Disorder
Intelligibility Index Score (%)
100
90
80
70
60
50
40
30
20
0
10
20
30
40
50
Number of Participants
85
80
High = 100.0%
Moderate = 0.0%
Low = 0.0%


A
PROSODY-VOICE SUMMARY Source: CS
APPROP PROSODY
APPROPRIATE VOICE
APPR
PHRAS RATE STRESS LDNSS PITCH QUAL LARYN RESON UTTS
M 86.2 97.5 83.1 80.4 87.9 71.9 86.2 81.7 40.8
SD 9.2 5.0 13.4 19.1 17.4 30.6 18.1 29.4 25.1
PERCENTAGE OF UTTERANCES
PHRASING RATE STRESS LDNSS PITCH QUALITY LARYN RESON
PROSODY
VOICE
QUALITY


B
SAMPLE INFORMATION AND EXCLUSION CODES Source: CS
NO. OF UTTS
%RESP
%DIFF
% EXCLUSION CODES
EXCLD CODED INVOLV JUDGE CONT ENVIR RGSTR STATE TOTAL
M 20.8 23.9 0.0 26.2 37.7 1.6 5.9 0.1 42.8
SD 14.6 0.9 - - 12.9 2.8 10.8 0.5 13.7
PERCENTAGE OF UTTERANCES
CONTENT/CONTEXT
ENVIR
REGISTER
STATE


C
INAPPROPRIATE PROSODY Source: CS
PHRASING
RATE
STRESS
TOTAL
Q N T Q N T Q N T Q N T
M 0.0 13.8 13.8 0.0 2.5 2.5 0.7 16.9 17.6 0.7 29.2 29.7
SD 0.0 9.2 9.2 0.0 5.0 5.0 2.7 13.4 13.8 2.7 13.5 13.9
PERCENTAGE OF UTTERANCES
PHRASING
RATE
STRESS


D
INAPPROPRIATE VOICE Source: CS
LDNSS
PITCH
LARYN
RESON
TOTAL
Q N T Q N T Q N T Q N T Q N T
M 0.0 19.6 19.6 0.3 12.1 12.4 1.6 13.8 15.4 0.6 18.3 18.8 2.5 43.9 45.7
SD 0.0 19.1 19.1 1.9 17.4 17.3 4.2 18.1 20.0 1.7 29.4 29.4 5.7 30.6 31.3
PERCENTAGE OF UTTERANCES
LDNSS
PITCH
LARYNGEAL
RESONANCE

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| Vowels | | | | | |
| | 1 | Decreased Percent vowels correct | 7/42 | 16.7 | I |
| | 2 | Decreased Percent vowels correct non-rhotic | 8/42 | 19.0 | I |
| | 3 | Decreased Percent vowels correct revised | 8/42 | 19.0 | I |
| Consonants | | | | | |
| | 4 | Decreased Percent consonants correct | 10/42 | 23.8 | SI |
| | 5 | Decreased Percent consonants correct - early | 11/42 | 26.2 | SI |
| | 6 | Decreased Percent consonants correct - middle | 8/42 | 19.0 | I |
| | 7 | Decreased Percent consonants correct - late | 9/42 | 21.4 | SI |
| | 8 | Decreased Percent consonants correct adjusted | 12/42 | 28.6 | SI |
| | 9 | Decreased Percent consonants correct revised | 12/42 | 28.6 | SI |
| | 10 | Decreased Percent consonants correct revised - early | 11/42 | 26.2 | SI |
| | 11 | Decreased Percent consonants correct revised - middle | 7/42 | 16.7 | I |
| | 12 | Decreased Percent consonants correct revised - late | 11/42 | 26.2 | SI |
| | 13 | Decreased Percent consonants in the inventory | 8/42 | 19.0 | I |
| | 14 | Decreased Percent consonants in the inventory - early | 0/42 | 0.0 | I |
| | 15 | Decreased Percent consonants in the inventory - middle | 8/42 | 19.0 | I |
| | 16 | Decreased Percent consonants in the inventory - late | 7/42 | 16.7 | I |
| | 17 | Increased Absolute omission index | 14/42 | 33.3 | SI |
| | 18 | Increased Absolute omission index - early | 9/42 | 21.4 | SI |
| | 19 | Increased Absolute omission index - middle | 14/42 | 33.3 | SI |
| | 20 | Increased Absolute omission index - late | 9/42 | 21.4 | SI |
| | 21 | Increased Absolute substitution index | 10/42 | 23.8 | SI |
| | 22 | Increased Absolute substitution index - early | 10/42 | 23.8 | SI |
| | 23 | Increased Absolute substitution index - middle | 8/42 | 19.0 | I |
| | 24 | Increased Absolute substitution index - late | 11/42 | 26.2 | SI |
| | 25 | Increased Absolute distortion index | 10/42 | 23.8 | SI |
| | 26 | Increased Absolute distortion index - early | 5/42 | 11.9 | I |
| | 27 | Increased Absolute distortion index - middle | 6/42 | 14.3 | I |
| | 28 | Increased Absolute distortion index - late | 10/42 | 23.8 | SI |
| Vowels and Consonants | | | | | |
| | 29 | Decreased Intelligibility index | 16/42 | 38.1 | SI |
| | 30 | Decreased Percentage of phonemes correct | 9/42 | 21.4 | SI |
| | 31 | Decreased Percentage of phonemes correct revised | 10/42 | 23.8 | SI |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **5/42** | **11.9** | **I** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **13/42** | **31.0** | **SI** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **8/42** | **19.0** | **I** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **15/42** | **35.7** | **SI** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **9/42** | **21.4** | **SI** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **4/42** | **9.5** | **I** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **8/42** | **19.0** | **I** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **42** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **78.1** | | **Frequent (F): 60.0-79.9%** | **0** |
| **Standard Deviation** | **18.2** | | **Somewhat Frequent (SF): 40.0-59.9%** | **0** |
| **Range** | **31.6 - 100.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **22** |
| | | | **Infrequent (I): 0.0-19.9%** | **16** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 42 | 97.3 | -1.25 | 3.1 | 1.91 | 85.8 | -5.00 | 100.0 | 1.28 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | 42 | 100.0 | 0 | 0.0 | 0 | 0.0 | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 42 | 92.0 | -0.62 | 5.9 | 1.50 | 77.7 | -5.00 | 99.7 | 1.59 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 42 | 78.1 | | 18.2 | | 31.6 | | 100.0 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 42 | 31.0 |
| Rate | | 42 | 2.4 |
| Stress | | 42 | 35.7 |
| Loudness | | 42 | 42.9 |
| Pitch | | 42 | 16.7 |
| Laryngeal Quality | | 42 | 26.2 |
| Resonance Quality | | 42 | 28.6 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | 42 | 83.9 | -0.10 | 9.6 | 1.00 | 60.0 | -2.64 | 100.0 | 1.65 |
| Encoding | | 38 | 64.5 | -0.08 | 30.1 | 1.32 | 0.0 | -3.33 | 100.0 | 1.80 |
| Memory | | 42 | 89.8 | 0.17 | 15.4 | 1.32 | 44.0 | -5.00 | 100.0 | 1.19 |
| Transcoding | | 42 | 93.4 | 0.12 | 8.2 | 1.26 | 66.7 | -4.74 | 100.0 | 1.23 |

## MOTOR SPEECH MEASURES AND SUMMARIES:

## Autism Spectrum Disorder (ASD)

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| **Vowels** | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 3/41 | 7.3 | I |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 5/40 | 12.5 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 5/41 | 12.2 | I |
| | 4 | Increased Duration of Corner Vowels | | X | 13/42 | 31.0 | SI |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 16/42 | 38.1 | SI |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 0/1 | 0.0 | I |
| | 7 | Reduced % Vowel Target Consistency | X | | 0/1 | 0.0 | I |
| **Consonants** | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 8/42 | 19.0 | I |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/41 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 7/39 | 17.9 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 4/35 | 11.4 | I |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 2/38 | 5.3 | I |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 9/38 | 23.7 | SI |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 11/42 | 26.2 | SI |
| | 15 | Increased All Consonant-Consonant Duration | | X | 5/41 | 12.2 | I |
| **Vowels and Consonants** | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 12/42 | 28.6 | SI |
| | 17 | Increased DMI Class: Duration % | X | | 6/42 | 14.3 | I |
| | 18 | Increased % of Epenthesis Errors | X | | 7/42 | 16.7 | I |
| **Phrasing** | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 19/42 | 45.2 | SF |
| **Rate** | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 5/42 | 11.9 | I |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 4/42 | 9.5 | I |
| **Stress** | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 13/42 | 31.0 | SI |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 6/38 | 15.8 | I |
| **Loudness** | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 8/42 | 19.0 | I |
| **Pitch** | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 2/42 | 4.8 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 4/42 | 9.5 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **8/42** | **19.0** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **26/42** | **61.9** | **F** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **38/42** | **90.5** | **VF** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **9/42** | **21.4** | **SI** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **2/42** | **4.8** | **I** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **8/42** | **19.0** | **I** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **42** | | **Very Frequent (VF): 80.0-100%** | **1** |
| **Mean** | **78.5** | | **Frequent (F): 60.0-79.9%** | **1** |
| **Standard Deviation** | **7.9** | | **Somewhat Frequent (SF): 40.0-59.9%** | **1** |
| **Range** | **56.7 - 93.1** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **7** |
| | | | **Infrequent (I): 0.0-19.9%** | **22** |
| | | | **Not Used** | **0** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**ASD**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **8** | **19.0** | **I** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **7** | **16.7** | **I** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **1** | **2.4** | **I** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **1** | **2.4** | **I** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **8** | **19.0** | **I** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **3** | **7.1** | **I** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **4** | **9.5** | **I** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **4** | **9.5** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **3** | **7.1** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **4** | **9.5** | **I** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **6** | **14.3** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **5** | **11.9** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **11** | **26.2** | **SI** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **7** | **16.7** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **4** | **9.5** | **I** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **2** | **4.8** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **5** | **11.9** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **1** | **2.4** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **3** | **7.1** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **8** | **19.0** | **I** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **2** | **4.8** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **3** | **7.1** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **3** | **7.1** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **0** | **0.0** | **I** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **4** | **9.5** | **I** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **0** | **0.0** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **8** | **19.0** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **23** | **54.8** | **SF** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **6** | **14.3** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **1** | **2.4** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **42** |
| **Mean Percentage Score** | **89.8** |
| **Standard Deviation** | **5.2** |
| **Range** | **76.5 - 97.1** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **85.9** | **91.2** | **91.7** | **89.1** | **92.1** |
| **Mean DSI Percentile Score** | **68.5** | **63.8** | **71.8** | **52.2** | **59.9** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **0.0** | **0.0** | **0.0** | **14.3** | **7.1** |

**ASD**

**Pause Marker Summary (PMS): Group**

**Group: All *n*: 42**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 42 | 100.0 | Abrupt | 42 | 0.6 | Long | 42 | 0.5 |
| PM+ | 0 | 0.0 | 0 | 0.0 | Code 1 | 0 | 0.0 | 1 | 100.0 | 0 | 0.0 | Mild-Moderate | 0 | 0.0 | Alone | 42 | 0.0 | Repeat/Revise | 42 | 0.3 |
| PM- | 41 | 97.6 | 42 | 100.0 | Code 0 | 1 | 100.0 | 0 | 0.0 | 1 | 100.0 | Moderate-Severe | 0 | 0.0 | Change | 42 | 0.2 | Breath | 42 | 0.4 |
| ?[a] | 1 | 2.4 | 0 | 0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 42 | 0.0 | Addition | 42 | 0.0 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

**SUMMARY SPEECH AND MOTOR SPEECH CLASSIFICATIONS:**

**Autism Spectrum Disorder (ASD)**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Speech Classification | | Motor Speech Classification | | | | | | Totals | |
| | | No Motor Speech Disorder (NO MSD) | Speech Motor Delay (SMD) | Childhood Dysarthria (CD) | Childhood Apraxia of Speech (CAS) | Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS) | | n | % |
| Normal(ized) Speech Aquisition (NSA)[a] | | 31 | 4 | 0 | 0 | 0 | | 35 | 83.3 |
| Speech Errors (SE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Errors (PSE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| (SE/PSE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Speech Delay (SD) | | 5 | 2 | 0 | 0 | 0 | | 7 | 16.7 |
| Persistent Speech Delay (PSD) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| (SD/PSD) | | 5 | 2 | 0 | 0 | 0 | | 7 | 16.7 |
| | | | | | | | | | |
| Totals | n | 36 | 6 | 0 | 0 | 0 | | 42 | |
| | % | 85.7 | 14.3 | 0.0 | 0.0 | 0.0 | | | 100.0 |

[a] Includes children younger than 9 years old with age-appropriate distortions

**SPEECH MEASURES AND SUMMARIES:**

**Down Syndrome (DS)**

## PERCENTAGE CONSONANTS CORRECT (PCC)

DS

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 599 | 16 | 258 | 11 | 397 | 16 | 1254 | 1297 | 7.07 | 96.68 |
| | n | 369 | 7 | 213 | 77 | 1437 | 234 | 2019 | 2337 | 12.74 | 86.39 |
| | ŋ | 0 | 0 | 32 | 7 | 89 | 31 | 121 | 159 | 0.87 | 76.10 |
| Glides | w | 570 | 114 | 54 | 11 | 0 | 0 | 624 | 749 | 4.08 | 83.31 |
| | j | 331 | 43 | 29 | 17 | 0 | 0 | 360 | 420 | 2.29 | 85.71 |
| Stops | p | 348 | 18 | 85 | 7 | 125 | 1 | 558 | 584 | 3.18 | 95.55 |
| | b | 427 | 13 | 184 | 8 | 12 | 4 | 623 | 648 | 3.53 | 96.14 |
| | t | 576 | 51 | 260 | 107 | 702 | 354 | 1538 | 2050 | 11.18 | 75.02 |
| | d | 322 | 17 | 153 | 51 | 331 | 109 | 806 | 983 | 5.36 | 81.99 |
| | k | 410 | 21 | 283 | 39 | 499 | 26 | 1192 | 1278 | 6.97 | 93.27 |
| | g | 436 | 22 | 70 | 7 | 35 | 7 | 541 | 577 | 3.15 | 93.76 |
| Fricatives and Affricates | f | 274 | 12 | 64 | 10 | 66 | 5 | 404 | 431 | 2.35 | 93.74 |
| | v | 22 | 11 | 106 | 12 | 129 | 25 | 257 | 305 | 1.66 | 84.26 |
| | θ | 34 | 18 | 19 | 19 | 73 | 50 | 126 | 213 | 1.16 | 59.15 |
| | ð | 254 | 205 | 19 | 22 | 0 | 0 | 273 | 500 | 2.73 | 54.60 |
| | s | 436 | 178 | 206 | 103 | 517 | 229 | 1159 | 1669 | 9.10 | 69.44 |
| | z | 2 | 2 | 51 | 22 | 457 | 278 | 510 | 812 | 4.43 | 62.81 |
| | ʃ | 97 | 29 | 35 | 19 | 19 | 10 | 151 | 209 | 1.14 | 72.25 |
| | ʒ | 0 | 0 | 4 | 0 | 0 | 1 | 4 | 5 | 0.03 | 80.00 |
| | h | 478 | 44 | 35 | 0 | 0 | 0 | 513 | 557 | 3.04 | 92.10 |
| | tʃ | 14 | 24 | 28 | 18 | 36 | 51 | 78 | 171 | 0.93 | 45.61 |
| | ʤ | 57 | 33 | 20 | 17 | 8 | 9 | 85 | 144 | 0.79 | 59.03 |
| Liquids | l | 401 | 187 | 138 | 55 | 259 | 204 | 798 | 1244 | 6.78 | 64.15 |
| | r | 237 | 195 | 107 | 112 | 179 | 165 | 523 | 995 | 5.43 | 52.56 |
| Percent Correct | | 84.16 | | 76.56 | | 74.80 | | 14517 | 18337 | | |
| | | | | | | | | Correct | Total | | |

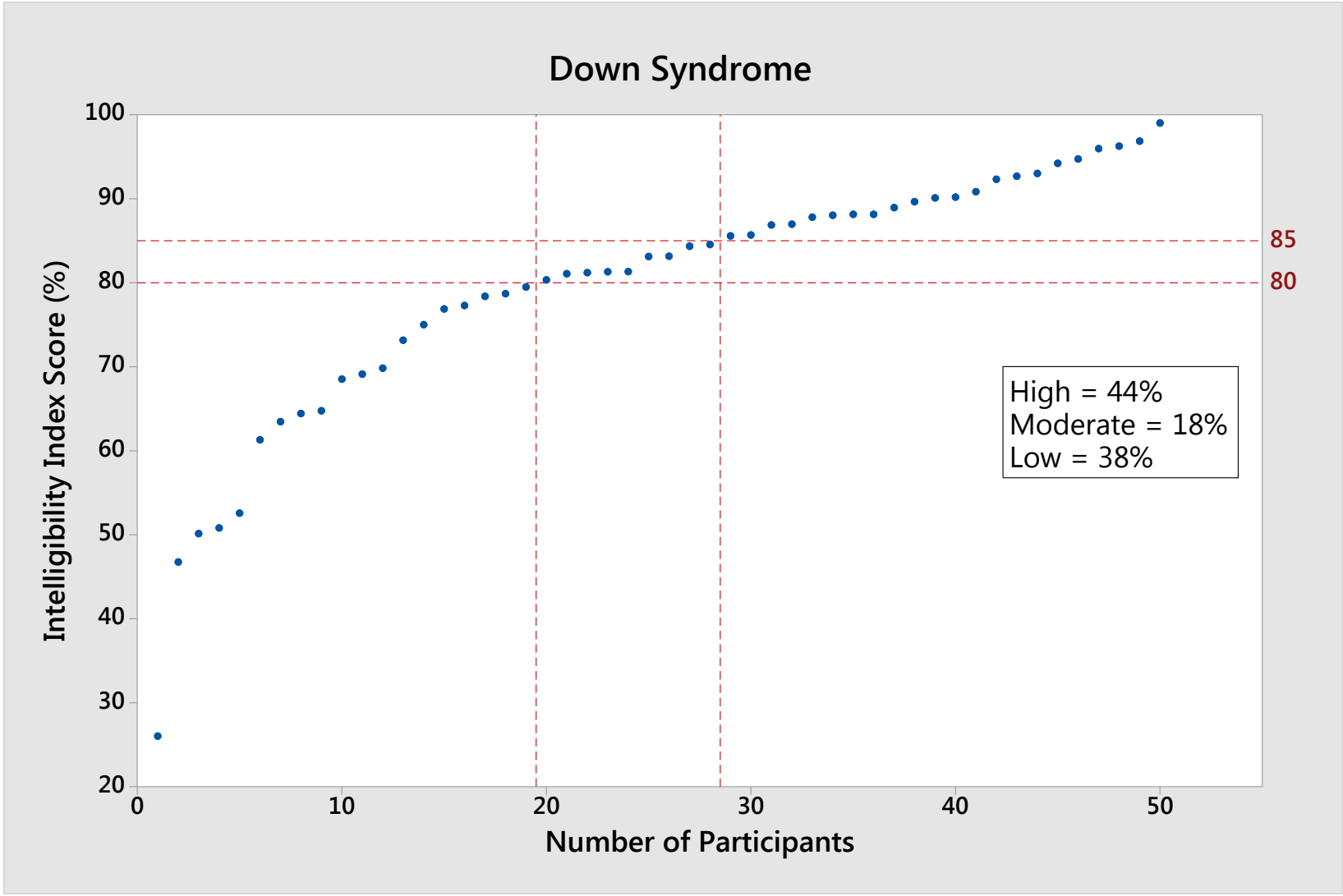
| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 15215 | 100.00 |
| "Words" used | 9932 | 65.28 |
| Disregard | 2712 | 17.82 |
| Either/Or | 3 | 0.02 |
| Unsure | 633 | 4.16 |
| Unintelligible | 1933 | 12.70 |
| INTELLIGIBILITY INDEX | | 79.44 |

79.17

Percentage Consonants Correct (PCC)

Severity Adjective

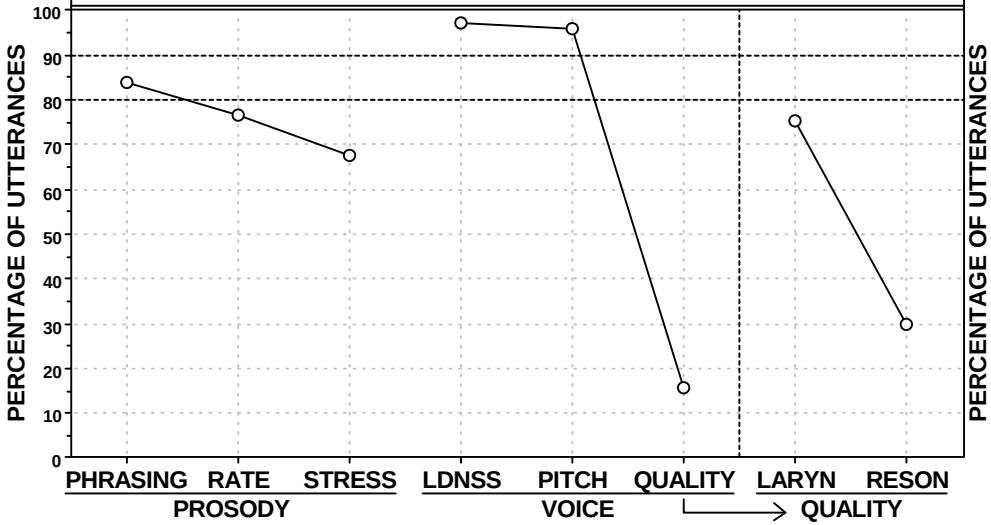
MILD-MODERATE


Down Syndrome
Intelligibility Index Score (%)
100
90
80
70
60
50
40
30
20
0
10
20
30
40
50
Number of Participants
85
80
High = 44%
Moderate = 18%
Low = 38%

A

PROSODY-VOICE SUMMARY Source: CS

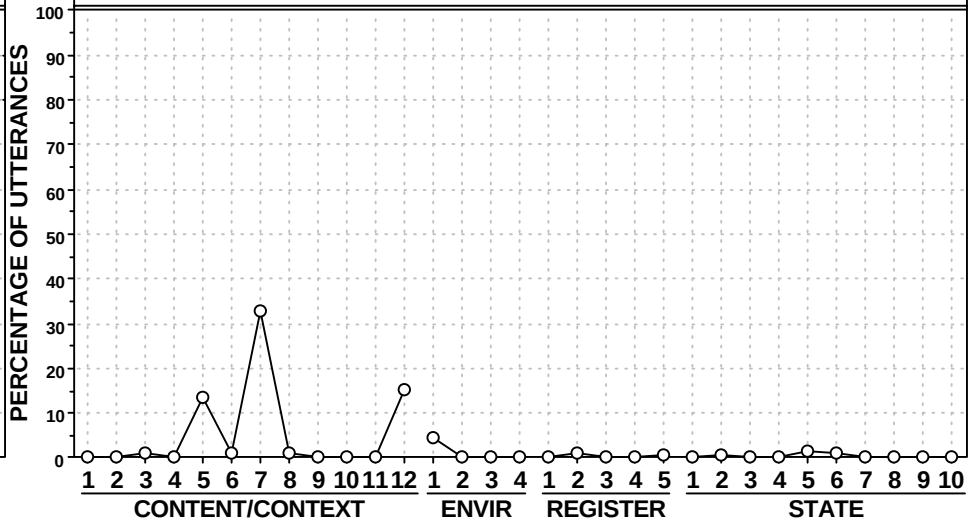
| | APPROP PROSODY | | | APPROPRIATE VOICE | | | | | APPR |
|---|---|---|---|---|---|---|---|---|---|
| | PHRAS | RATE | STRESS | LDNSS | PITCH | QUAL | LARYN | RESON | UTTS |
| *M* | 83.8 | 76.5 | 67.7 | 97.2 | 95.7 | 15.7 | 75.3 | 30.0 | 8.6 |
| *SD* | 13.8 | 20.7 | 19.1 | 10.5 | 16.0 | 19.4 | 27.2 | 32.4 | 11.4 |




B

SAMPLE INFORMATION AND EXCLUSION CODES Source: CS

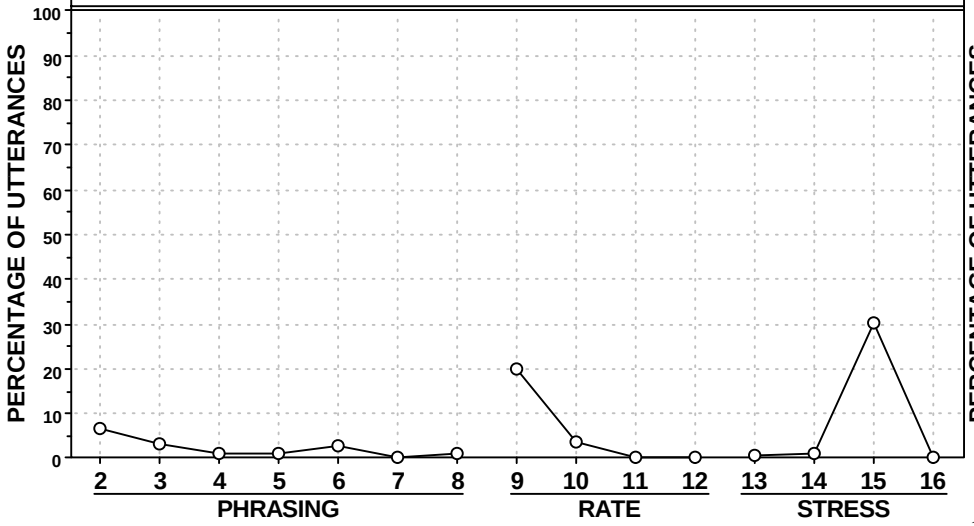
| | NO. OF UTTS | | %RESP | %DIFF | % EXCLUSION CODES | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | EXCLD | CODED | INVOLV | JUDGE | CONT | ENVIR | RGSTR | STATE | TOTAL |
| *M* | 56.8 | 23.8 | 35.6 | 68.9 | 65.4 | 4.9 | 2.4 | 3.3 | 62.5 |
| *SD* | 45.3 | 1.0 | - | - | 26.4 | 5.7 | 4.6 | 4.0 | 17.3 |




C

INAPPROPRIATE PROSODY Source: CS

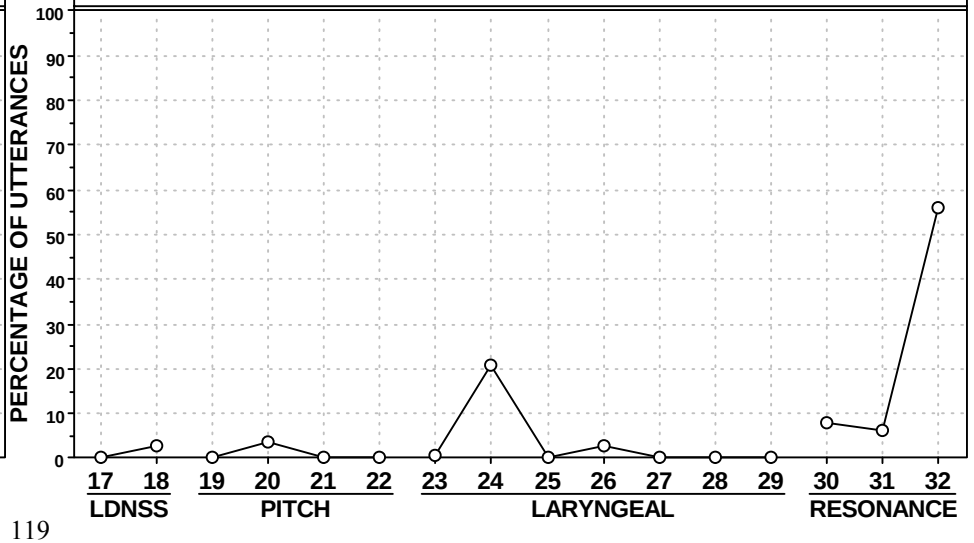
| | PHRASING | | | RATE | | | STRESS | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q | N | T | Q | N | T | Q | N | T | Q | N | T |
| *M* | 0.1 | 16.2 | 16.3 | 0.1 | 23.5 | 23.6 | 11.6 | 32.3 | 43.8 | 11.7 | 53.2 | 61.6 |
| *SD* | 0.6 | 13.8 | 13.8 | 0.6 | 20.7 | 20.6 | 7.0 | 19.1 | 19.7 | 7.0 | 18.9 | 18.1 |




D

INAPPROPRIATE VOICE Source: CS

| | LDNSS | | | PITCH | | | LARYN | | | RESON | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q | N | T | Q | N | T | Q | N | T | Q | N | T | Q | N | T |
| *M* | 2.0 | 2.8 | 4.8 | 1.0 | 4.3 | 5.3 | 5.4 | 24.7 | 30.1 | 9.4 | 70.0 | 79.5 | 17.0 | 85.1 | 92.4 |
| *SD* | 3.1 | 10.5 | 12.5 | 2.6 | 16.0 | 17.5 | 5.1 | 27.2 | 29.6 | 15.9 | 32.4 | 28.1 | 16.6 | 19.2 | 11.4 |



# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| **Vowels** | | | | | |
| | **1** | **Decreased Percent vowels correct** | **45/45** | **100.0** | **VF** |
| | **2** | **Decreased Percent vowels correct non-rhotic** | **45/45** | **100.0** | **VF** |
| | **3** | **Decreased Percent vowels correct revised** | **45/45** | **100.0** | **VF** |
| **Consonants** | | | | | |
| | **4** | **Decreased Percent consonants correct** | **45/45** | **100.0** | **VF** |
| | **5** | **Decreased Percent consonants correct - early** | **45/45** | **100.0** | **VF** |
| | **6** | **Decreased Percent consonants correct - middle** | **45/45** | **100.0** | **VF** |
| | **7** | **Decreased Percent consonants correct - late** | **44/45** | **97.8** | **VF** |
| | **8** | **Decreased Percent consonants correct adjusted** | **45/45** | **100.0** | **VF** |
| | **9** | **Decreased Percent consonants correct revised** | **45/45** | **100.0** | **VF** |
| | **10** | **Decreased Percent consonants correct revised - early** | **44/45** | **97.8** | **VF** |
| | **11** | **Decreased Percent consonants correct revised - middle** | **45/45** | **100.0** | **VF** |
| | **12** | **Decreased Percent consonants correct revised - late** | **45/45** | **100.0** | **VF** |
| | **13** | **Decreased Percent consonants in the inventory** | **37/45** | **82.2** | **VF** |
| | **14** | **Decreased Percent consonants in the inventory - early** | **0/45** | **0.0** | **I** |
| | **15** | **Decreased Percent consonants in the inventory - middle** | **30/45** | **66.7** | **F** |
| | **16** | **Decreased Percent consonants in the inventory - late** | **22/45** | **48.9** | **SF** |
| | **17** | **Increased Absolute omission index** | **45/45** | **100.0** | **VF** |
| | **18** | **Increased Absolute omission index - early** | **43/45** | **95.6** | **VF** |
| | **19** | **Increased Absolute omission index - middle** | **44/45** | **97.8** | **VF** |
| | **20** | **Increased Absolute omission index - late** | **41/45** | **91.1** | **VF** |
| | **21** | **Increased Absolute substitution index** | **45/45** | **100.0** | **VF** |
| | **22** | **Increased Absolute substitution index - early** | **39/45** | **86.7** | **VF** |
| | **23** | **Increased Absolute substitution index - middle** | **45/45** | **100.0** | **VF** |
| | **24** | **Increased Absolute substitution index - late** | **45/45** | **100.0** | **VF** |
| | **25** | **Increased Absolute distortion index** | **44/45** | **97.8** | **VF** |
| | **26** | **Increased Absolute distortion index - early** | **39/45** | **86.7** | **VF** |
| | **27** | **Increased Absolute distortion index - middle** | **26/45** | **57.8** | **SF** |
| | **28** | **Increased Absolute distortion index - late** | **44/45** | **97.8** | **VF** |
| **Vowels and Consonants** | | | | | |
| | **29** | **Decreased Intelligibility index** | **45/45** | **100.0** | **VF** |
| | **30** | **Decreased Percentage of phonemes correct** | **45/45** | **100.0** | **VF** |
| | **31** | **Decreased Percentage of phonemes correct revised** | **45/45** | **100.0** | **VF** |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **15/45** | **33.3** | **SI** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **37/45** | **82.2** | **VF** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **40/45** | **88.9** | **VF** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **4/45** | **8.9** | **I** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **3/45** | **6.7** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **8/45** | **17.8** | **I** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **36/45** | **80.0** | **VF** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **45** | | **Very Frequent (VF): 80.0-100%** | **30** |
| **Mean** | **17.8** | | **Frequent (F): 60.0-79.9%** | **1** |
| **Standard Deviation** | **5.0** | | **Somewhat Frequent (SF): 40.0-59.9%** | **2** |
| **Range** | **7.9 - 31.6** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **1** |
| | | | **Infrequent (I): 0.0-19.9%** | **4** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 45 | 81.3 | -4.94 | 12.3 | 0.43 | 50.1 | -5.00 | 99.0 | -2.12 |

| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | n | % | n | % | n | % | |
| | | | 20 | 44.4 | 9 | 20.0 | 16 | 35.6 | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 45 | 78.9 | -4.96 | 8.7 | 0.26 | 59.3 | -5.00 | 93.3 | -3.29 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 45 | 17.8 | | 5.0 | | 7.9 | | 31.6 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 45 | 33.3 |
| Rate | | 45 | 51.1 |
| Stress | | 45 | 73.3 |
| Loudness | | 45 | 4.4 |
| Pitch | | 45 | 4.4 |
| Laryngeal Quality | | 45 | 42.2 |
| Resonance Quality | | 45 | 91.1 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | 11 | 70.2 | -3.92 | 11.9 | 1.22 | 52.0 | -5.00 | 86.0 | -1.24 |
| Encoding | | 11 | 40.9 | -1.33 | 11.6 | 0.94 | 23.1 | -3.09 | 57.1 | 0.17 |
| Memory | | 11 | 65.8 | -2.87 | 21.2 | 1.81 | 27.6 | -5.00 | 88.2 | -0.41 |
| Transcoding | | 11 | 67.2 | -4.21 | 19.2 | 1.63 | 38.9 | -5.00 | 94.4 | -0.19 |

**MOTOR SPEECH MEASURES AND SUMMARIES:**

**Down Syndrome (DS)**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| **Vowels** | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 11/45 | 24.4 | SI |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 6/45 | 13.3 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 10/45 | 22.2 | SI |
| | 4 | Increased Duration of Corner Vowels | | X | 42/45 | 93.3 | VF |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 44/45 | 97.8 | VF |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 0/0 | | |
| | 7 | Reduced % Vowel Target Consistency | X | | 0/0 | | |
| **Consonants** | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 37/45 | 82.2 | VF |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/45 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 0/45 | 0.0 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 28/38 | 73.7 | F |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 16/40 | 40.0 | SF |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 26/40 | 65.0 | F |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 36/45 | 80.0 | VF |
| | 15 | Increased All Consonant-Consonant Duration | | X | 28/44 | 63.6 | F |
| **Vowels and Consonants** | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 45/45 | 100.0 | VF |
| | 17 | Increased DMI Class: Duration % | X | | 44/45 | 97.8 | VF |
| | 18 | Increased % of Epenthesis Errors | X | | 45/45 | 100.0 | VF |
| **Phrasing** | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 25/45 | 55.6 | SF |
| **Rate** | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 38/45 | 84.4 | VF |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 40/45 | 88.9 | VF |
| **Stress** | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 39/45 | 86.7 | VF |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 30/45 | 66.7 | F |
| **Loudness** | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 1/42 | 2.4 | I |
| **Pitch** | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 3/45 | 6.7 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 10/45 | 22.2 | SI |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **3/45** | **6.7** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **2/45** | **4.4** | **I** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **8/45** | **17.8** | **I** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **39/45** | **86.7** | **VF** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **5/45** | **11.1** | **I** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **9/45** | **20.0** | **SI** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **45** | | **Very Frequent (VF): 80.0-100%** | **11** |
| **Mean** | **49.5** | | **Frequent (F): 60.0-79.9%** | **4** |
| **Standard Deviation** | **8.3** | | **Somewhat Frequent (SF): 40.0-59.9%** | **2** |
| **Range** | **33.3 - 70.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **4** |
| | | | **Infrequent (I): 0.0-19.9%** | **9** |
| | | | **Not Used** | **2** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**DS**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **42** | **93.3** | **VF** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **9** | **20.0** | **SI** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **45** | **100.0** | **VF** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **39** | **86.7** | **VF** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **18** | **40.0** | **SF** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **38** | **84.4** | **VF** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **28** | **62.2** | **F** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **35** | **77.8** | **F** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **1** | **2.2** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **13** | **28.9** | **SI** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **38** | **84.4** | **VF** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **8** | **17.8** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **4** | **8.9** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **6** | **13.3** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **0** | **0.0** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **1** | **2.2** | **I** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **4** | **8.9** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **3** | **6.7** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **3** | **6.7** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **8** | **17.8** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **2** | **4.4** | **I** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **1** | **2.2** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **7** | **15.6** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **0** | **0.0** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **9** | **20.0** | **SI** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **16** | **35.6** | **SI** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **2** | **4.4** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **2** | **4.4** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **1** | **2.2** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **2** | **4.4** | **I** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **3** | **6.7** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **10** | **22.2** | **SI** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **5** | **11.1** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **45** |
| **Mean Percentage Score** | **73.7** |
| **Standard Deviation** | **7.0** |
| **Range** | **58.8 - 85.3** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **52.9** | **67.9** | **66.1** | **85.3** | **83.7** |
| **Mean DSI Percentile Score** | **18.5** | **23.1** | **20.9** | **41.2** | **34.7** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **46.7** | **17.8** | **26.7** | **15.6** | **17.8** |

## Pause Marker Summary (PMS): Group

**Group: All *n*: 45**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 40 | 88.9 | Abrupt | 45 | 2.9 | Long | 45 | 0.8 |
| PM+ | 11 | 24.4 | 15 | 33.3 | Code 1 | 4 | 80.0 | 4 | 80.0 | 2 | 40.0 | Mild-Moderate | 5 | 11.1 | Alone | 45 | 0.7 | Repeat/Revise | 45 | 0.7 |
| PM- | 29 | 64.4 | 30 | 66.7 | Code 0 | 1 | 20.0 | 1 | 20.0 | 0 | 0.0 | Moderate-Severe | 0 | 0.0 | Change | 45 | 0.6 | Breath | 45 | 0.1 |
| ?[a] | 5 | 11.1 | 0 | -0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 45 | 0.1 | Addition | 45 | 0.0 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

**SUMMARY SPEECH AND MOTOR SPEECH CLASSIFICATIONS:**

**Down Syndrome (DS)**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Speech Classification | | Motor Speech Classification | | | | | | Totals | |
| | | No Motor Speech Disorder (NO MSD) | Speech Motor Delay (SMD) | Childhood Dysarthria (CD) | Childhood Apraxia of Speech (CAS) | Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS) | | n | % |
| Normal(ized) Speech Aquisition (NSA)[a] | | 0 | 0 | 1 | 0 | 0 | | 1 | 2.2 |
| Speech Errors (SE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Errors (PSE) | | 0 | 1 | 0 | 1 | 0 | | 2 | 4.4 |
| (SE/PSE) | | 0 | 1 | 0 | 1 | 0 | | 2 | 4.4 |
| Speech Delay (SD) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Delay (PSD) | | 1 | 11 | 16 | 4 | 10 | | 42 | 93.3 |
| (SD/PSD) | | 1 | 11 | 16 | 4 | 10 | | 42 | 93.3 |
| | | | | | | | | | |
| Totals | n | 1 | 12 | 17 | 5 | 10 | | 45 | |
| | % | 2.2 | 26.7 | 37.8 | 11.1 | 22.2 | | | 100.0 |

[a] Includes children younger than 9 years old with age-appropriate distortions

**SPEECH MEASURES AND SUMMARIES:**

**Fragile X Syndrome (FXS)**

## PERCENTAGE CONSONANTS CORRECT (PCC)

FXS

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 314 | 1 | 144 | 1 | 290 | 4 | 748 | 754 | 6.52 | 99.20 |
| | n | 253 | 3 | 161 | 17 | 946 | 45 | 1360 | 1425 | 12.31 | 95.44 |
| | ŋ | 0 | 0 | 22 | 0 | 67 | 8 | 89 | 97 | 0.84 | 91.75 |
| Glides | w | 567 | 15 | 29 | 1 | 0 | 0 | 596 | 612 | 5.29 | 97.39 |
| | j | 184 | 4 | 22 | 1 | 0 | 0 | 206 | 211 | 1.82 | 97.63 |
| Stops | p | 195 | 3 | 59 | 1 | 88 | 2 | 342 | 348 | 3.01 | 98.28 |
| | b | 198 | 2 | 93 | 1 | 11 | 0 | 302 | 305 | 2.64 | 99.02 |
| | t | 393 | 18 | 208 | 23 | 666 | 156 | 1267 | 1464 | 12.65 | 86.54 |
| | d | 220 | 9 | 86 | 13 | 251 | 30 | 557 | 609 | 5.26 | 91.46 |
| | k | 259 | 5 | 158 | 9 | 274 | 7 | 691 | 712 | 6.15 | 97.05 |
| | g | 301 | 3 | 38 | 0 | 25 | 1 | 364 | 368 | 3.18 | 98.91 |
| Fricatives and Affricates | f | 192 | 0 | 60 | 0 | 62 | 0 | 314 | 314 | 2.71 | 100.00 |
| | v | 19 | 0 | 77 | 0 | 85 | 5 | 181 | 186 | 1.61 | 97.31 |
| | θ | 33 | 1 | 27 | 2 | 56 | 10 | 116 | 129 | 1.11 | 89.92 |
| | ð | 331 | 109 | 18 | 6 | 1 | 0 | 350 | 465 | 4.02 | 75.27 |
| | s | 310 | 22 | 151 | 7 | 487 | 32 | 948 | 1009 | 8.72 | 93.95 |
| | z | 2 | 0 | 26 | 5 | 456 | 46 | 484 | 535 | 4.62 | 90.47 |
| | ʃ | 75 | 5 | 26 | 3 | 23 | 4 | 124 | 136 | 1.18 | 91.18 |
| | ʒ | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 3 | 0.03 | 100.00 |
| | h | 292 | 5 | 27 | 0 | 0 | 0 | 319 | 324 | 2.80 | 98.46 |
| | tʃ | 14 | 1 | 46 | 5 | 28 | 12 | 88 | 106 | 0.92 | 83.02 |
| | ʤ | 63 | 21 | 14 | 0 | 5 | 3 | 82 | 106 | 0.92 | 77.36 |
| Liquids | l | 249 | 30 | 130 | 8 | 287 | 25 | 666 | 729 | 6.30 | 91.36 |
| | r | 235 | 18 | 143 | 18 | 198 | 14 | 576 | 626 | 5.41 | 92.01 |
| Percent Correct | | 94.47 | | 93.59 | | 91.42 | | 10773 | 11573 | | |
| | | | | | | | | Correct | Total | | |

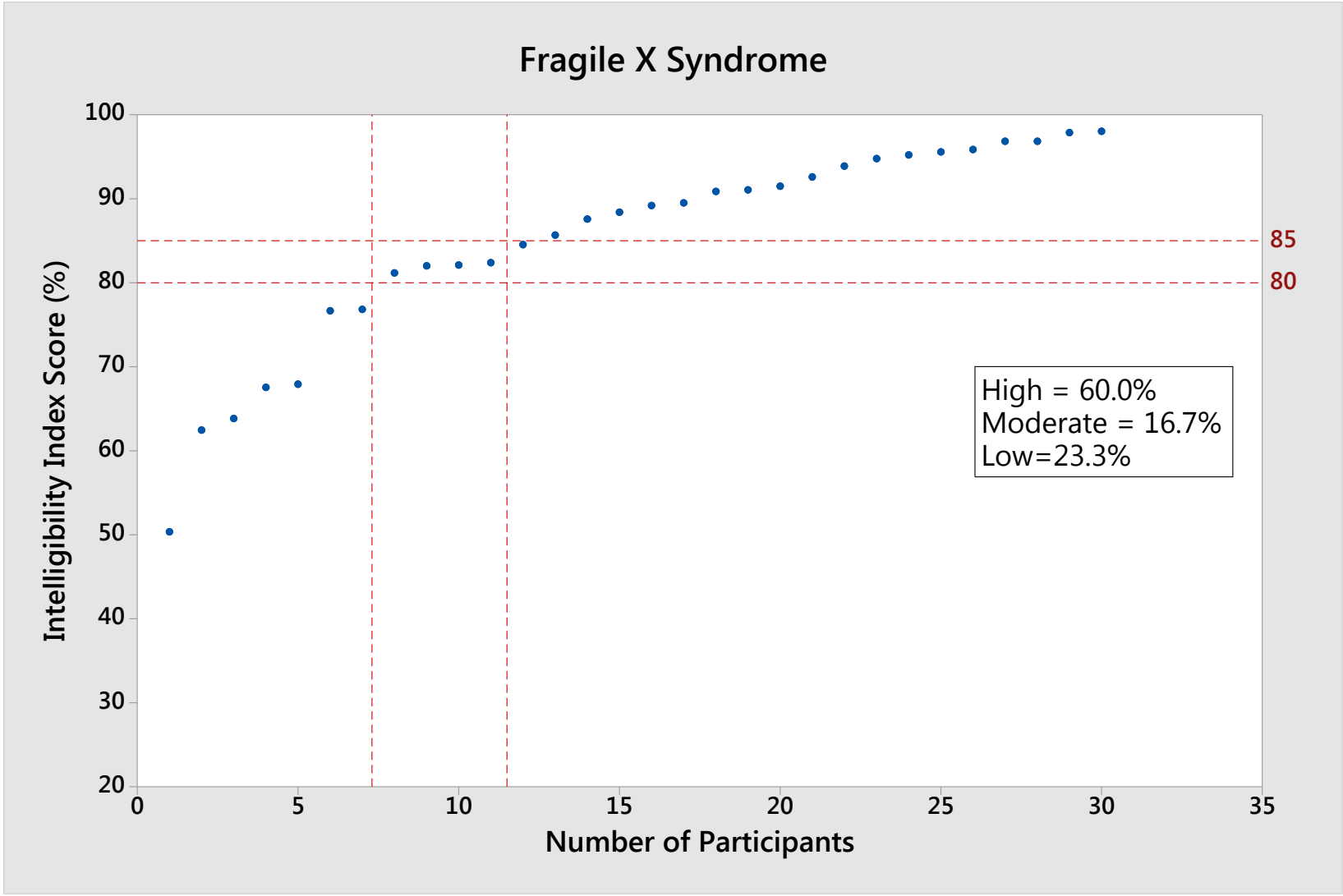
| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 8820 | 100.00 |
| "Words" used | 6329 | 71.76 |
| Disregard | 1137 | 12.89 |
| Either/Or | 2 | 0.02 |
| Unsure | 292 | 3.31 |
| Unintelligible | 1059 | 12.01 |
| INTELLIGIBILITY INDEX | | 82.38 |

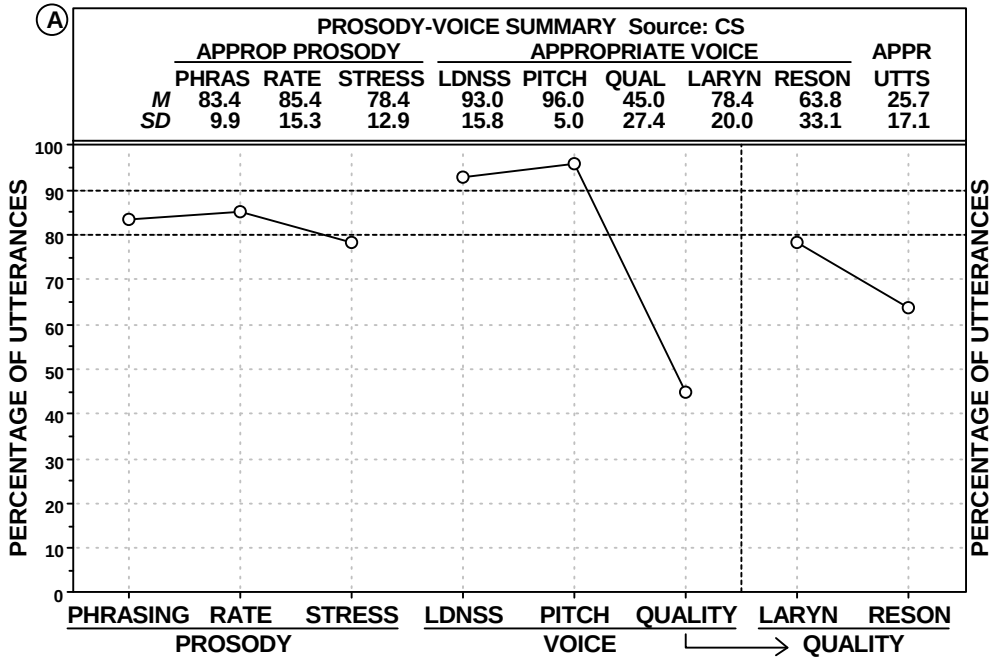
93.09

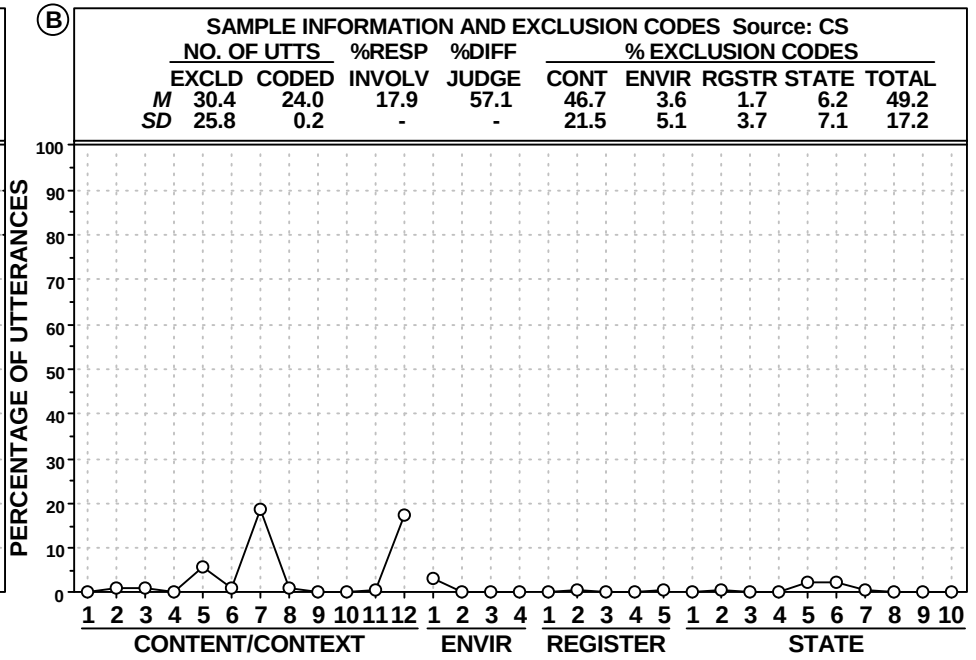
Percentage Consonants Correct (PCC)

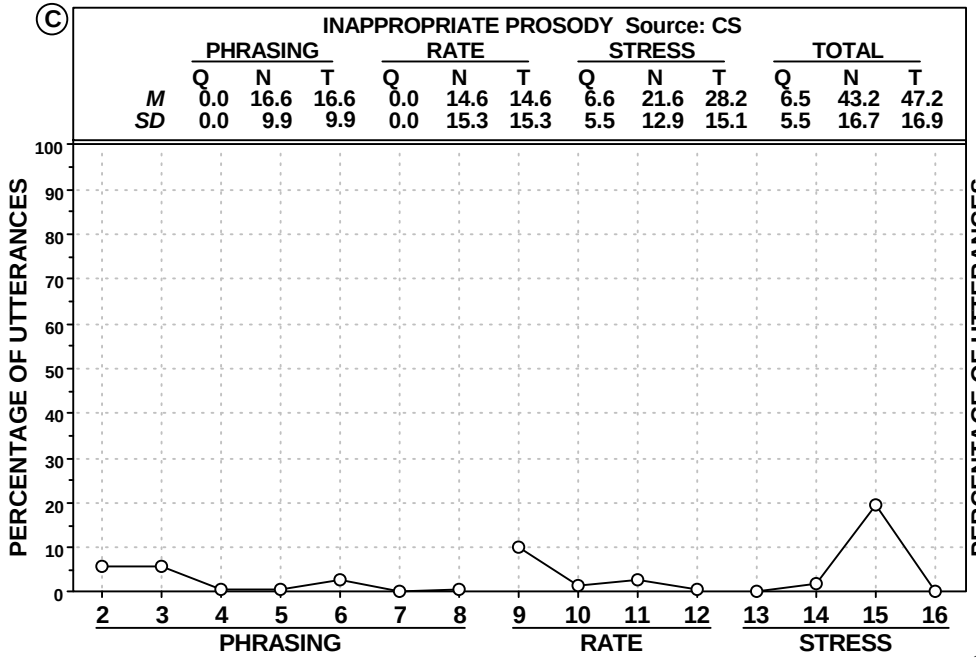
Severity Adjective

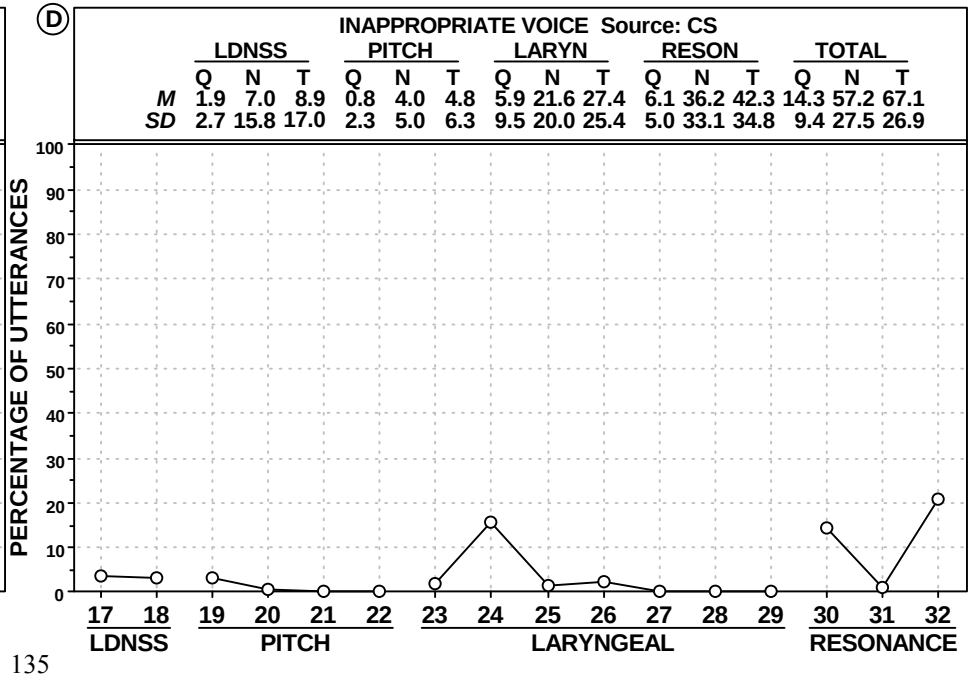
MILD


Fragile X Syndrome
Intelligibility Index Score (%)
100
90
80
70
60
50
40
30
20
0
5
10
15
20
25
30
35
Number of Participants
85
80
High = 60.0%
Moderate = 16.7%
Low=23.3%


A
PROSODY-VOICE SUMMARY Source: CS
APPROP PROSODY
APPROPRIATE VOICE
APPR
PHRAS RATE STRESS LDNSS PITCH QUAL LARYN RESON UTTS
M 83.4 85.4 78.4 93.0 96.0 45.0 78.4 63.8 25.7
SD 9.9 15.3 12.9 15.8 5.0 27.4 20.0 33.1 17.1
PERCENTAGE OF UTTERANCES
PHRASING RATE STRESS LDNSS PITCH QUALITY LARYN RESON
PROSODY
VOICE
QUALITY


B
SAMPLE INFORMATION AND EXCLUSION CODES Source: CS
NO. OF UTTS
%RESP
%DIFF
% EXCLUSION CODES
EXCLD CODED INVOLV JUDGE CONT ENVIR RGSTR STATE TOTAL
M 30.4 24.0 17.9 57.1 46.7 3.6 1.7 6.2 49.2
SD 25.8 0.2 - - 21.5 5.1 3.7 7.1 17.2
PERCENTAGE OF UTTERANCES
CONTENT/CONTEXT
ENVIR
REGISTER
STATE


C
INAPPROPRIATE PROSODY Source: CS
PHRASING
RATE
STRESS
TOTAL
Q N T Q N T Q N T Q N T
M 0.0 16.6 16.6 0.0 14.6 14.6 6.6 21.6 28.2 6.5 43.2 47.2
SD 0.0 9.9 9.9 0.0 15.3 15.3 5.5 12.9 15.1 5.5 16.7 16.9
PERCENTAGE OF UTTERANCES
PHRASING
RATE
STRESS


D
INAPPROPRIATE VOICE Source: CS
LDNSS
PITCH
LARYN
RESON
TOTAL
Q N T Q N T Q N T Q N T Q N T
M 1.9 7.0 8.9 0.8 4.0 4.8 5.9 21.6 27.4 6.1 36.2 42.3 14.3 57.2 67.1
SD 2.7 15.8 17.0 2.3 5.0 6.3 9.5 20.0 25.4 5.0 33.1 34.8 9.4 27.5 26.9
PERCENTAGE OF UTTERANCES
LDNSS
PITCH
LARYNGEAL
RESONANCE

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| Vowels | | | | | |
| | 1 | Decreased Percent vowels correct | 28/28 | 100.0 | VF |
| | 2 | Decreased Percent vowels correct non-rhotic | 28/28 | 100.0 | VF |
| | 3 | Decreased Percent vowels correct revised | 28/28 | 100.0 | VF |
| Consonants | | | | | |
| | 4 | Decreased Percent consonants correct | 26/28 | 92.9 | VF |
| | 5 | Decreased Percent consonants correct - early | 17/28 | 60.7 | F |
| | 6 | Decreased Percent consonants correct - middle | 25/28 | 89.3 | VF |
| | 7 | Decreased Percent consonants correct - late | 26/28 | 92.9 | VF |
| | 8 | Decreased Percent consonants correct adjusted | 26/28 | 92.9 | VF |
| | 9 | Decreased Percent consonants correct revised | 26/28 | 92.9 | VF |
| | 10 | Decreased Percent consonants correct revised - early | 14/28 | 50.0 | SF |
| | 11 | Decreased Percent consonants correct revised - middle | 25/28 | 89.3 | VF |
| | 12 | Decreased Percent consonants correct revised - late | 23/28 | 82.1 | VF |
| | 13 | Decreased Percent consonants in the inventory | 10/28 | 35.7 | SI |
| | 14 | Decreased Percent consonants in the inventory - early | 0/28 | 0.0 | I |
| | 15 | Decreased Percent consonants in the inventory - middle | 7/28 | 25.0 | SI |
| | 16 | Decreased Percent consonants in the inventory - late | 4/28 | 14.3 | I |
| | 17 | Increased Absolute omission index | 25/28 | 89.3 | VF |
| | 18 | Increased Absolute omission index - early | 12/28 | 42.9 | SF |
| | 19 | Increased Absolute omission index - middle | 24/28 | 85.7 | VF |
| | 20 | Increased Absolute omission index - late | 20/28 | 71.4 | F |
| | 21 | Increased Absolute substitution index | 25/28 | 89.3 | VF |
| | 22 | Increased Absolute substitution index - early | 15/28 | 53.6 | SF |
| | 23 | Increased Absolute substitution index - middle | 24/28 | 85.7 | VF |
| | 24 | Increased Absolute substitution index - late | 19/28 | 67.9 | F |
| | 25 | Increased Absolute distortion index | 26/28 | 92.9 | VF |
| | 26 | Increased Absolute distortion index - early | 15/28 | 53.6 | SF |
| | 27 | Increased Absolute distortion index - middle | 13/28 | 46.4 | SF |
| | 28 | Increased Absolute distortion index - late | 26/28 | 92.9 | VF |
| Vowels and Consonants | | | | | |
| | 29 | Decreased Intelligibility index | 28/28 | 100.0 | VF |
| | 30 | Decreased Percentage of phonemes correct | 28/28 | 100.0 | VF |
| | 31 | Decreased Percentage of phonemes correct revised | 27/28 | 96.4 | VF |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **9/28** | **32.1** | **SI** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **23/28** | **82.1** | **VF** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **16/28** | **57.1** | **SF** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **11/28** | **39.3** | **SI** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **4/28** | **14.3** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **9/28** | **32.1** | **SI** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **9/28** | **32.1** | **SI** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **28** | | **Very Frequent (VF): 80.0-100%** | **20** |
| **Mean** | **32.2** | | **Frequent (F): 60.0-79.9%** | **3** |
| **Standard Deviation** | **15.6** | | **Somewhat Frequent (SF): 40.0-59.9%** | **6** |
| **Range** | **13.2 - 73.7** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **6** |
| | | | **Infrequent (I): 0.0-19.9%** | **3** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 28 | 84.4 | -4.91 | 12.4 | 0.34 | 50.4 | -5.00 | 98.0 | -3.26 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | 16 | 57.1 | 5 | 17.9 | 7 | 25.0 | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 28 | 93.0 | -4.61 | 3.3 | 1.13 | 84.7 | -5.00 | 98.8 | -0.93 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 28 | 32.2 | | 15.6 | | 13.2 | | 73.7 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 28 | 35.7 |
| Rate | | 28 | 25.0 |
| Stress | | 28 | 53.6 |
| Loudness | | 28 | 10.7 |
| Pitch | | 28 | 0.0 |
| Laryngeal Quality | | 28 | 35.7 |
| Resonance Quality | | 28 | 60.7 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | | | | | | | | | |
| Encoding | | | | | | | | | | |
| Memory | | | | | | | | | | |
| Transcoding | | | | | | | | | | |

**MOTOR SPEECH MEASURES AND SUMMARIES:**

**Fragile X Syndrome (FXS)**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| **Vowels** | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 8/27 | 29.6 | SI |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 10/27 | 37.0 | SI |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 8/27 | 29.6 | SI |
| | 4 | Increased Duration of Corner Vowels | | X | 8/28 | 28.6 | SI |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 19/28 | 67.9 | F |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 0/0 | | |
| | 7 | Reduced % Vowel Target Consistency | X | | 0/0 | | |
| **Consonants** | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 2/28 | 7.1 | I |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/28 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 0/28 | 0.0 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 13/26 | 50.0 | SF |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 3/23 | 13.0 | I |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 16/23 | 69.6 | F |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 20/28 | 71.4 | F |
| | 15 | Increased All Consonant-Consonant Duration | | X | 8/28 | 28.6 | SI |
| **Vowels and Consonants** | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 28/28 | 100.0 | VF |
| | 17 | Increased DMI Class: Duration % | X | | 20/28 | 71.4 | F |
| | 18 | Increased % of Epenthesis Errors | X | | 24/28 | 85.7 | VF |
| **Phrasing** | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 9/28 | 32.1 | SI |
| **Rate** | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 11/28 | 39.3 | SI |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 11/28 | 39.3 | SI |
| **Stress** | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 16/28 | 57.1 | SF |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 9/28 | 32.1 | SI |
| **Loudness** | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 2/26 | 7.7 | I |
| **Pitch** | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 0/28 | 0.0 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 1/28 | 3.6 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **1/28** | **3.6** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **6/28** | **21.4** | **SI** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **7/28** | **25.0** | **SI** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **11/28** | **39.3** | **SI** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **5/28** | **17.9** | **I** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **12/28** | **42.9** | **SF** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **28** | | **Very Frequent (VF): 80.0-100%** | **2** |
| **Mean** | **65.1** | | **Frequent (F): 60.0-79.9%** | **4** |
| **Standard Deviation** | **10.3** | | **Somewhat Frequent (SF): 40.0-59.9%** | **3** |
| **Range** | **43.3 - 84.6** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **12** |
| | | | **Infrequent (I): 0.0-19.9%** | **9** |
| | | | **Not Used** | **2** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**FXS**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **21** | **75.0** | **F** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **28** | **100.0** | **VF** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **16** | **57.1** | **SF** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **7** | **25.0** | **SI** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **20** | **71.4** | **F** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **8** | **28.6** | **SI** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **9** | **32.1** | **SI** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **6** | **21.4** | **SI** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **6** | **21.4** | **SI** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **14** | **50.0** | **SF** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **8** | **28.6** | **SI** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **2** | **7.1** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **5** | **17.9** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **8** | **28.6** | **SI** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **2** | **7.1** | **I** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **11** | **39.3** | **SI** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **1** | **3.6** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **7** | **25.0** | **SI** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **6** | **21.4** | **SI** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **4** | **14.3** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **7** | **25.0** | **SI** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **3** | **10.7** | **I** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **10** | **35.7** | **SI** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **0** | **0.0** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **1** | **3.6** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **1** | **3.6** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **5** | **17.9** | **I** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **1** | **3.6** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **8** | **28.6** | **SI** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **2** | **7.1** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **28** |
| **Mean Percentage Score** | **76.2** |
| **Standard Deviation** | **8.3** |
| **Range** | **55.9 - 91.2** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **66.2** | **75.6** | **73.9** | **80.8** | **81.9** |
| **Mean DSI Percentile Score** | **36.4** | **34.7** | **32.4** | **36.7** | **30.3** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **17.9** | **14.3** | **7.1** | **35.7** | **32.1** |

**FXS**

**Pause Marker Summary (PMS): Group**

**Group: All *n*: 28**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 27 | 96.4 | Abrupt | 28 | 1.3 | Long | 28 | 0.4 |
| PM+ | 1 | 3.6 | 1 | 3.6 | Code 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | Mild-Moderate | 0 | 0.0 | Alone | 28 | 0.3 | Repeat/Revise | 28 | 0.2 |
| PM- | 26 | 92.9 | 27 | 96.4 | Code 0 | 1 | 100.0 | 1 | 100.0 | 0 | 0.0 | Moderate-Severe | 1 | 3.6 | Change | 28 | 0.2 | Breath | 28 | 0.0 |
| ?[a] | 1 | 3.6 | 0 | 0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 28 | 0.1 | Addition | 28 | 0.0 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

**SUMMARY SPEECH AND MOTOR SPEECH CLASSIFICATIONS:**

**Fragile X Syndrome (FXS)**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Speech Classification | | Motor Speech Classification | | | | | | Totals | |
| | | No Motor Speech Disorder (NO MSD) | Speech Motor Delay (SMD) | Childhood Dysarthria (CD) | Childhood Apraxia of Speech (CAS) | Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS) | | n | % |
| Normal(ized) Speech Aquisition (NSA)[a] | | 4 | 2 | 5 | 0 | 0 | | 11 | 39.3 |
| Speech Errors (SE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Errors (PSE) | | 1 | 1 | 1 | 0 | 0 | | 3 | 10.7 |
| (SE/PSE) | | 1 | 1 | 1 | 0 | 0 | | 3 | 10.7 |
| Speech Delay (SD) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Delay (PSD) | | 5 | 5 | 3 | 1 | 0 | | 14 | 50.0 |
| (SD/PSD) | | 5 | 5 | 3 | 1 | 0 | | 14 | 50.0 |
| | | | | | | | | | |
| Totals | n | 10 | 8 | 9 | 1 | 0 | | 28 | |
| | % | 35.7 | 28.6 | 32.1 | 3.6 | 0.0 | | | 100.0 |

[a] Includes children younger than 9 years old with age-appropriate distortions

**SPEECH MEASURES AND SUMMARIES:**

**Galactosemia (GAL)**

## PERCENTAGE CONSONANTS CORRECT (PCC)

GAL: Younger Group

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 227 | 6 | 115 | 6 | 205 | 6 | 547 | 565 | 6.90 | 96.81 |
| | n | 237 | 4 | 95 | 17 | 861 | 82 | 1193 | 1296 | 15.82 | 92.05 |
| | ŋ | 0 | 0 | 3 | 0 | 57 | 3 | 60 | 63 | 0.77 | 95.24 |
| Glides | w | 354 | 18 | 26 | 1 | 0 | 0 | 380 | 399 | 4.87 | 95.24 |
| | j | 178 | 19 | 10 | 1 | 0 | 0 | 188 | 208 | 2.54 | 90.38 |
| Stops | p | 141 | 10 | 39 | 9 | 43 | 3 | 223 | 245 | 2.99 | 91.02 |
| | b | 184 | 6 | 62 | 6 | 6 | 0 | 252 | 264 | 3.22 | 95.45 |
| | t | 185 | 21 | 131 | 21 | 463 | 141 | 779 | 962 | 11.75 | 80.98 |
| | d | 181 | 15 | 60 | 16 | 225 | 16 | 466 | 513 | 6.26 | 90.84 |
| | k | 128 | 14 | 100 | 21 | 166 | 37 | 394 | 466 | 5.69 | 84.55 |
| | g | 124 | 48 | 21 | 9 | 13 | 7 | 158 | 222 | 2.71 | 71.17 |
| Fricatives and Affricates | f | 92 | 2 | 22 | 0 | 35 | 0 | 149 | 151 | 1.84 | 98.68 |
| | v | 4 | 0 | 33 | 1 | 60 | 6 | 97 | 104 | 1.27 | 93.27 |
| | θ | 14 | 11 | 24 | 10 | 19 | 12 | 57 | 90 | 1.10 | 63.33 |
| | ð | 194 | 112 | 9 | 8 | 0 | 0 | 203 | 323 | 3.94 | 62.85 |
| | s | 159 | 54 | 76 | 22 | 232 | 50 | 467 | 593 | 7.24 | 78.75 |
| | z | 2 | 0 | 11 | 8 | 305 | 62 | 318 | 388 | 4.74 | 81.96 |
| | ʃ | 42 | 24 | 14 | 3 | 16 | 0 | 72 | 99 | 1.21 | 72.73 |
| | ʒ | 0 | 0 | 2 | 1 | 0 | 0 | 2 | 3 | 0.04 | 66.67 |
| | h | 195 | 23 | 22 | 0 | 0 | 0 | 217 | 240 | 2.93 | 90.42 |
| | tʃ | 9 | 2 | 10 | 8 | 14 | 6 | 33 | 49 | 0.60 | 67.35 |
| | ʤ | 15 | 13 | 7 | 2 | 2 | 0 | 24 | 39 | 0.48 | 61.54 |
| Liquids | l | 131 | 22 | 89 | 27 | 108 | 73 | 328 | 450 | 5.49 | 72.89 |
| | r | 127 | 86 | 40 | 28 | 87 | 90 | 254 | 458 | 5.59 | 55.46 |
| Percent Correct | | 85.14 | | 81.94 | | 83.08 | | 6861 | 8190 | | |
| | | | | | | | | Correct | Total | | |

| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 5889 | 100.00 |
| "Words" used | 4577 | 77.72 |
| Disregard | 829 | 14.08 |
| Either/Or | 1 | 0.02 |
| Unsure | 102 | 1.73 |
| Unintelligible | 380 | 6.45 |
| INTELLIGIBILITY INDEX | | 90.45 |

83.77

Percentage Consonants Correct (PCC)

Severity Adjective

MILD-MODERATE

## PERCENTAGE CONSONANTS CORRECT (PCC)

GAL: Older Group

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 107 | 1 | 50 | 2 | 93 | 3 | 250 | 256 | 5.90 | 97.66 |
| | n | 95 | 1 | 69 | 0 | 383 | 23 | 547 | 571 | 13.16 | 95.80 |
| | ŋ | 0 | 0 | 11 | 0 | 44 | 2 | 55 | 57 | 1.31 | 96.49 |
| Glides | w | 208 | 25 | 22 | 1 | 0 | 0 | 230 | 256 | 5.90 | 89.84 |
| | j | 78 | 13 | 4 | 3 | 0 | 0 | 82 | 98 | 2.26 | 83.67 |
| Stops | p | 59 | 0 | 37 | 0 | 22 | 3 | 118 | 121 | 2.79 | 97.52 |
| | b | 108 | 9 | 32 | 0 | 5 | 0 | 145 | 154 | 3.55 | 94.16 |
| | t | 126 | 4 | 83 | 6 | 247 | 50 | 456 | 516 | 11.89 | 88.37 |
| | d | 86 | 4 | 51 | 8 | 114 | 11 | 251 | 274 | 6.31 | 91.61 |
| | k | 75 | 0 | 53 | 12 | 85 | 12 | 213 | 237 | 5.46 | 89.87 |
| | g | 79 | 2 | 23 | 2 | 13 | 3 | 115 | 122 | 2.81 | 94.26 |
| Fricatives and Affricates | f | 63 | 2 | 15 | 2 | 9 | 0 | 87 | 91 | 2.10 | 95.60 |
| | v | 9 | 0 | 29 | 0 | 38 | 2 | 76 | 78 | 1.80 | 97.44 |
| | θ | 13 | 4 | 15 | 2 | 8 | 8 | 36 | 50 | 1.15 | 72.00 |
| | ð | 128 | 58 | 15 | 4 | 2 | 0 | 145 | 207 | 4.77 | 70.05 |
| | s | 91 | 29 | 44 | 5 | 109 | 25 | 244 | 303 | 6.98 | 80.53 |
| | z | 0 | 0 | 9 | 3 | 142 | 40 | 151 | 194 | 4.47 | 77.84 |
| | ʃ | 25 | 2 | 9 | 1 | 6 | 5 | 40 | 48 | 1.11 | 83.33 |
| | ʒ | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0.05 | 0.00 |
| | h | 118 | 1 | 15 | 0 | 0 | 0 | 133 | 134 | 3.09 | 99.25 |
| | tʃ | 2 | 3 | 4 | 1 | 12 | 9 | 18 | 31 | 0.71 | 58.06 |
| | ʤ | 19 | 5 | 3 | 1 | 6 | 2 | 28 | 36 | 0.83 | 77.78 |
| Liquids | l | 73 | 22 | 46 | 14 | 100 | 26 | 219 | 281 | 6.48 | 77.94 |
| | r | 50 | 31 | 42 | 21 | 42 | 36 | 134 | 222 | 5.12 | 60.36 |
| Percent Correct | | 88.18 | | 88.33 | | 85.06 | | 3773 | 4339 | | |
| | | | | | | | | Correct | Total | | |

| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 2727 | 100.00 |
| "Words" used | 2349 | 86.14 |
| Disregard | 267 | 9.79 |
| Either/Or | 0 | 0.00 |
| Unsure | 38 | 1.39 |
| Unintelligible | 73 | 2.68 |
| INTELLIGIBILITY INDEX | | 95.49 |

86.96

Percentage Consonants Correct (PCC)

Severity Adjective

MILD

## PERCENTAGE CONSONANTS CORRECT (PCC)

GAL: Combined

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 334 | 7 | 165 | 8 | 298 | 9 | 797 | 821 | 6.55 | 97.08 |
| | n | 332 | 5 | 164 | 17 | 1244 | 105 | 1740 | 1867 | 14.90 | 93.20 |
| | ŋ | 0 | 0 | 14 | 0 | 101 | 5 | 115 | 120 | 0.96 | 95.83 |
| Glides | w | 562 | 43 | 48 | 2 | 0 | 0 | 610 | 655 | 5.23 | 93.13 |
| | j | 256 | 32 | 14 | 4 | 0 | 0 | 270 | 306 | 2.44 | 88.24 |
| Stops | p | 200 | 10 | 76 | 9 | 65 | 6 | 341 | 366 | 2.92 | 93.17 |
| | b | 292 | 15 | 94 | 6 | 11 | 0 | 397 | 418 | 3.34 | 94.98 |
| | t | 311 | 25 | 214 | 27 | 710 | 191 | 1235 | 1478 | 11.80 | 83.56 |
| | d | 267 | 19 | 111 | 24 | 339 | 27 | 717 | 787 | 6.28 | 91.11 |
| | k | 203 | 14 | 153 | 33 | 251 | 49 | 607 | 703 | 5.61 | 86.34 |
| | g | 203 | 50 | 44 | 11 | 26 | 10 | 273 | 344 | 2.75 | 79.36 |
| Fricatives and Affricates | f | 155 | 4 | 37 | 2 | 44 | 0 | 236 | 242 | 1.93 | 97.52 |
| | v | 13 | 0 | 62 | 1 | 98 | 8 | 173 | 182 | 1.45 | 95.05 |
| | θ | 27 | 15 | 39 | 12 | 27 | 20 | 93 | 140 | 1.12 | 66.43 |
| | ð | 322 | 170 | 24 | 12 | 2 | 0 | 348 | 530 | 4.23 | 65.66 |
| | s | 250 | 83 | 120 | 27 | 341 | 75 | 711 | 896 | 7.15 | 79.35 |
| | z | 2 | 0 | 20 | 11 | 447 | 102 | 469 | 582 | 4.65 | 80.58 |
| | ʃ | 67 | 26 | 23 | 4 | 22 | 5 | 112 | 147 | 1.17 | 76.19 |
| | ʒ | 0 | 0 | 2 | 3 | 0 | 0 | 2 | 5 | 0.04 | 40.00 |
| | h | 313 | 24 | 37 | 0 | 0 | 0 | 350 | 374 | 2.99 | 93.58 |
| | tʃ | 11 | 5 | 14 | 9 | 26 | 15 | 51 | 80 | 0.64 | 63.75 |
| | ʤ | 34 | 18 | 10 | 3 | 8 | 2 | 52 | 75 | 0.60 | 69.33 |
| Liquids | l | 204 | 44 | 135 | 41 | 208 | 99 | 547 | 731 | 5.83 | 74.83 |
| | r | 177 | 117 | 82 | 49 | 129 | 126 | 388 | 680 | 5.43 | 57.06 |
| Percent Correct | | 86.20 | | 84.38 | | 83.74 | | 10634 | 12529 | | |
| | | | | | | | | Correct | Total | | |

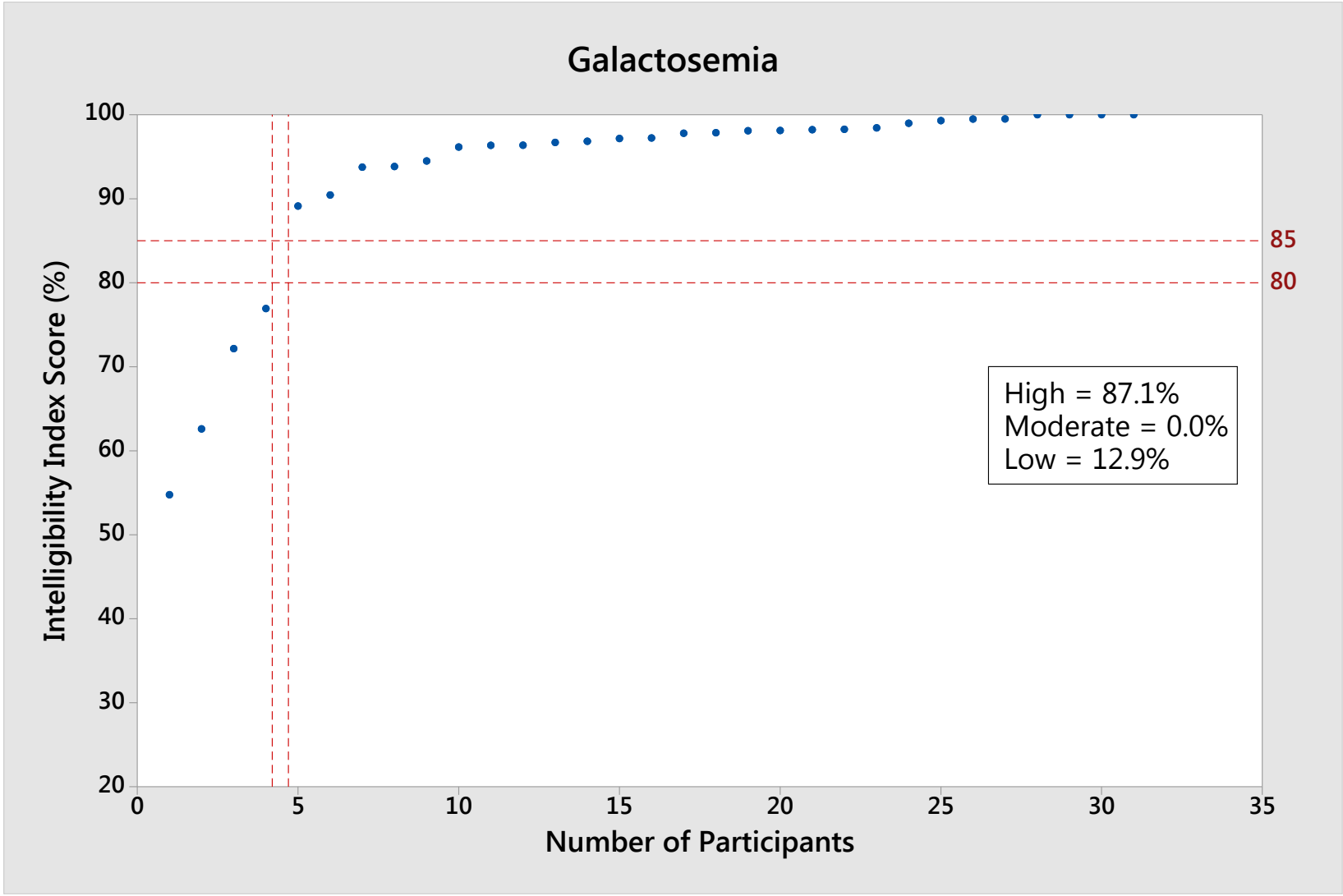
| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 8616 | 100.00 |
| "Words" used | 6926 | 80.39 |
| Disregard | 1096 | 12.72 |
| Either/Or | 1 | 0.01 |
| Unsure | 140 | 1.62 |
| Unintelligible | 453 | 5.26 |
| INTELLIGIBILITY INDEX | | 92.10 |

84.88

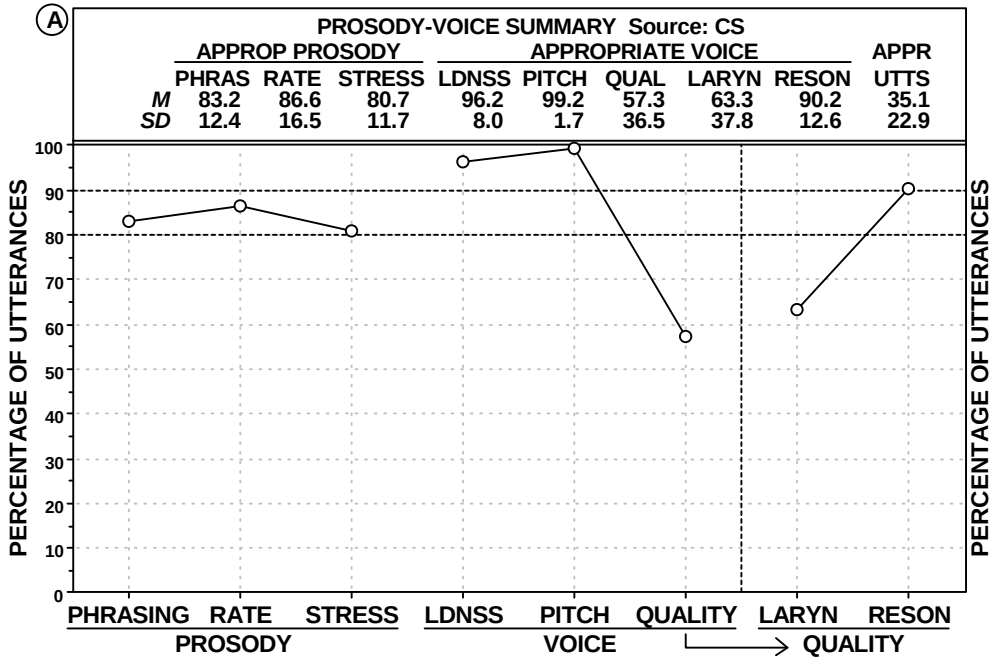
Percentage Consonants Correct (PCC)

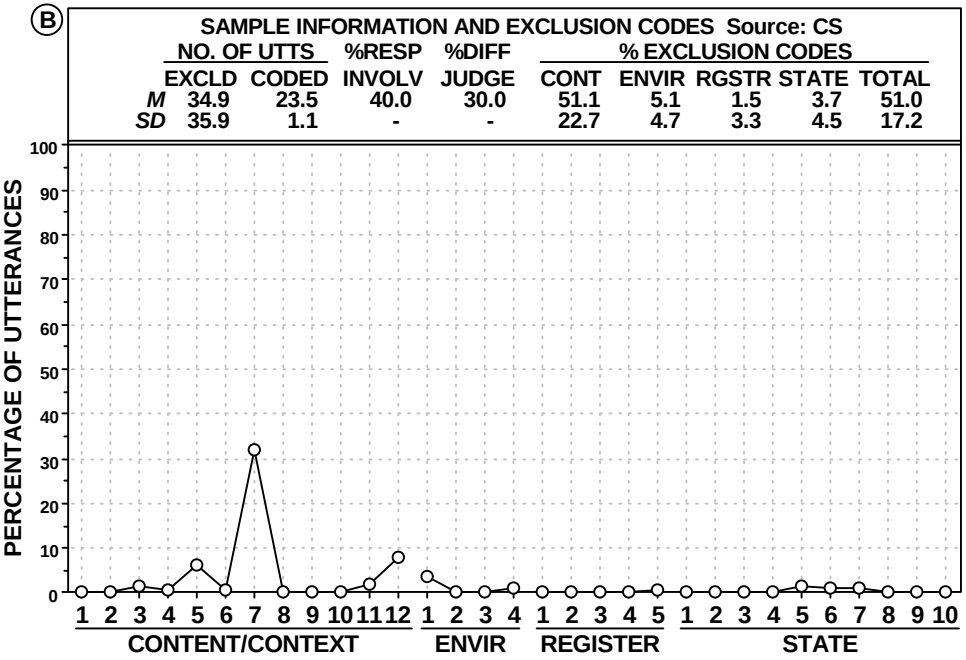
Severity Adjective

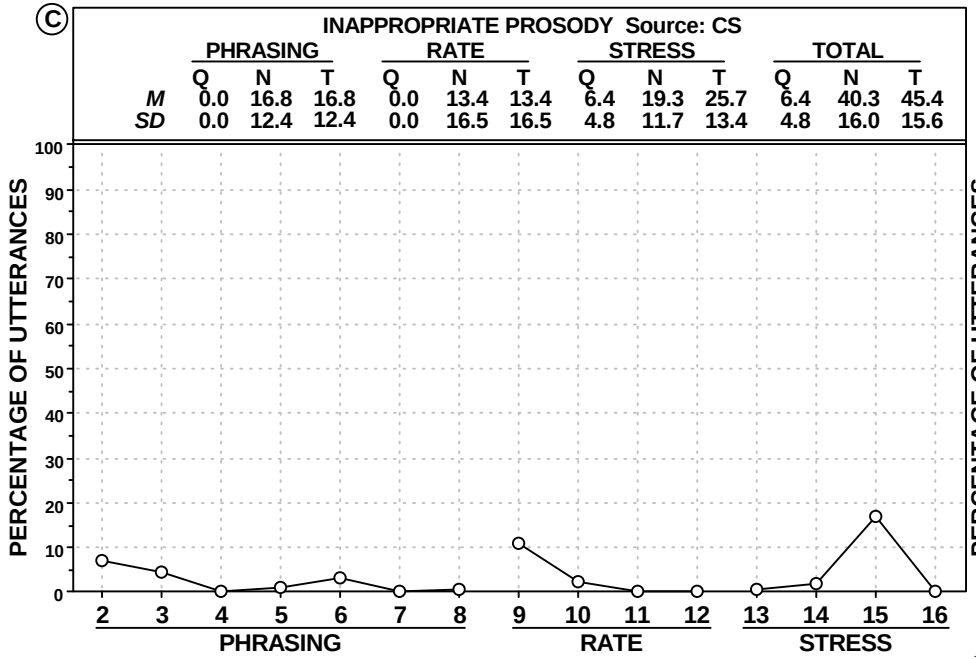
MILD-MODERATE

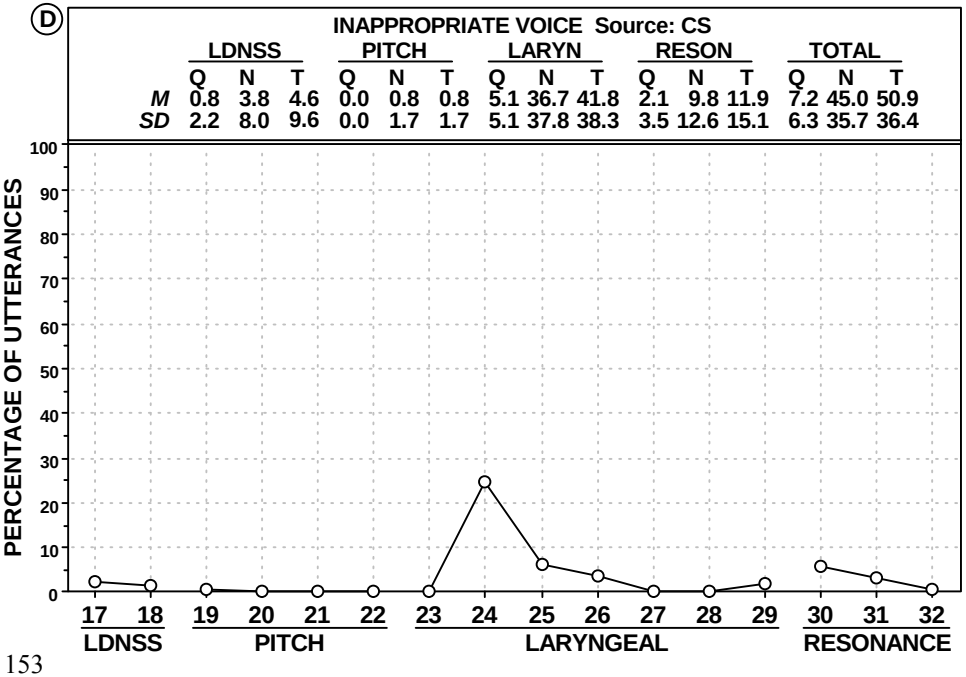

Galactosemia
Intelligibility Index Score (%)
100
90
80
70
60
50
40
30
20
0
5
10
15
20
25
30
35
Number of Participants
85
80
High = 87.1%
Moderate = 0.0%
Low = 12.9%

GAL: PVSP
Younger Group

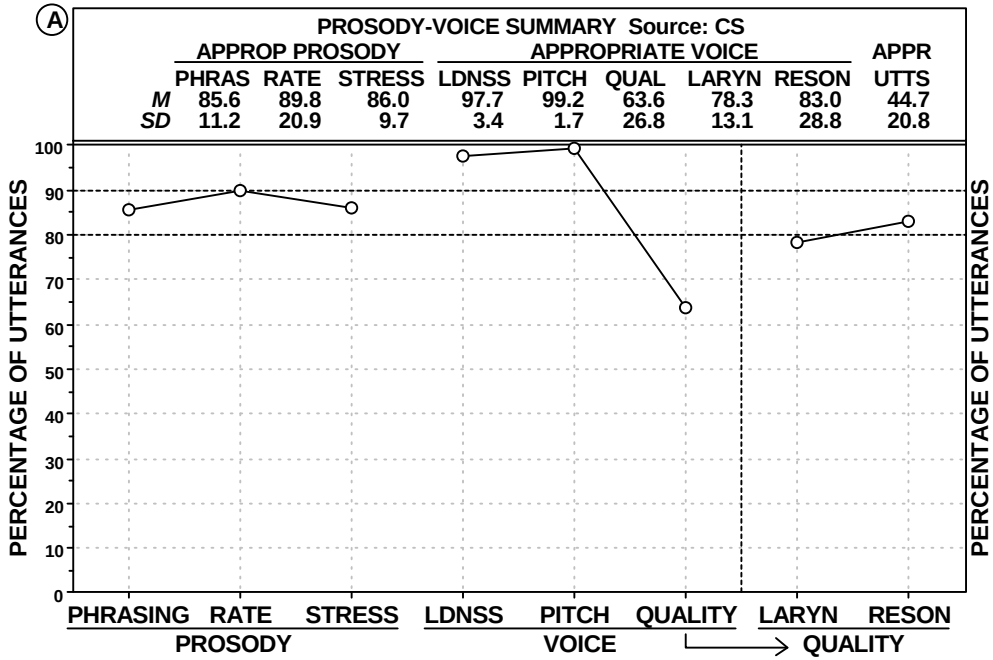


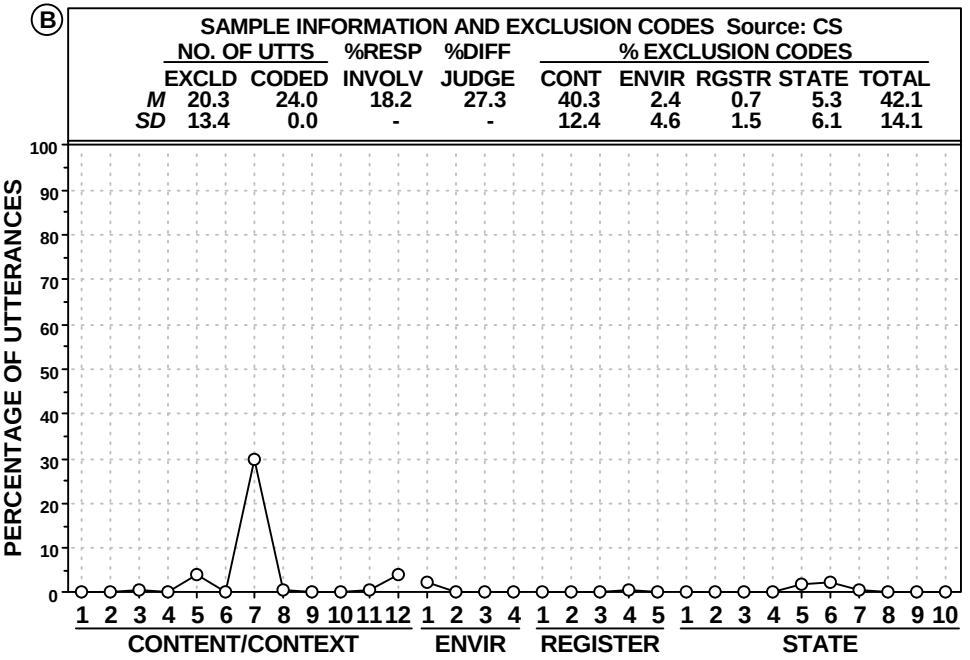



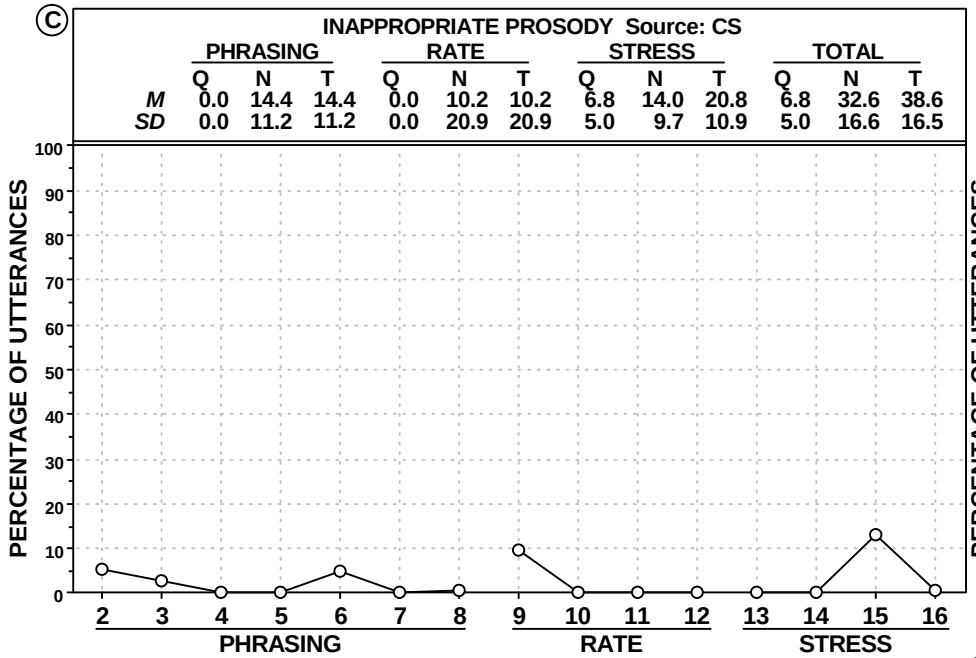



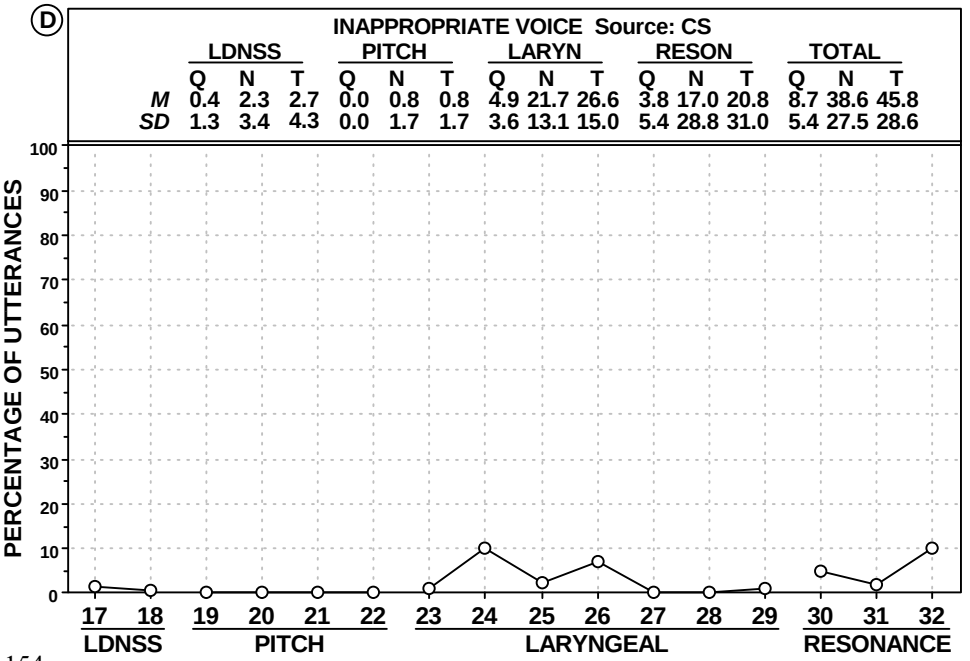



GAL: PVSP
Older Group

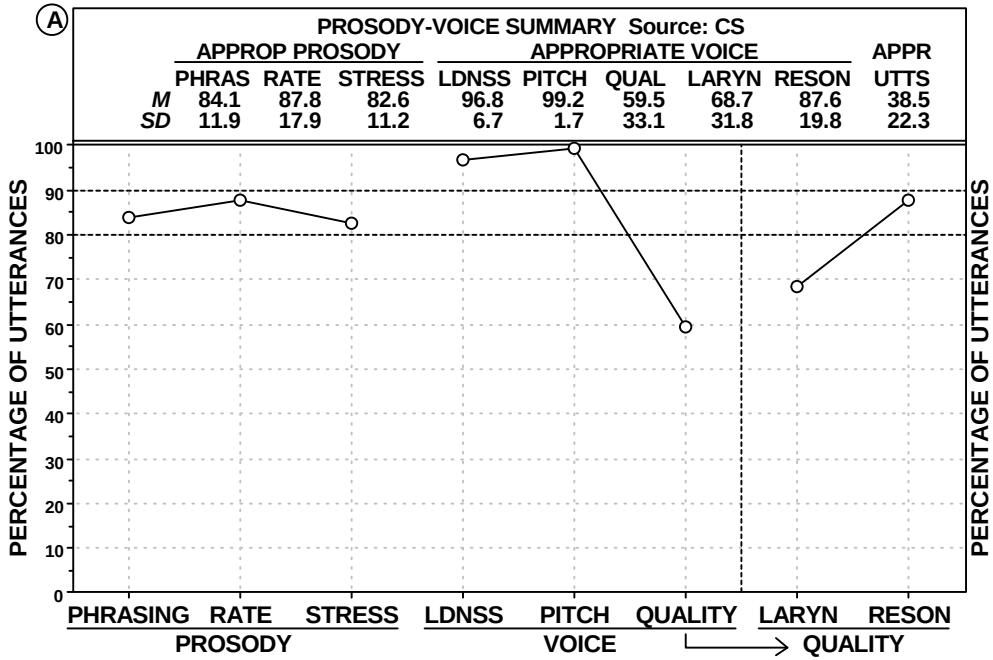


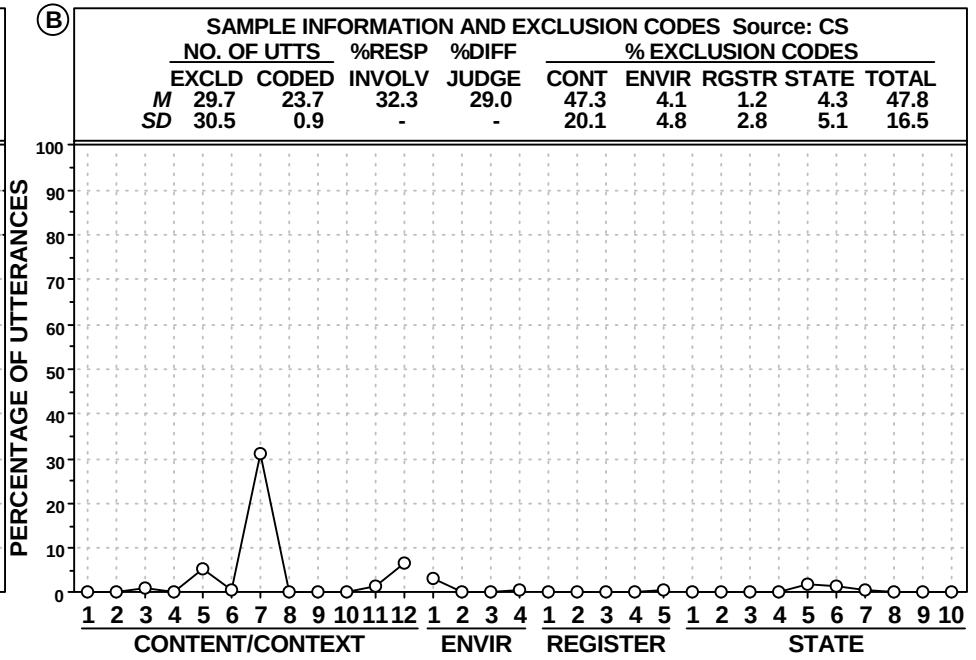



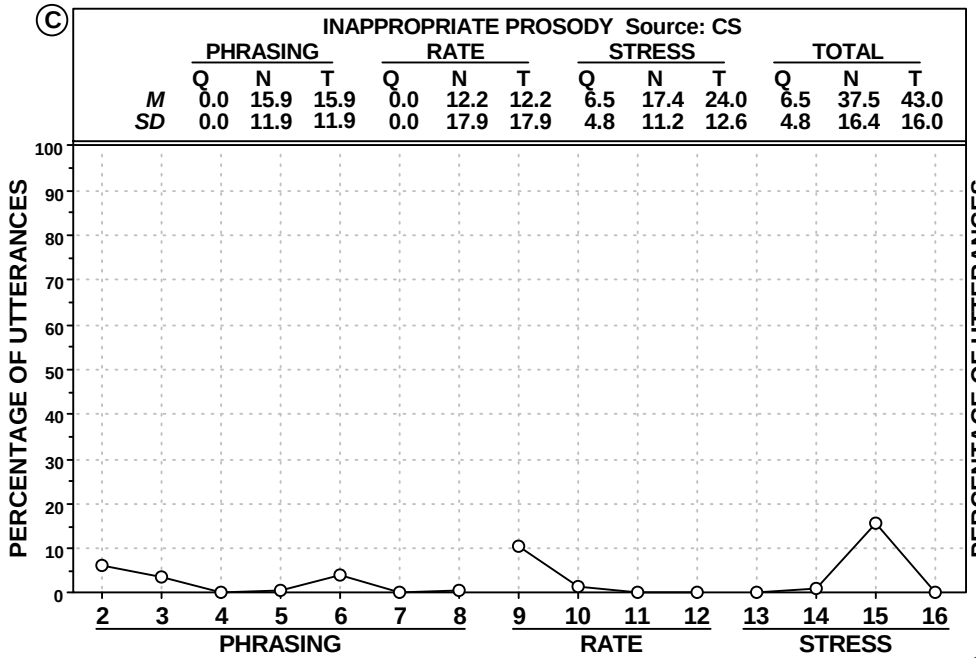



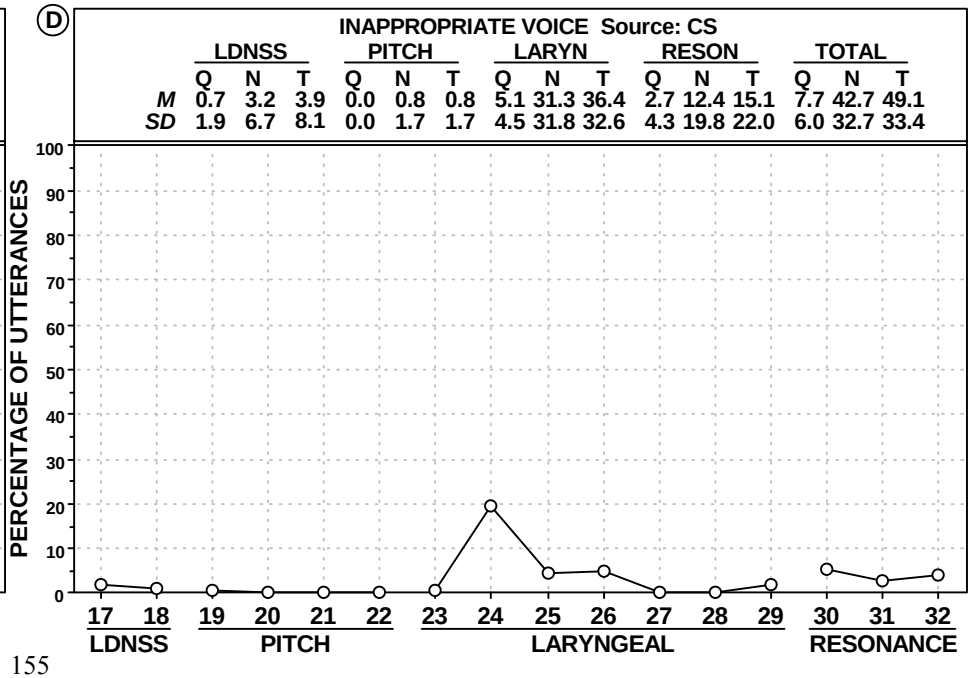



GAL: PVSP
Combined



# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| **Vowels** | | | | | |
| | **1** | **Decreased Percent vowels correct** | **14/20** | **70.0** | **F** |
| | **2** | **Decreased Percent vowels correct non-rhotic** | **15/20** | **75.0** | **F** |
| | **3** | **Decreased Percent vowels correct revised** | **14/20** | **70.0** | **F** |
| **Consonants** | | | | | |
| | **4** | **Decreased Percent consonants correct** | **14/20** | **70.0** | **F** |
| | **5** | **Decreased Percent consonants correct - early** | **14/20** | **70.0** | **F** |
| | **6** | **Decreased Percent consonants correct - middle** | **15/20** | **75.0** | **F** |
| | **7** | **Decreased Percent consonants correct - late** | **13/20** | **65.0** | **F** |
| | **8** | **Decreased Percent consonants correct adjusted** | **17/20** | **85.0** | **VF** |
| | **9** | **Decreased Percent consonants correct revised** | **15/20** | **75.0** | **F** |
| | **10** | **Decreased Percent consonants correct revised - early** | **11/20** | **55.0** | **SF** |
| | **11** | **Decreased Percent consonants correct revised - middle** | **15/20** | **75.0** | **F** |
| | **12** | **Decreased Percent consonants correct revised - late** | **12/20** | **60.0** | **F** |
| | **13** | **Decreased Percent consonants in the inventory** | **11/20** | **55.0** | **SF** |
| | **14** | **Decreased Percent consonants in the inventory - early** | **2/20** | **10.0** | **I** |
| | **15** | **Decreased Percent consonants in the inventory - middle** | **6/20** | **30.0** | **SI** |
| | **16** | **Decreased Percent consonants in the inventory - late** | **11/20** | **55.0** | **SF** |
| | **17** | **Increased Absolute omission index** | **15/20** | **75.0** | **F** |
| | **18** | **Increased Absolute omission index - early** | **10/20** | **50.0** | **SF** |
| | **19** | **Increased Absolute omission index - middle** | **16/20** | **80.0** | **VF** |
| | **20** | **Increased Absolute omission index - late** | **13/20** | **65.0** | **F** |
| | **21** | **Increased Absolute substitution index** | **14/20** | **70.0** | **F** |
| | **22** | **Increased Absolute substitution index - early** | **7/20** | **35.0** | **SI** |
| | **23** | **Increased Absolute substitution index - middle** | **14/20** | **70.0** | **F** |
| | **24** | **Increased Absolute substitution index - late** | **12/20** | **60.0** | **F** |
| | **25** | **Increased Absolute distortion index** | **8/20** | **40.0** | **SF** |
| | **26** | **Increased Absolute distortion index - early** | **10/20** | **50.0** | **SF** |
| | **27** | **Increased Absolute distortion index - middle** | **7/20** | **35.0** | **SI** |
| | **28** | **Increased Absolute distortion index - late** | **8/20** | **40.0** | **SF** |
| **Vowels and Consonants** | | | | | |
| | **29** | **Decreased Intelligibility index** | **16/20** | **80.0** | **VF** |
| | **30** | **Decreased Percentage of phonemes correct** | **15/20** | **75.0** | **F** |
| | **31** | **Decreased Percentage of phonemes correct revised** | **16/20** | **80.0** | **VF** |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **6/20** | **30.0** | **SI** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **15/20** | **75.0** | **F** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **6/20** | **30.0** | **SI** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **1/20** | **5.0** | **I** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **0/20** | **0.0** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **8/20** | **40.0** | **SF** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **1/20** | **5.0** | **I** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **20** | | **Very Frequent (VF): 80.0-100%** | **4** |
| **Mean** | **45.1** | | **Frequent (F): 60.0-79.9%** | **17** |
| **Standard Deviation** | **25.1** | | **Somewhat Frequent (SF): 40.0-59.9%** | **8** |
| **Range** | **15.8 - 92.1** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **5** |
| | | | **Infrequent (I): 0.0-19.9%** | **4** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| **Vowels** | | | | | |
| | **1** | **Decreased Percent vowels correct** | **11/11** | **100.0** | **VF** |
| | **2** | **Decreased Percent vowels correct non-rhotic** | **9/11** | **81.8** | **VF** |
| | **3** | **Decreased Percent vowels correct revised** | **10/11** | **90.9** | **VF** |
| **Consonants** | | | | | |
| | **4** | **Decreased Percent consonants correct** | **11/11** | **100.0** | **VF** |
| | **5** | **Decreased Percent consonants correct - early** | **6/11** | **54.5** | **SF** |
| | **6** | **Decreased Percent consonants correct - middle** | **9/11** | **81.8** | **VF** |
| | **7** | **Decreased Percent consonants correct - late** | **9/11** | **81.8** | **VF** |
| | **8** | **Decreased Percent consonants correct adjusted** | **11/11** | **100.0** | **VF** |
| | **9** | **Decreased Percent consonants correct revised** | **11/11** | **100.0** | **VF** |
| | **10** | **Decreased Percent consonants correct revised - early** | **6/11** | **54.5** | **SF** |
| | **11** | **Decreased Percent consonants correct revised - middle** | **9/11** | **81.8** | **VF** |
| | **12** | **Decreased Percent consonants correct revised - late** | **8/11** | **72.7** | **F** |
| | **13** | **Decreased Percent consonants in the inventory** | **5/11** | **45.5** | **SF** |
| | **14** | **Decreased Percent consonants in the inventory - early** | **1/11** | **9.1** | **I** |
| | **15** | **Decreased Percent consonants in the inventory - middle** | **4/11** | **36.4** | **SI** |
| | **16** | **Decreased Percent consonants in the inventory - late** | **2/11** | **18.2** | **I** |
| | **17** | **Increased Absolute omission index** | **8/11** | **72.7** | **F** |
| | **18** | **Increased Absolute omission index - early** | **5/11** | **45.5** | **SF** |
| | **19** | **Increased Absolute omission index - middle** | **7/11** | **63.6** | **F** |
| | **20** | **Increased Absolute omission index - late** | **7/11** | **63.6** | **F** |
| | **21** | **Increased Absolute substitution index** | **9/11** | **81.8** | **VF** |
| | **22** | **Increased Absolute substitution index - early** | **6/11** | **54.5** | **SF** |
| | **23** | **Increased Absolute substitution index - middle** | **11/11** | **100.0** | **VF** |
| | **24** | **Increased Absolute substitution index - late** | **9/11** | **81.8** | **VF** |
| | **25** | **Increased Absolute distortion index** | **7/11** | **63.6** | **F** |
| | **26** | **Increased Absolute distortion index - early** | **10/11** | **90.9** | **VF** |
| | **27** | **Increased Absolute distortion index - middle** | **3/11** | **27.3** | **SI** |
| | **28** | **Increased Absolute distortion index - late** | **6/11** | **54.5** | **SF** |
| **Vowels and Consonants** | | | | | |
| | **29** | **Decreased Intelligibility index** | **6/11** | **54.5** | **SF** |
| | **30** | **Decreased Percentage of phonemes correct** | **11/11** | **100.0** | **VF** |
| | **31** | **Decreased Percentage of phonemes correct revised** | **11/11** | **100.0** | **VF** |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **3/11** | **27.3** | **SI** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **5/11** | **45.5** | **SF** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **3/11** | **27.3** | **SI** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **1/11** | **9.1** | **I** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **0/11** | **0.0** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **1/11** | **9.1** | **I** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **2/11** | **18.2** | **I** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **11** | | **Very Frequent (VF): 80.0-100%** | **15** |
| **Mean** | **39.5** | | **Frequent (F): 60.0-79.9%** | **5** |
| **Standard Deviation** | **15.9** | | **Somewhat Frequent (SF): 40.0-59.9%** | **8** |
| **Range** | **18.4 - 63.2** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **4** |
| | | | **Infrequent (I): 0.0-19.9%** | **6** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| Vowels | | | | | |
| | 1 | Decreased Percent vowels correct | 25/31 | 80.6 | VF |
| | 2 | Decreased Percent vowels correct non-rhotic | 24/31 | 77.4 | F |
| | 3 | Decreased Percent vowels correct revised | 24/31 | 77.4 | F |
| Consonants | | | | | |
| | 4 | Decreased Percent consonants correct | 25/31 | 80.6 | VF |
| | 5 | Decreased Percent consonants correct - early | 20/31 | 64.5 | F |
| | 6 | Decreased Percent consonants correct - middle | 24/31 | 77.4 | F |
| | 7 | Decreased Percent consonants correct - late | 22/31 | 71.0 | F |
| | 8 | Decreased Percent consonants correct adjusted | 28/31 | 90.3 | VF |
| | 9 | Decreased Percent consonants correct revised | 26/31 | 83.9 | VF |
| | 10 | Decreased Percent consonants correct revised - early | 17/31 | 54.8 | SF |
| | 11 | Decreased Percent consonants correct revised - middle | 24/31 | 77.4 | F |
| | 12 | Decreased Percent consonants correct revised - late | 20/31 | 64.5 | F |
| | 13 | Decreased Percent consonants in the inventory | 16/31 | 51.6 | SF |
| | 14 | Decreased Percent consonants in the inventory - early | 3/31 | 9.7 | I |
| | 15 | Decreased Percent consonants in the inventory - middle | 10/31 | 32.3 | SI |
| | 16 | Decreased Percent consonants in the inventory - late | 13/31 | 41.9 | SF |
| | 17 | Increased Absolute omission index | 23/31 | 74.2 | F |
| | 18 | Increased Absolute omission index - early | 15/31 | 48.4 | SF |
| | 19 | Increased Absolute omission index - middle | 23/31 | 74.2 | F |
| | 20 | Increased Absolute omission index - late | 20/31 | 64.5 | F |
| | 21 | Increased Absolute substitution index | 23/31 | 74.2 | F |
| | 22 | Increased Absolute substitution index - early | 13/31 | 41.9 | SF |
| | 23 | Increased Absolute substitution index - middle | 25/31 | 80.6 | VF |
| | 24 | Increased Absolute substitution index - late | 21/31 | 67.7 | F |
| | 25 | Increased Absolute distortion index | 15/31 | 48.4 | SF |
| | 26 | Increased Absolute distortion index - early | 20/31 | 64.5 | F |
| | 27 | Increased Absolute distortion index - middle | 10/31 | 32.3 | SI |
| | 28 | Increased Absolute distortion index - late | 14/31 | 45.2 | SF |
| Vowels and Consonants | | | | | |
| | 29 | Decreased Intelligibility index | 22/31 | 71.0 | F |
| | 30 | Decreased Percentage of phonemes correct | 26/31 | 83.9 | VF |
| | 31 | Decreased Percentage of phonemes correct revised | 27/31 | 87.1 | VF |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **9/31** | **29.0** | **SI** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **20/31** | **64.5** | **F** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **9/31** | **29.0** | **SI** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **2/31** | **6.5** | **I** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **0/31** | **0.0** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **9/31** | **29.0** | **SI** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **3/31** | **9.7** | **I** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **31** | | **Very Frequent (VF): 80.0-100%** | **7** |
| **Mean** | **43.1** | | **Frequent (F): 60.0-79.9%** | **15** |
| **Standard Deviation** | **22.2** | | **Somewhat Frequent (SF): 40.0-59.9%** | **7** |
| **Range** | **15.8 - 92.1** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **5** |
| | | | **Infrequent (I): 0.0-19.9%** | **4** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 20 | 91.6 | -3.26 | 12.9 | 1.96 | 54.8 | -5.00 | 100.0 | 0.89 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | 17 | 85.0 | 0 | 0.0 | 3 | 15.0 | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 20 | 82.9 | -2.99 | 14.2 | 1.93 | 46.5 | -5.00 | 98.5 | 0.33 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 20 | 45.1 | | 25.1 | | 15.8 | | 92.1 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 20 | 45.0 |
| Rate | | 20 | 15.0 |
| Stress | | 20 | 35.0 |
| Loudness | | 20 | 5.0 |
| Pitch | | 20 | 0.0 |
| Laryngeal Quality | | 20 | 50.0 |
| Resonance Quality | | 20 | 20.0 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | 19 | 71.7 | -1.80 | 18.0 | 1.86 | 26.0 | -5.00 | 100.0 | 1.65 |
| Encoding | | 19 | 55.7 | -0.49 | 21.8 | 0.85 | 27.3 | -1.77 | 100.0 | 1.10 |
| Memory | | 20 | 68.1 | -1.85 | 29.3 | 2.28 | 0.0 | -5.00 | 100.0 | 1.01 |
| Transcoding | | 19 | 82.5 | -1.47 | 15.3 | 2.21 | 55.6 | -5.00 | 100.0 | 1.23 |

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 11 | 96.1 | -2.55 | 6.6 | 2.43 | 76.9 | -5.00 | 100.0 | 0.90 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | 10 | 90.9 | 0 | 0.0 | 1 | 9.1 | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 11 | 86.9 | -4.25 | 11.4 | 1.30 | 60.0 | -5.00 | 97.8 | -1.66 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 11 | 39.5 | | 15.9 | | 18.4 | | 63.2 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 11 | 18.2 |
| Rate | | 11 | 9.1 |
| Stress | | 11 | 27.3 |
| Loudness | | 11 | 0.0 |
| Pitch | | 11 | 0.0 |
| Laryngeal Quality | | 11 | 54.5 |
| Resonance Quality | | 11 | 36.4 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | 11 | 79.6 | -1.67 | 18.4 | 1.80 | 38.0 | -5.00 | 94.0 | 0.37 |
| Encoding | | 11 | 46.8 | -1.08 | 25.5 | 1.26 | 0.0 | -4.41 | 83.3 | 0.06 |
| Memory | | 11 | 88.2 | -0.67 | 9.9 | 1.75 | 72.8 | -5.00 | 100.0 | 0.72 |
| Transcoding | | 11 | 80.8 | -2.27 | 21.9 | 2.22 | 33.3 | -5.00 | 100.0 | 0.71 |

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 31 | 93.2 | -3.01 | 11.2 | 2.13 | 54.8 | -5.00 | 100.0 | 0.90 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | | | | | | | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 31 | 84.3 | -3.44 | 13.2 | 1.81 | 46.5 | -5.00 | 98.5 | 0.33 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 31 | 43.1 | | 22.2 | | 15.8 | | 92.1 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | | |
| Rate | | | |
| Stress | | | |
| Loudness | | | |
| Pitch | | | |
| Laryngeal Quality | | | |
| Resonance Quality | | | |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | 30 | 74.6 | -1.75 | 18.2 | 1.81 | 26.0 | -5.00 | 100.0 | 1.65 |
| Encoding | | 30 | 52.5 | -0.71 | 23.2 | 1.04 | 0.0 | -4.41 | 100.0 | 1.10 |
| Memory | | 31 | 75.2 | -1.43 | 25.9 | 2.15 | 0.0 | -5.00 | 100.0 | 1.01 |
| Transcoding | | 30 | 81.9 | -1.76 | 17.6 | 2.21 | 33.3 | -5.00 | 100.0 | 1.23 |

**MOTOR SPEECH MEASURES AND SUMMARIES:**

**Galactosemia (GAL)**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| Vowels | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 2/16 | 12.5 | I |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 2/14 | 14.3 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 1/16 | 6.3 | I |
| | 4 | Increased Duration of Corner Vowels | | X | 11/20 | 55.0 | SF |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 11/20 | 55.0 | SF |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 2/3 | 66.7 | F |
| | 7 | Reduced % Vowel Target Consistency | X | | 1/4 | 25.0 | SI |
| Consonants | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 9/20 | 45.0 | SF |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/20 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 3/20 | 15.0 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 4/17 | 23.5 | SI |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 4/16 | 25.0 | SI |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 4/16 | 25.0 | SI |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 5/20 | 25.0 | SI |
| | 15 | Increased All Consonant-Consonant Duration | | X | 7/19 | 36.8 | SI |
| Vowels and Consonants | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 11/20 | 55.0 | SF |
| | 17 | Increased DMI Class: Duration % | X | | 15/20 | 75.0 | F |
| | 18 | Increased % of Epenthesis Errors | X | | 13/20 | 65.0 | F |
| Phrasing | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 11/20 | 55.0 | SF |
| Rate | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 10/20 | 50.0 | SF |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 8/20 | 40.0 | SF |
| Stress | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 8/20 | 40.0 | SF |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 5/20 | 25.0 | SI |
| Loudness | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 3/18 | 16.7 | I |
| Pitch | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 0/20 | 0.0 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 2/20 | 10.0 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **2/20** | **10.0** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **2/20** | **10.0** | **I** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **5/20** | **25.0** | **SI** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **1/20** | **5.0** | **I** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **2/19** | **10.5** | **I** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **2/20** | **10.0** | **I** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **20** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **71.3** | | **Frequent (F): 60.0-79.9%** | **3** |
| **Standard Deviation** | **11.4** | | **Somewhat Frequent (SF): 40.0-59.9%** | **8** |
| **Range** | **50.0 - 92.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **8** |
| | | | **Infrequent (I): 0.0-19.9%** | **13** |
| | | | **Not Used** | **0** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| Vowels | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 1/11 | 9.1 | I |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 1/11 | 9.1 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 1/11 | 9.1 | I |
| | 4 | Increased Duration of Corner Vowels | | X | 5/11 | 45.5 | SF |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 10/11 | 90.9 | VF |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 0/0 | | |
| | 7 | Reduced % Vowel Target Consistency | X | | 1/1 | 100.0 | VF |
| Consonants | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 7/11 | 63.6 | F |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/11 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 0/11 | 0.0 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 8/10 | 80.0 | VF |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 0/10 | 0.0 | I |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 5/10 | 50.0 | SF |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 6/10 | 60.0 | F |
| | 15 | Increased All Consonant-Consonant Duration | | X | 2/11 | 18.2 | I |
| Vowels and Consonants | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 11/11 | 100.0 | VF |
| | 17 | Increased DMI Class: Duration % | X | | 8/11 | 72.7 | F |
| | 18 | Increased % of Epenthesis Errors | X | | 10/11 | 90.9 | VF |
| Phrasing | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 9/11 | 81.8 | VF |
| Rate | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 6/11 | 54.5 | SF |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 6/11 | 54.5 | SF |
| Stress | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 4/11 | 36.4 | SI |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 3/11 | 27.3 | SI |
| Loudness | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 0/10 | 0.0 | I |
| Pitch | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 0/11 | 0.0 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 4/11 | 36.4 | SI |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **2/11** | **18.2** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **2/11** | **18.2** | **I** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **2/11** | **18.2** | **I** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **3/11** | **27.3** | **SI** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **0/11** | **0.0** | **I** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **2/11** | **18.2** | **I** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **11** | | **Very Frequent (VF): 80.0-100%** | **6** |
| **Mean** | **63.4** | | **Frequent (F): 60.0-79.9%** | **3** |
| **Standard Deviation** | **9.7** | | **Somewhat Frequent (SF): 40.0-59.9%** | **4** |
| **Range** | **44.8 - 76.7** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **4** |
| | | | **Infrequent (I): 0.0-19.9%** | **14** |
| | | | **Not Used** | **1** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| Vowels | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 3/27 | 11.1 | I |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 3/25 | 12.0 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 2/27 | 7.4 | I |
| | 4 | Increased Duration of Corner Vowels | | X | 16/31 | 51.6 | SF |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 21/31 | 67.7 | F |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 2/3 | 66.7 | F |
| | 7 | Reduced % Vowel Target Consistency | X | | 2/5 | 40.0 | SF |
| Consonants | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 16/31 | 51.6 | SF |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/31 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 3/31 | 9.7 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 12/27 | 44.4 | SF |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 4/26 | 15.4 | I |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 9/26 | 34.6 | SI |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 11/30 | 36.7 | SI |
| | 15 | Increased All Consonant-Consonant Duration | | X | 9/30 | 30.0 | SI |
| Vowels and Consonants | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 22/31 | 71.0 | F |
| | 17 | Increased DMI Class: Duration % | X | | 23/31 | 74.2 | F |
| | 18 | Increased % of Epenthesis Errors | X | | 23/31 | 74.2 | F |
| Phrasing | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 20/31 | 64.5 | F |
| Rate | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 16/31 | 51.6 | SF |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 14/31 | 45.2 | SF |
| Stress | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 12/31 | 38.7 | SI |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 8/31 | 25.8 | SI |
| Loudness | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 3/28 | 10.7 | I |
| Pitch | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 0/31 | 0.0 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 6/31 | 19.4 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **4/31** | **12.9** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **4/31** | **12.9** | **I** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **7/31** | **22.6** | **SI** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **4/31** | **12.9** | **I** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **2/30** | **6.7** | **I** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **4/31** | **12.9** | **I** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **31** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **68.5** | | **Frequent (F): 60.0-79.9%** | **6** |
| **Standard Deviation** | **11.4** | | **Somewhat Frequent (SF): 40.0-59.9%** | **6** |
| **Range** | **44.8 - 92.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **6** |
| | | | **Infrequent (I): 0.0-19.9%** | **14** |
| | | | **Not Used** | **0** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference $\geq$ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

## Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **11** | **55.0** | **SF** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **11** | **55.0** | **SF** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **10** | **50.0** | **SF** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **8** | **40.0** | **SF** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **14** | **70.0** | **F** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **10** | **50.0** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **7** | **35.0** | **SI** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **0** | **0.0** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **0** | **0.0** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **5** | **25.0** | **SI** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **4** | **20.0** | **SI** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **2** | **10.5** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **5** | **26.3** | **SI** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **1** | **5.0** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **3** | **15.0** | **I** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **2** | **10.0** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **2** | **10.0** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **3** | **15.0** | **I** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **0** | **0.0** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **4** | **20.0** | **SI** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **4** | **20.0** | **SI** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **4** | **20.0** | **SI** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **3** | **15.0** | **I** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **6** | **30.0** | **SI** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **1** | **5.0** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **2** | **10.0** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **1** | **5.0** | **I** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **7** | **35.0** | **SI** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **1** | **5.3** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10th %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **20** |
| **Mean Percentage Score** | **80.7** |
| **Standard Deviation** | **8.0** |
| **Range** | **64.7 - 94.1** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **71.8** | **75.6** | **73.2** | **85.7** | **87.2** |
| **Mean DSI Percentile Score** | **45.3** | **35.3** | **33.8** | **39.6** | **42.5** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **5.0** | **15.0** | **15.0** | **15.0** | **15.0** |

**GAL: Older Group**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **8** | **72.7** | **F** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **1** | **9.1** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **9** | **81.8** | **VF** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **6** | **54.5** | **SF** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **1** | **9.1** | **I** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **4** | **36.4** | **SI** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **4** | **36.4** | **SI** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **6** | **54.5** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **1** | **9.1** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **0** | **0.0** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **3** | **27.3** | **SI** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **1** | **9.1** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **2** | **18.2** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **0** | **0.0** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **1** | **9.1** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **2** | **18.2** | **I** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **1** | **9.1** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **1** | **9.1** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **0** | **0.0** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **3** | **27.3** | **SI** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **3** | **27.3** | **SI** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **7** | **63.6** | **F** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **3** | **27.3** | **SI** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **2** | **18.2** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **1** | **9.1** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **1** | **9.1** | **I** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **1** | **9.1** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **3** | **27.3** | **SI** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **0** | **0.0** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **11** |
| **Mean Percentage Score** | **79.9** |
| **Standard Deviation** | **8.4** |
| **Range** | **70.6 - 97.1** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **69.1** | **77.1** | **72.7** | **91.4** | **86.1** |
| **Mean DSI Percentile Score** | **41.2** | **39.3** | **33.3** | **56.5** | **40.0** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **9.1** | **9.1** | **18.2** | **9.1** | **18.2** |

**GAL: Combined**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **19** | **61.3** | **F** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **1** | **3.2** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **20** | **64.5** | **F** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **16** | **51.6** | **SF** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **9** | **29.0** | **SI** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **18** | **58.1** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **14** | **45.2** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **13** | **41.9** | **SF** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **1** | **3.2** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **0** | **0.0** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **8** | **25.8** | **SI** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **5** | **16.1** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **4** | **13.3** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **5** | **16.7** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **2** | **6.5** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **5** | **16.1** | **I** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **2** | **6.5** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **3** | **9.7** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **3** | **9.7** | **I** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **1** | **3.2** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **4** | **12.9** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **7** | **22.6** | **SI** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **7** | **22.6** | **SI** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **10** | **32.3** | **SI** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **9** | **29.0** | **SI** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **3** | **9.7** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **3** | **9.7** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **2** | **6.5** | **I** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **1** | **3.2** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **10** | **32.3** | **SI** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **1** | **3.3** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **31** |
| **Mean Percentage Score** | **80.4** |
| **Standard Deviation** | **8.0** |
| **Range** | **64.7 - 97.1** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **70.8** | **76.1** | **73.1** | **87.7** | **86.8** |
| **Mean DSI Percentile Score** | **43.8** | **36.7** | **33.6** | **45.6** | **41.6** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **6.5** | **12.9** | **16.1** | **12.9** | **16.1** |

**GAL: Younger Group**

**Pause Marker Summary (PMS): Group**

**Group: 1 *n*: 20**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 19 | 95.0 | Abrupt | 20 | 2.1 | Long | 20 | 0.9 |
| PM+ | 2 | 10.0 | 3 | 15.0 | Code 1 | 1 | 100.0 | 1 | 100.0 | 0 | 0.0 | Mild-Moderate | 1 | 5.0 | Alone | 20 | 0.3 | Repeat/Revise | 20 | 0.3 |
| PM- | 17 | 85.0 | 17 | 85.0 | Code 0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 | Moderate-Severe | 0 | 0.0 | Change | 20 | 0.4 | Breath | 20 | 0.2 |
| ?[a] | 1 | 5.0 | 0 | 0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 20 | 0.1 | Addition | 20 | 0.1 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

## GAL: Older Group

### Pause Marker Summary (PMS): Group

**Group: 2 *n*: 11**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 10 | 90.9 | Abrupt | 11 | 3.4 | Long | 11 | 1.6 |
| PM+ | 3 | 27.3 | 3 | 27.3 | Code 1 | | | | | | | Mild-Moderate | 0 | 0.0 | Alone | 11 | 0.4 | Repeat/Revise | 11 | 0.6 |
| PM- | 8 | 72.7 | 8 | 72.7 | Code 0 | | | | | | | Moderate-Severe | 0 | 0.0 | Change | 11 | 0.5 | Breath | 11 | 0.2 |
| ?[a] | 0 | -0.0 | 0 | -0.0 | | | | | | | | Severe | 1 | 9.1 | Grope | 11 | 0.7 | Addition | 11 | 0.3 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

**GAL: Combined**

**Pause Marker Summary (PMS): Group**

**Group: All *n*: 31**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 29 | 93.5 | Abrupt | 31 | 2.6 | Long | 31 | 1.1 |
| PM+ | 5 | 16.1 | 6 | 19.4 | Code 1 | 1 | 100.0 | 1 | 100.0 | 0 | 0.0 | Mild-Moderate | 1 | 3.2 | Alone | 31 | 0.3 | Repeat/Revise | 31 | 0.4 |
| PM- | 25 | 80.6 | 25 | 80.6 | Code 0 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 | Moderate-Severe | 0 | 0.0 | Change | 31 | 0.4 | Breath | 31 | 0.2 |
| ?[a] | 1 | 3.2 | 0 | 0.0 | | | | | | | | Severe | 1 | 3.2 | Grope | 31 | 0.3 | Addition | 31 | 0.2 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

**SUMMARY SPEECH AND MOTOR SPEECH CLASSIFICATIONS:**

**Galactosemia (GAL)**

**GAL: Younger Group**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Speech Classification** | | **Motor Speech Classification** | | | | | | **Totals** | |
| | | **No Motor Speech Disorder (NO MSD)** | **Speech Motor Delay (SMD)** | **Childhood Dysarthria (CD)** | **Childhood Apraxia of Speech (CAS)** | **Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS)** | | **n** | **%** |
| **Normal(ized) Speech Aquisition (NSA)[a]** | | **4** | **1** | **2** | **0** | **0** | | **7** | **35.0** |
| **Speech Errors (SE)** | | **2** | **0** | **0** | **0** | **0** | | **2** | **10.0** |
| **Persistent Speech Errors (PSE)** | | **0** | **0** | **0** | **0** | **0** | | **0** | **0.0** |
| **(SE/PSE)** | | **2** | **0** | **0** | **0** | **0** | | **2** | **10.0** |
| **Speech Delay (SD)** | | **4** | **2** | **2** | **2** | **1** | | **11** | **55.0** |
| **Persistent Speech Delay (PSD)** | | **0** | **0** | **0** | **0** | **0** | | **0** | **0.0** |
| **(SD/PSD)** | | **4** | **2** | **2** | **2** | **1** | | **11** | **55.0** |
| | | | | | | | | | |
| **Totals** | **n** | **10** | **3** | **4** | **2** | **1** | | **20** | |
| | **%** | **50.0** | **15.0** | **20.0** | **10.0** | **5.0** | | | **100.0** |

**[a] Includes children younger than 9 years old with age-appropriate distortions**

**GAL: Older Group**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Speech Classification | | Motor Speech Classification | | | | | | Totals | |
| | | No Motor Speech Disorder (NO MSD) | Speech Motor Delay (SMD) | Childhood Dysarthria (CD) | Childhood Apraxia of Speech (CAS) | Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS) | | n | % |
| Normal(ized) Speech Aquisition (NSA)[a] | | 1 | 2 | 0 | 0 | 1 | | 4 | 36.4 |
| Speech Errors (SE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Errors (PSE) | | 2 | 1 | 0 | 0 | 0 | | 3 | 27.3 |
| (SE/PSE) | | 2 | 1 | 0 | 0 | 0 | | 3 | 27.3 |
| Speech Delay (SD) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Delay (PSD) | | 0 | 1 | 1 | 0 | 2 | | 4 | 36.4 |
| (SD/PSD) | | 0 | 1 | 1 | 0 | 2 | | 4 | 36.4 |
| | | | | | | | | | |
| Totals | n | 3 | 4 | 1 | 0 | 3 | | 11 | |
| | % | 27.3 | 36.4 | 9.1 | 0.0 | 27.3 | | | 100.0 |

[a] Includes children younger than 9 years old with age-appropriate distortions

**GAL: Combined**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Speech Classification** | | **Motor Speech Classification** | | | | | | **Totals** | |
| | | **No Motor Speech Disorder (NO MSD)** | **Speech Motor Delay (SMD)** | **Childhood Dysarthria (CD)** | **Childhood Apraxia of Speech (CAS)** | **Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS)** | | **n** | **%** |
| **Normal(ized) Speech Aquisition (NSA)[a]** | | **5** | **3** | **2** | **0** | **1** | | **11** | **35.5** |
| **Speech Errors (SE)** | | **2** | **0** | **0** | **0** | **0** | | **2** | **6.5** |
| **Persistent Speech Errors (PSE)** | | **2** | **1** | **0** | **0** | **0** | | **3** | **9.7** |
| **(SE/PSE)** | | **4** | **1** | **0** | **0** | **0** | | **5** | **16.1** |
| **Speech Delay (SD)** | | **4** | **2** | **2** | **2** | **1** | | **11** | **35.5** |
| **Persistent Speech Delay (PSD)** | | **0** | **1** | **1** | **0** | **2** | | **4** | **12.9** |
| **(SD/PSD)** | | **4** | **3** | **3** | **2** | **3** | | **15** | **48.4** |
| | | | | | | | | | |
| **Totals** | **n** | **13** | **7** | **5** | **2** | **4** | | **31** | |
| | **%** | **41.9** | **22.6** | **16.1** | **6.5** | **12.9** | | | **100.0** |

**[a] Includes children younger than 9 years old with age-appropriate distortions**

**SPEECH MEASURES AND SUMMARIES:**

**Idiopathic Intellectual Disability (IID)**

## PERCENTAGE CONSONANTS CORRECT (PCC)

IID

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 205 | 1 | 202 | 1 | 324 | 4 | 731 | 737 | 8.83 | 99.19 |
| | n | 365 | 0 | 132 | 1 | 646 | 7 | 1143 | 1151 | 13.79 | 99.30 |
| | ŋ | 0 | 0 | 3 | 0 | 114 | 5 | 117 | 122 | 1.46 | 95.90 |
| Glides | w | 337 | 2 | 28 | 1 | 0 | 0 | 365 | 368 | 4.41 | 99.18 |
| | j | 296 | 5 | 0 | 0 | 0 | 0 | 296 | 301 | 3.61 | 98.34 |
| Stops | p | 70 | 1 | 87 | 1 | 101 | 0 | 258 | 260 | 3.11 | 99.23 |
| | b | 150 | 1 | 52 | 2 | 8 | 0 | 210 | 213 | 2.55 | 98.59 |
| | t | 271 | 5 | 219 | 10 | 702 | 15 | 1192 | 1222 | 14.64 | 97.55 |
| | d | 214 | 2 | 49 | 1 | 191 | 7 | 454 | 464 | 5.56 | 97.84 |
| | k | 136 | 1 | 49 | 1 | 184 | 4 | 369 | 375 | 4.49 | 98.40 |
| | g | 156 | 3 | 18 | 0 | 2 | 1 | 176 | 180 | 2.16 | 97.78 |
| Fricatives and Affricates | f | 99 | 1 | 32 | 1 | 50 | 1 | 181 | 184 | 2.20 | 98.37 |
| | v | 18 | 2 | 59 | 1 | 53 | 4 | 130 | 137 | 1.64 | 94.89 |
| | θ | 43 | 13 | 20 | 11 | 19 | 6 | 82 | 112 | 1.34 | 73.21 |
| | ð | 124 | 79 | 14 | 8 | 0 | 0 | 138 | 225 | 2.70 | 61.33 |
| | s | 268 | 87 | 50 | 12 | 272 | 76 | 590 | 765 | 9.16 | 77.12 |
| | z | 4 | 0 | 22 | 5 | 257 | 48 | 283 | 336 | 4.02 | 84.23 |
| | ʃ | 21 | 2 | 7 | 0 | 5 | 1 | 33 | 36 | 0.43 | 91.67 |
| | ʒ | 0 | 0 | 2 | 1 | 0 | 0 | 2 | 3 | 0.04 | 66.67 |
| | h | 167 | 1 | 49 | 0 | 0 | 0 | 216 | 217 | 2.60 | 99.54 |
| | tʃ | 1 | 0 | 9 | 2 | 7 | 1 | 17 | 20 | 0.24 | 85.00 |
| | ʤ | 31 | 16 | 3 | 0 | 0 | 0 | 34 | 50 | 0.60 | 68.00 |
| Liquids | l | 159 | 17 | 84 | 12 | 176 | 28 | 419 | 476 | 5.70 | 88.03 |
| | r | 104 | 49 | 68 | 39 | 97 | 37 | 269 | 394 | 4.72 | 68.27 |
| Percent Correct | | 91.83 | | 91.96 | | 92.90 | | 7705 | 8348 | | |
| | | | | | | | | Correct | Total | | |

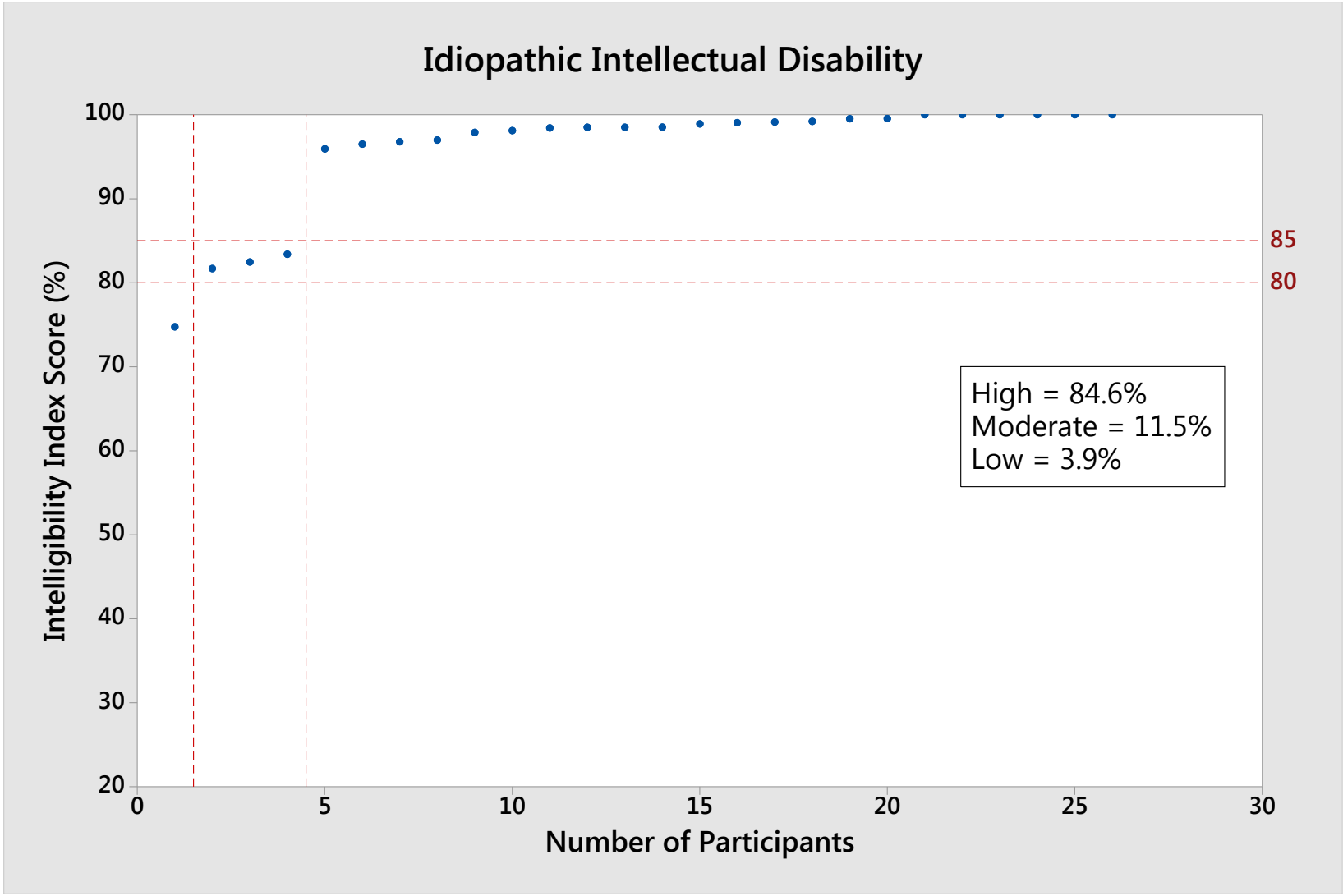
| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 5628 | 100.00 |
| "Words" used | 4733 | 84.10 |
| Disregard | 717 | 12.74 |
| Either/Or | 0 | 0.00 |
| Unsure | 19 | 0.34 |
| Unintelligible | 159 | 2.83 |
| INTELLIGIBILITY INDEX | | 96.38 |

92.30

Percentage Consonants Correct (PCC)

Severity Adjective

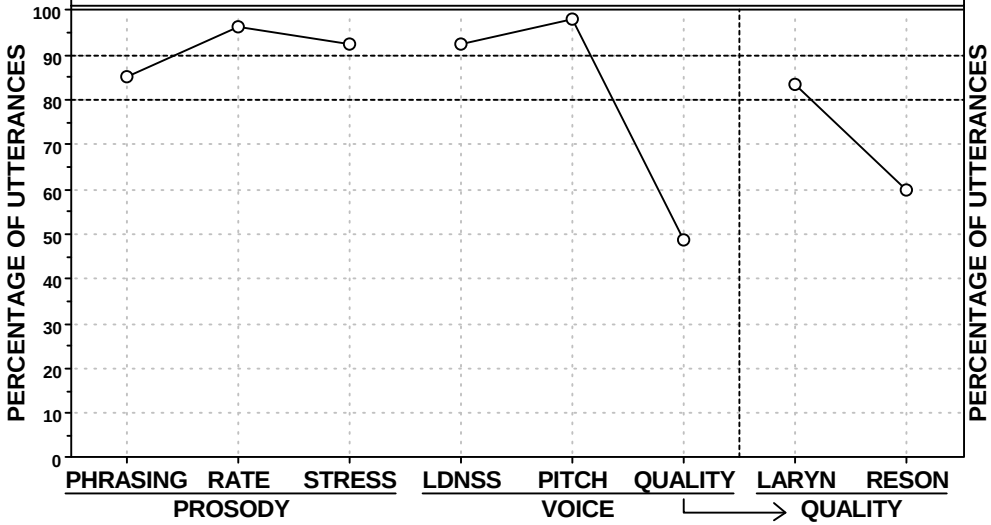
MILD


Idiopathic Intellectual Disability
Intelligibility Index Score (%)
100
90
80
70
60
50
40
30
20
0
5
10
15
20
25
30
Number of Participants
85
80
High = 84.6%
Moderate = 11.5%
Low = 3.9%

A

PROSODY-VOICE SUMMARY Source: CS

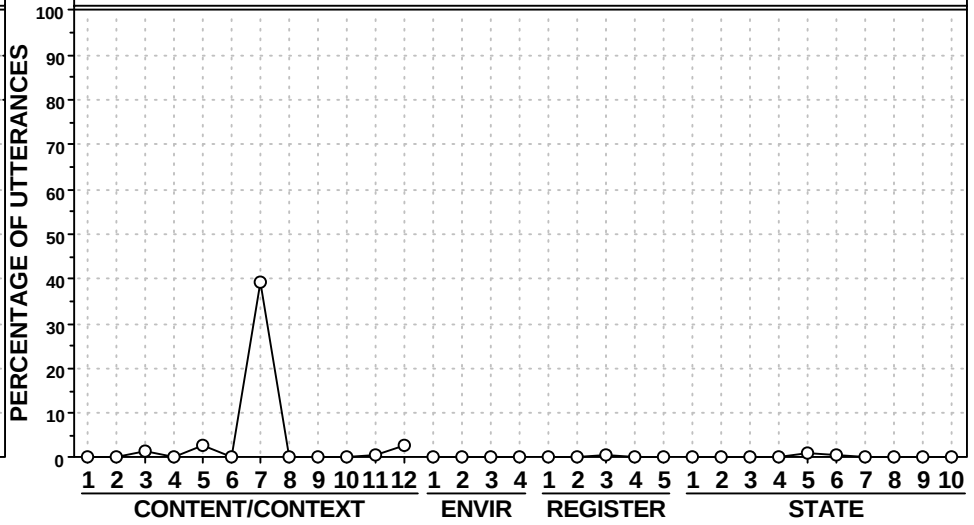
| | APPROP PROSODY | | | APPROPRIATE VOICE | | | | | APPR |
|---|---|---|---|---|---|---|---|---|---|
| | PHRAS | RATE | STRESS | LDNSS | PITCH | QUAL | LARYN | RESON | UTTS |
| *M* | 85.0 | 96.4 | 92.5 | 92.7 | 97.9 | 48.5 | 83.5 | 60.0 | 33.4 |
| *SD* | 12.2 | 8.0 | 8.1 | 22.1 | 6.3 | 44.4 | 27.8 | 47.8 | 35.6 |




B

SAMPLE INFORMATION AND EXCLUSION CODES Source: CS

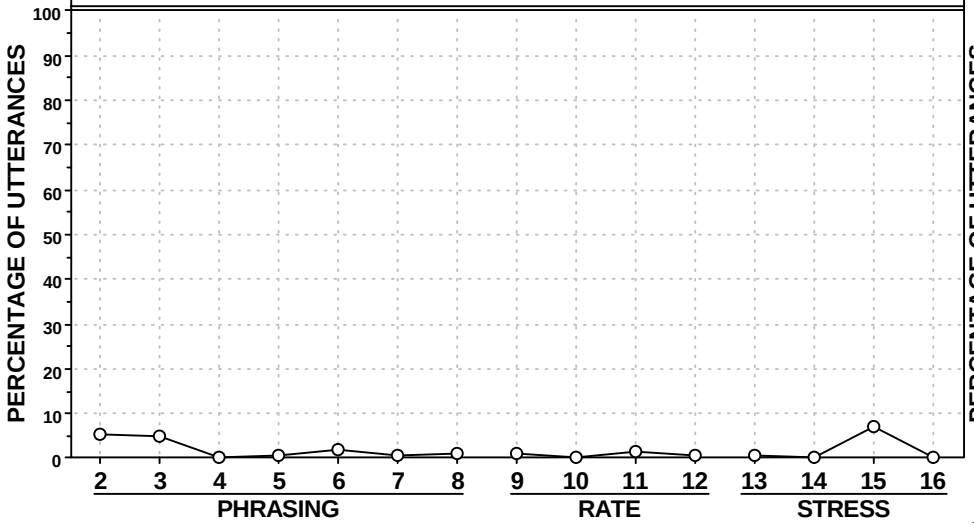
| | NO. OF UTTS | | %RESP | %DIFF | % EXCLUSION CODES | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | EXCLD | CODED | INVOLV | JUDGE | CONT | ENVIR | RGSTR | STATE | TOTAL |
| *M* | 34.3 | 23.1 | 0.0 | 34.8 | 47.9 | 0.4 | 0.5 | 1.8 | 49.1 |
| *SD* | 28.5 | 1.6 | - | - | 23.5 | 1.0 | 2.3 | 3.5 | 24.0 |




C

INAPPROPRIATE PROSODY Source: CS

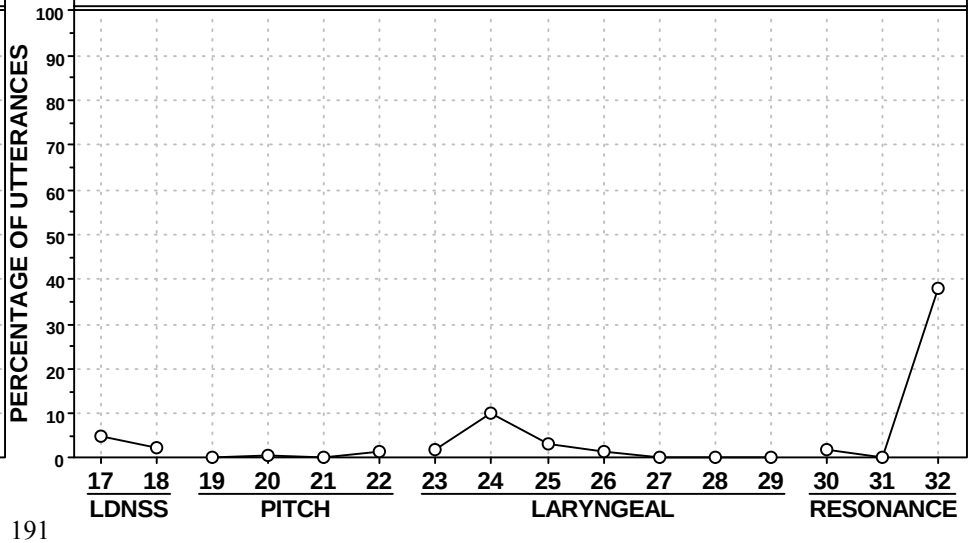
| | PHRASING | | | RATE | | | STRESS | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q | N | T | Q | N | T | Q | N | T | Q | N | T |
| *M* | 0.0 | 15.0 | 15.0 | 0.0 | 3.6 | 3.6 | 2.2 | 7.5 | 9.7 | 2.2 | 23.1 | 25.1 |
| *SD* | 0.0 | 12.2 | 12.2 | 0.0 | 8.0 | 8.0 | 3.9 | 8.1 | 9.9 | 3.9 | 15.3 | 15.6 |




D

INAPPROPRIATE VOICE Source: CS

| | LDNSS | | | PITCH | | | LARYN | | | RESON | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q | N | T | Q | N | T | Q | N | T | Q | N | T | Q | N | T |
| *M* | 2.6 | 7.3 | 9.9 | 0.0 | 2.0 | 2.0 | 1.6 | 16.5 | 18.1 | 2.5 | 40.0 | 42.6 | 6.4 | 55.5 | 59.9 |
| *SD* | 5.7 | 22.1 | 22.2 | 0.0 | 6.1 | 6.1 | 3.9 | 27.8 | 28.6 | 6.5 | 47.8 | 48.0 | 10.3 | 44.9 | 43.2 |



# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| **Vowels** | | | | | |
| | **1** | **Decreased Percent vowels correct** | **16/23** | **69.6** | **F** |
| | **2** | **Decreased Percent vowels correct non-rhotic** | **10/23** | **43.5** | **SF** |
| | **3** | **Decreased Percent vowels correct revised** | **13/23** | **56.5** | **SF** |
| **Consonants** | | | | | |
| | **4** | **Decreased Percent consonants correct** | **21/23** | **91.3** | **VF** |
| | **5** | **Decreased Percent consonants correct - early** | **14/23** | **60.9** | **F** |
| | **6** | **Decreased Percent consonants correct - middle** | **20/23** | **87.0** | **VF** |
| | **7** | **Decreased Percent consonants correct - late** | **21/23** | **91.3** | **VF** |
| | **8** | **Decreased Percent consonants correct adjusted** | **19/23** | **82.6** | **VF** |
| | **9** | **Decreased Percent consonants correct revised** | **21/23** | **91.3** | **VF** |
| | **10** | **Decreased Percent consonants correct revised - early** | **13/23** | **56.5** | **SF** |
| | **11** | **Decreased Percent consonants correct revised - middle** | **18/23** | **78.3** | **F** |
| | **12** | **Decreased Percent consonants correct revised - late** | **19/23** | **82.6** | **VF** |
| | **13** | **Decreased Percent consonants in the inventory** | **9/23** | **39.1** | **SI** |
| | **14** | **Decreased Percent consonants in the inventory - early** | **0/23** | **0.0** | **I** |
| | **15** | **Decreased Percent consonants in the inventory - middle** | **5/23** | **21.7** | **SI** |
| | **16** | **Decreased Percent consonants in the inventory - late** | **5/23** | **21.7** | **SI** |
| | **17** | **Increased Absolute omission index** | **20/23** | **87.0** | **VF** |
| | **18** | **Increased Absolute omission index - early** | **11/23** | **47.8** | **SF** |
| | **19** | **Increased Absolute omission index - middle** | **14/23** | **60.9** | **F** |
| | **20** | **Increased Absolute omission index - late** | **14/23** | **60.9** | **F** |
| | **21** | **Increased Absolute substitution index** | **18/23** | **78.3** | **F** |
| | **22** | **Increased Absolute substitution index - early** | **8/23** | **34.8** | **SI** |
| | **23** | **Increased Absolute substitution index - middle** | **12/23** | **52.2** | **SF** |
| | **24** | **Increased Absolute substitution index - late** | **18/23** | **78.3** | **F** |
| | **25** | **Increased Absolute distortion index** | **19/23** | **82.6** | **VF** |
| | **26** | **Increased Absolute distortion index - early** | **5/23** | **21.7** | **SI** |
| | **27** | **Increased Absolute distortion index - middle** | **3/23** | **13.0** | **I** |
| | **28** | **Increased Absolute distortion index - late** | **19/23** | **82.6** | **VF** |
| **Vowels and Consonants** | | | | | |
| | **29** | **Decreased Intelligibility index** | **19/23** | **82.6** | **VF** |
| | **30** | **Decreased Percentage of phonemes correct** | **21/23** | **91.3** | **VF** |
| | **31** | **Decreased Percentage of phonemes correct revised** | **20/23** | **87.0** | **VF** |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **4/23** | **17.4** | **I** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **6/23** | **26.1** | **SI** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **10/23** | **43.5** | **SF** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **4/23** | **17.4** | **I** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **2/22** | **9.1** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **10/23** | **43.5** | **SF** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **11/23** | **47.8** | **SF** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **23** | | **Very Frequent (VF): 80.0-100%** | **12** |
| **Mean** | **43.7** | | **Frequent (F): 60.0-79.9%** | **7** |
| **Standard Deviation** | **20.7** | | **Somewhat Frequent (SF): 40.0-59.9%** | **8** |
| **Range** | **23.7 - 100.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **6** |
| | | | **Infrequent (I): 0.0-19.9%** | **5** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 23 | 96.1 | -3.83 | 6.7 | 2.09 | 74.8 | -5.00 | 100.0 | 0.50 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | 20 | 87.0 | 2 | 8.7 | 1 | 4.3 | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 23 | 91.8 | -4.23 | 7.7 | 1.66 | 70.3 | -5.00 | 100.0 | 0.65 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 23 | 43.7 | | 20.7 | | 23.7 | | 100.0 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 23 | 30.4 |
| Rate | | 23 | 8.7 |
| Stress | | 23 | 13.0 |
| Loudness | | 23 | 8.7 |
| Pitch | | 22 | 9.1 |
| Laryngeal Quality | | 23 | 26.1 |
| Resonance Quality | | 23 | 43.5 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | | | | | | | | | |
| Encoding | | | | | | | | | | |
| Memory | | | | | | | | | | |
| Transcoding | | | | | | | | | | |

**MOTOR SPEECH MEASURES AND SUMMARIES:**

**Idiopathic Intellectual Disability (IID)**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| **Vowels** | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 3/19 | 15.8 | I |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 3/19 | 15.8 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 4/19 | 21.1 | SI |
| | 4 | Increased Duration of Corner Vowels | | X | 4/23 | 17.4 | I |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 6/23 | 26.1 | SI |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 0/0 | | |
| | 7 | Reduced % Vowel Target Consistency | X | | 0/0 | | |
| **Consonants** | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 6/23 | 26.1 | SI |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/6 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 0/5 | 0.0 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 0/1 | 0.0 | I |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 10/22 | 45.5 | SF |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 9/22 | 40.9 | SF |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 8/23 | 34.8 | SI |
| | 15 | Increased All Consonant-Consonant Duration | | X | 8/20 | 40.0 | SF |
| **Vowels and Consonants** | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 19/23 | 82.6 | VF |
| | 17 | Increased DMI Class: Duration % | X | | 6/23 | 26.1 | SI |
| | 18 | Increased % of Epenthesis Errors | X | | 14/23 | 60.9 | F |
| **Phrasing** | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 13/23 | 56.5 | SF |
| **Rate** | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 9/23 | 39.1 | SI |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 10/23 | 43.5 | SF |
| **Stress** | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 5/23 | 21.7 | SI |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 3/13 | 23.1 | SI |
| **Loudness** | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 8/23 | 34.8 | SI |
| **Pitch** | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 2/23 | 8.7 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 10/23 | 43.5 | SF |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **1/23** | **4.3** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **3/23** | **13.0** | **I** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **4/23** | **17.4** | **I** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **12/23** | **52.2** | **SF** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **5/23** | **21.7** | **SI** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **7/22** | **31.8** | **SI** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **23** | | **Very Frequent (VF): 80.0-100%** | **1** |
| **Mean** | **68.1** | | **Frequent (F): 60.0-79.9%** | **1** |
| **Standard Deviation** | **8.8** | | **Somewhat Frequent (SF): 40.0-59.9%** | **7** |
| **Range** | **53.8 - 85.7** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **11** |
| | | | **Infrequent (I): 0.0-19.9%** | **10** |
| | | | **Not Used** | **2** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**IID**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **13** | **56.5** | **SF** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **1** | **4.3** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **4** | **17.4** | **I** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **3** | **13.0** | **I** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **1** | **4.3** | **I** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **1** | **4.3** | **I** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **9** | **39.1** | **SI** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **9** | **39.1** | **SI** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **2** | **8.7** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **5** | **21.7** | **SI** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **9** | **39.1** | **SI** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **0** | **0.0** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **4** | **18.2** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **4** | **18.2** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **3** | **13.0** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **7** | **30.4** | **SI** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **1** | **4.3** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **1** | **4.3** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **1** | **4.3** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **10** | **43.5** | **SF** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **1** | **4.3** | **I** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **2** | **8.7** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **8** | **34.8** | **SI** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **3** | **13.0** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **0** | **0.0** | **I** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **5** | **21.7** | **SI** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **0** | **0.0** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **1** | **4.3** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **2** | **8.7** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **2** | **8.7** | **I** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **4** | **17.4** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **1** | **4.3** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **3** | **13.0** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **23** |
| **Mean Percentage Score** | **84.6** |
| **Standard Deviation** | **7.8** |
| **Range** | **67.6 - 97.1** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **75.4** | **82.6** | **80.7** | **83.8** | **87.8** |
| **Mean DSI Percentile Score** | **51.2** | **46.7** | **46.1** | **39.1** | **46.3** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **0.0** | **4.3** | **0.0** | **26.1** | **13.0** |

**IID**

## Pause Marker Summary (PMS): Group

**Group: All *n*: 23**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 23 | 100.0 | Abrupt | 23 | 0.3 | Long | 23 | 0.5 |
| PM+ | 1 | 4.3 | 2 | 8.7 | Code 1 | 1 | 100.0 | 1 | 100.0 | 0 | 0.0 | Mild-Moderate | 0 | 0.0 | Alone | 23 | 1.1 | Repeat/Revise | 23 | 1.6 |
| PM- | 21 | 91.3 | 21 | 91.3 | Code 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | Moderate-Severe | 0 | 0.0 | Change | 23 | 0.3 | Breath | 23 | 0.3 |
| ?[a] | 1 | 4.3 | 0 | 0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 23 | 0.1 | Addition | 23 | 0.0 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

**SUMMARY SPEECH AND MOTOR SPEECH CLASSIFICATIONS:**

**Idiopathic Intellectual Disability (IID)**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Speech Classification | | Motor Speech Classification | | | | | | Totals | |
| | | No Motor Speech Disorder (NO MSD) | Speech Motor Delay (SMD) | Childhood Dysarthria (CD) | Childhood Apraxia of Speech (CAS) | Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS) | | n | % |
| Normal(ized) Speech Aquisition (NSA)[a] | | 4 | 2 | 1 | 1 | 0 | | 8 | 34.8 |
| Speech Errors (SE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Errors (PSE) | | 2 | 5 | 3 | 0 | 0 | | 10 | 43.5 |
| (SE/PSE) | | 2 | 5 | 3 | 0 | 0 | | 10 | 43.5 |
| Speech Delay (SD) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Delay (PSD) | | 0 | 4 | 0 | 1 | 0 | | 5 | 21.7 |
| (SD/PSD) | | 0 | 4 | 0 | 1 | 0 | | 5 | 21.7 |
| | | | | | | | | | |
| Totals | n | 6 | 11 | 4 | 2 | 0 | | 23 | |
| | % | 26.1 | 47.8 | 17.4 | 8.7 | 0.0 | | | 100.0 |

[a] Includes children younger than 9 years old with age-appropriate distortions

**SPEECH MEASURES AND SUMMARIES:**

**Traumatic Brain Injury (TBI)**

## PERCENTAGE CONSONANTS CORRECT (PCC)

TBI: Younger Group

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 238 | 3 | 142 | 2 | 233 | 8 | 613 | 626 | 5.59 | 97.92 |
| | n | 260 | 0 | 215 | 12 | 802 | 21 | 1277 | 1310 | 11.69 | 97.48 |
| | ŋ | 1 | 0 | 20 | 0 | 74 | 6 | 95 | 101 | 0.90 | 94.06 |
| Glides | w | 453 | 16 | 20 | 1 | 0 | 0 | 473 | 490 | 4.37 | 96.53 |
| | j | 278 | 7 | 10 | 0 | 0 | 0 | 288 | 295 | 2.63 | 97.63 |
| Stops | p | 259 | 13 | 84 | 6 | 108 | 5 | 451 | 475 | 4.24 | 94.95 |
| | b | 326 | 7 | 119 | 1 | 5 | 0 | 450 | 458 | 4.09 | 98.25 |
| | t | 266 | 7 | 210 | 25 | 773 | 92 | 1249 | 1373 | 12.25 | 90.97 |
| | d | 218 | 12 | 84 | 11 | 245 | 18 | 547 | 588 | 5.25 | 93.03 |
| | k | 245 | 4 | 202 | 4 | 243 | 5 | 690 | 703 | 6.27 | 98.15 |
| | g | 214 | 5 | 61 | 8 | 66 | 6 | 341 | 360 | 3.21 | 94.72 |
| Fricatives and Affricates | f | 175 | 6 | 45 | 1 | 39 | 3 | 259 | 269 | 2.40 | 96.28 |
| | v | 10 | 0 | 37 | 4 | 72 | 6 | 119 | 129 | 1.15 | 92.25 |
| | θ | 38 | 8 | 29 | 5 | 30 | 13 | 97 | 123 | 1.10 | 78.86 |
| | ð | 234 | 273 | 15 | 14 | 0 | 0 | 249 | 536 | 4.78 | 46.46 |
| | s | 211 | 58 | 98 | 35 | 351 | 90 | 660 | 843 | 7.52 | 78.29 |
| | z | 7 | 1 | 30 | 6 | 362 | 119 | 399 | 525 | 4.68 | 76.00 |
| | ʃ | 30 | 12 | 15 | 1 | 7 | 3 | 52 | 68 | 0.61 | 76.47 |
| | ʒ | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0.01 | 100.00 |
| | h | 345 | 11 | 48 | 0 | 0 | 0 | 393 | 404 | 3.60 | 97.28 |
| | tʃ | 47 | 2 | 26 | 3 | 17 | 6 | 90 | 101 | 0.90 | 89.11 |
| | ʤ | 37 | 8 | 6 | 0 | 3 | 1 | 46 | 55 | 0.49 | 83.64 |
| Liquids | l | 238 | 45 | 89 | 21 | 169 | 74 | 496 | 636 | 5.68 | 77.99 |
| | r | 167 | 122 | 81 | 50 | 155 | 163 | 403 | 738 | 6.59 | 54.61 |
| Percent Correct | | 87.39 | | 88.93 | | 85.45 | | 9738 | 11207 | | |
| | | | | | | | | Correct | Total | | |

| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 7813 | 100.00 |
| "Words" used | 6056 | 77.51 |
| Disregard | 1534 | 19.63 |
| Either/Or | 0 | 0.00 |
| Unsure | 54 | 0.69 |
| Unintelligible | 169 | 2.16 |
| INTELLIGIBILITY INDEX | | 96.45 |

86.89

Percentage Consonants Correct (PCC)

Severity Adjective

MILD

## PERCENTAGE CONSONANTS CORRECT (PCC)

TBI: Older Group

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 205 | 0 | 101 | 0 | 161 | 1 | 467 | 468 | 6.34 | 99.79 |
| | n | 161 | 1 | 152 | 2 | 586 | 11 | 899 | 913 | 12.37 | 98.47 |
| | ŋ | 0 | 0 | 19 | 0 | 96 | 2 | 115 | 117 | 1.59 | 98.29 |
| Glides | w | 293 | 2 | 19 | 0 | 0 | 0 | 312 | 314 | 4.26 | 99.36 |
| | j | 154 | 2 | 12 | 0 | 0 | 0 | 166 | 168 | 2.28 | 98.81 |
| Stops | p | 124 | 0 | 46 | 1 | 65 | 1 | 235 | 237 | 3.21 | 99.16 |
| | b | 179 | 0 | 63 | 0 | 2 | 0 | 244 | 244 | 3.31 | 100.00 |
| | t | 190 | 3 | 170 | 4 | 503 | 33 | 863 | 903 | 12.24 | 95.57 |
| | d | 116 | 2 | 83 | 4 | 194 | 15 | 393 | 414 | 5.61 | 94.93 |
| | k | 141 | 2 | 112 | 0 | 209 | 2 | 462 | 466 | 6.32 | 99.14 |
| | g | 122 | 0 | 32 | 0 | 18 | 0 | 172 | 172 | 2.33 | 100.00 |
| Fricatives and Affricates | f | 85 | 1 | 45 | 0 | 32 | 1 | 162 | 164 | 2.22 | 98.78 |
| | v | 9 | 0 | 44 | 3 | 63 | 5 | 116 | 124 | 1.68 | 93.55 |
| | θ | 46 | 1 | 10 | 4 | 25 | 3 | 81 | 89 | 1.21 | 91.01 |
| | ð | 191 | 96 | 24 | 2 | 0 | 0 | 215 | 313 | 4.24 | 68.69 |
| | s | 171 | 17 | 81 | 11 | 216 | 22 | 468 | 518 | 7.02 | 90.35 |
| | z | 3 | 0 | 23 | 6 | 258 | 34 | 284 | 324 | 4.39 | 87.65 |
| | ʃ | 71 | 2 | 20 | 0 | 11 | 0 | 102 | 104 | 1.41 | 98.08 |
| | ʒ | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0.01 | 100.00 |
| | h | 227 | 3 | 36 | 0 | 0 | 0 | 263 | 266 | 3.61 | 98.87 |
| | tʃ | 11 | 0 | 15 | 1 | 19 | 1 | 45 | 47 | 0.64 | 95.74 |
| | ʤ | 39 | 1 | 2 | 0 | 7 | 0 | 48 | 49 | 0.66 | 97.96 |
| Liquids | l | 196 | 11 | 121 | 6 | 178 | 10 | 495 | 522 | 7.08 | 94.83 |
| | r | 166 | 18 | 86 | 12 | 138 | 21 | 390 | 441 | 5.98 | 88.44 |
| Percent Correct | | 94.71 | | 95.92 | | 94.50 | | 6998 | 7378 | | |
| | | | | | | | | Correct | Total | | |

| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 4406 | 100.00 |
| "Words" used | 3931 | 89.22 |
| Disregard | 449 | 10.19 |
| Either/Or | 1 | 0.02 |
| Unsure | 11 | 0.25 |
| Unintelligible | 14 | 0.32 |
| INTELLIGIBILITY INDEX | | 99.34 |

94.85

Percentage Consonants Correct (PCC)

Severity Adjective

MILD

## PERCENTAGE CONSONANTS CORRECT (PCC)

TBI: Combined

Child_____
Study Identification_____
DOB_____
Age at Sampling Date_____
Sampling Date_____
Sampling Clinician _____
Pepfile Entry Date _____

**Severity Adjective:**

| PCC | Adjective |
|---|---|
| ≥86% | Mild |
| 66%-85% | Mild-Moderate |
| 50%-65% | Moderate-Severe |
| ≤49% | Severe |

**Key:**

+ Correct

- Incorrect

| Consonant | | Initial | | Medial | | Final | | Consonants | | Percentage Consonants | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class | Sound | + | - | + | - | + | - | Correct | Total | Occurrence | Correct |
| Nasals | m | 443 | 3 | 243 | 2 | 394 | 9 | 1080 | 1094 | 5.89 | 98.72 |
| | n | 421 | 1 | 367 | 14 | 1388 | 32 | 2176 | 2223 | 11.96 | 97.89 |
| | ŋ | 1 | 0 | 39 | 0 | 170 | 8 | 210 | 218 | 1.17 | 96.33 |
| Glides | w | 746 | 18 | 39 | 1 | 0 | 0 | 785 | 804 | 4.33 | 97.64 |
| | j | 432 | 9 | 22 | 0 | 0 | 0 | 454 | 463 | 2.49 | 98.06 |
| Stops | p | 383 | 13 | 130 | 7 | 173 | 6 | 686 | 712 | 3.83 | 96.35 |
| | b | 505 | 7 | 182 | 1 | 7 | 0 | 694 | 702 | 3.78 | 98.86 |
| | t | 456 | 10 | 380 | 29 | 1276 | 125 | 2112 | 2276 | 12.25 | 92.79 |
| | d | 334 | 14 | 167 | 15 | 439 | 33 | 940 | 1002 | 5.39 | 93.81 |
| | k | 386 | 6 | 314 | 4 | 452 | 7 | 1152 | 1169 | 6.29 | 98.55 |
| | g | 336 | 5 | 93 | 8 | 84 | 6 | 513 | 532 | 2.86 | 96.43 |
| Fricatives and Affricates | f | 260 | 7 | 90 | 1 | 71 | 4 | 421 | 433 | 2.33 | 97.23 |
| | v | 19 | 0 | 81 | 7 | 135 | 11 | 235 | 253 | 1.36 | 92.89 |
| | θ | 84 | 9 | 39 | 9 | 55 | 16 | 178 | 212 | 1.14 | 83.96 |
| | ð | 425 | 369 | 39 | 16 | 0 | 0 | 464 | 849 | 4.57 | 54.65 |
| | s | 382 | 75 | 179 | 46 | 567 | 112 | 1128 | 1361 | 7.32 | 82.88 |
| | z | 10 | 1 | 53 | 12 | 620 | 153 | 683 | 849 | 4.57 | 80.45 |
| | ʃ | 101 | 14 | 35 | 1 | 18 | 3 | 154 | 172 | 0.93 | 89.53 |
| | ʒ | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 2 | 0.01 | 100.00 |
| | h | 572 | 14 | 84 | 0 | 0 | 0 | 656 | 670 | 3.61 | 97.91 |
| | tʃ | 58 | 2 | 41 | 4 | 36 | 7 | 135 | 148 | 0.80 | 91.22 |
| | ʤ | 76 | 9 | 8 | 0 | 10 | 1 | 94 | 104 | 0.56 | 90.38 |
| Liquids | l | 434 | 56 | 210 | 27 | 347 | 84 | 991 | 1158 | 6.23 | 85.58 |
| | r | 333 | 140 | 167 | 62 | 293 | 184 | 793 | 1179 | 6.34 | 67.26 |
| Percent Correct | | 90.20 | | 91.87 | | 89.08 | | 16736 | 18585 | | |
| | | | | | | | | Correct | Total | | |

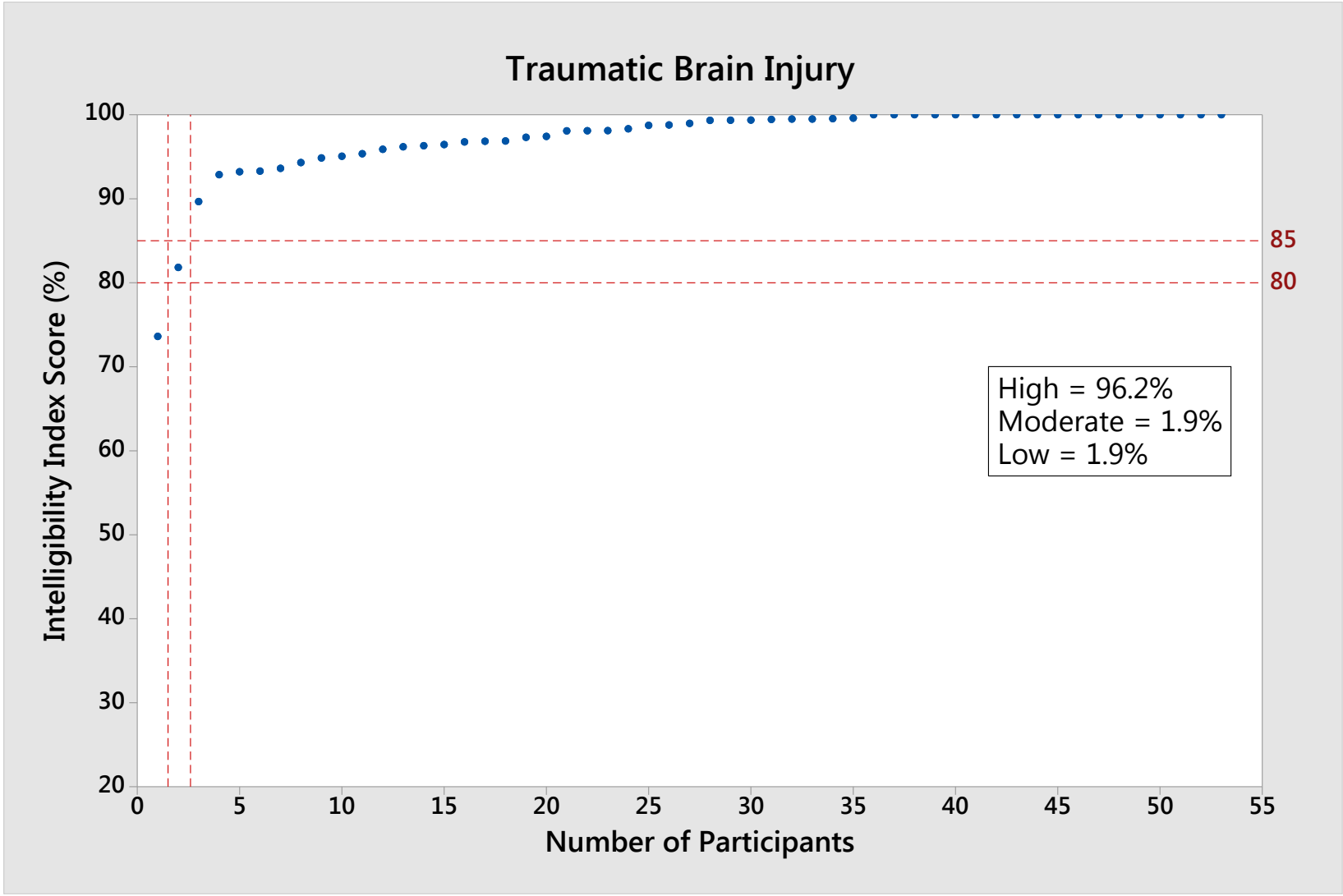
| Word Coding Summary | N | % |
|---|---|---|
| "Words" entered | 12219 | 100.00 |
| "Words" used | 9987 | 81.73 |
| Disregard | 1983 | 16.23 |
| Either/Or | 1 | 0.01 |
| Unsure | 65 | 0.53 |
| Unintelligible | 183 | 1.50 |
| INTELLIGIBILITY INDEX | | 97.57 |

90.05

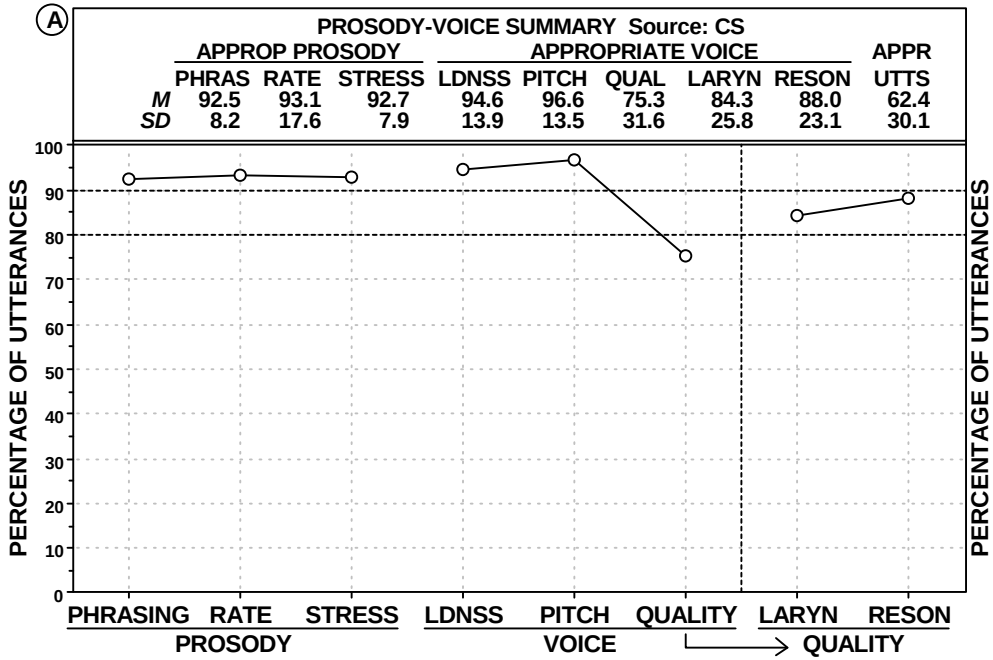
Percentage Consonants Correct (PCC)

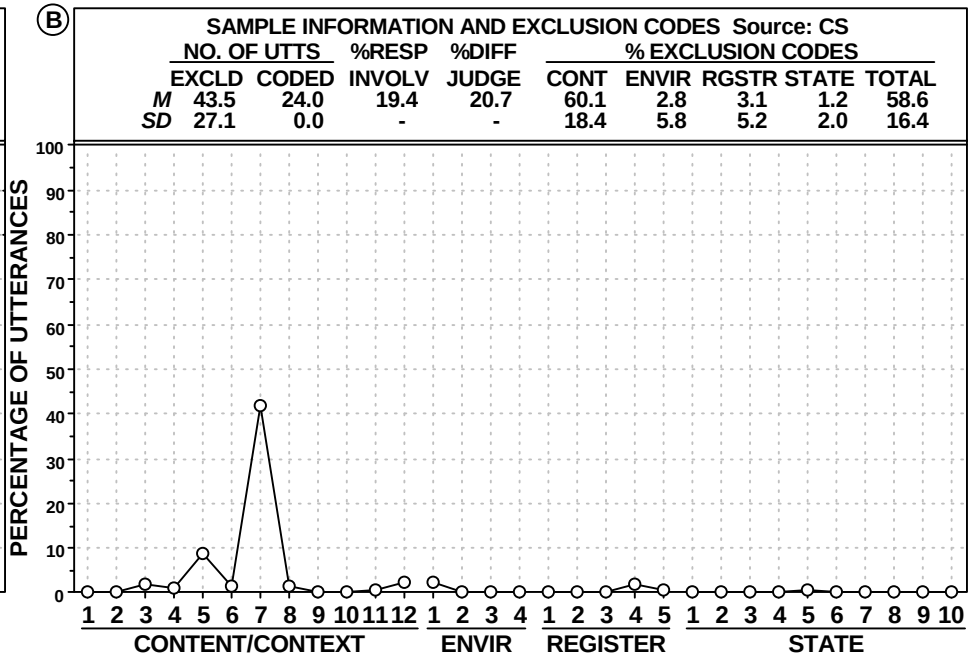
Severity Adjective

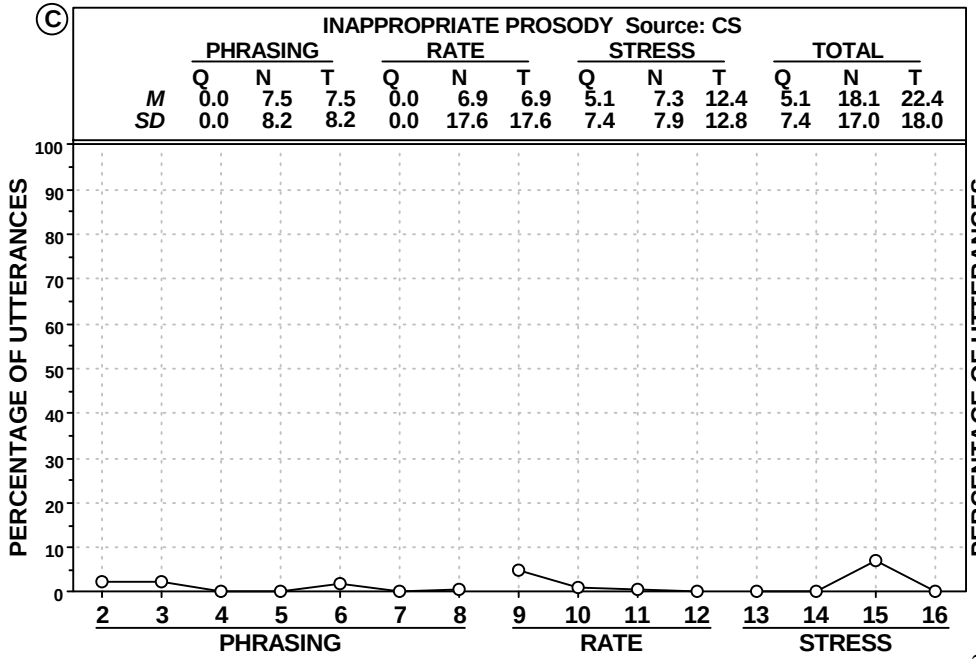
MILD

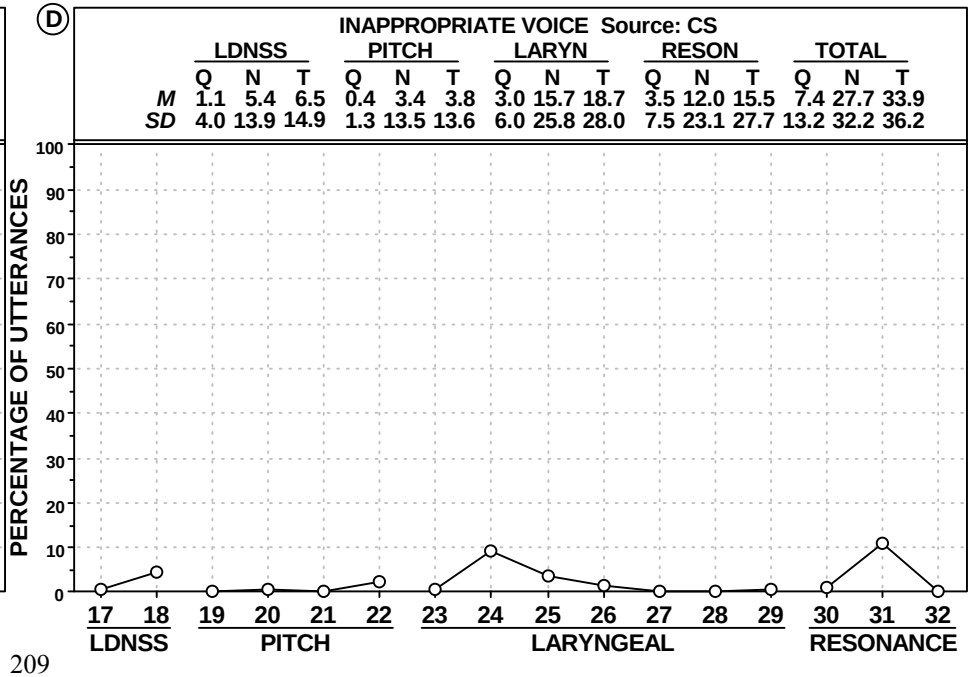

Traumatic Brain Injury
Intelligibility Index Score (%)
100
90
80
70
60
50
40
30
20
0
5
10
15
20
25
30
35
40
45
50
55
Number of Participants
85
80
High = 96.2%
Moderate = 1.9%
Low = 1.9%

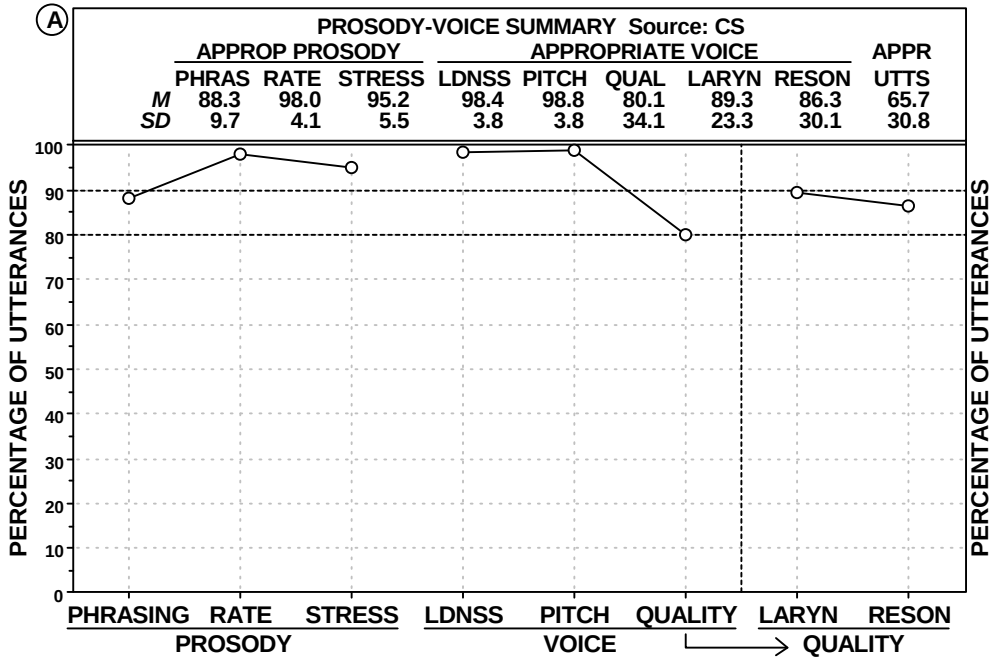
**TBI: PVSP**
**Younger Group**

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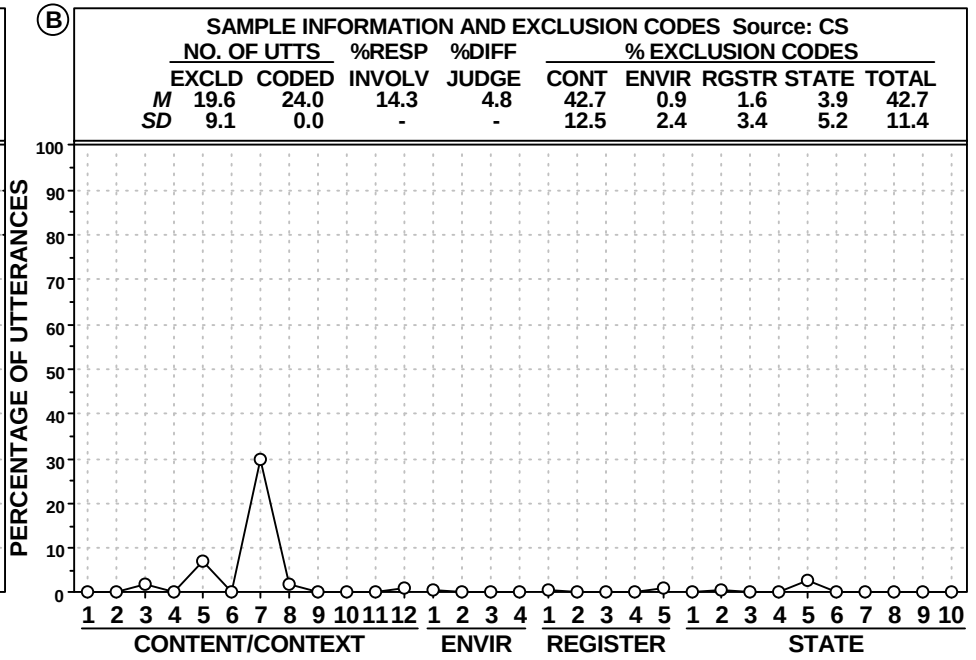
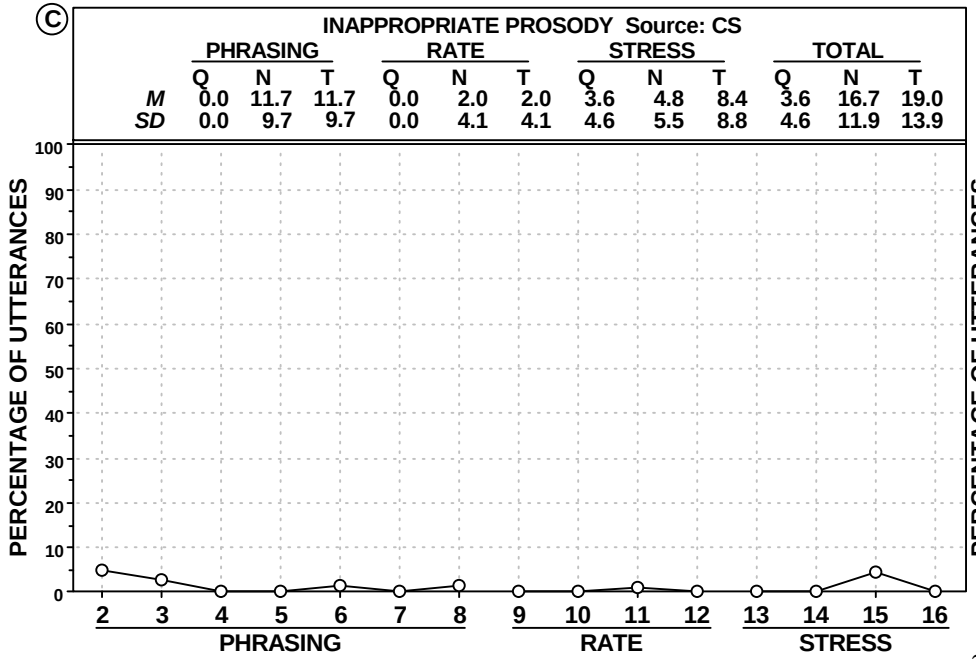
PROSODY-VOICE SUMMARY Source: CS
APPROP PROSODY
APPROPRIATE VOICE
APPR
PHRAS RATE STRESS LDNSS PITCH QUAL LARYN RESON UTTS
M 88.3 98.0 95.2 98.4 98.8 80.1 89.3 86.3 65.7
SD 9.7 4.1 5.5 3.8 3.8 34.1 23.3 30.1 30.8
PERCENTAGE OF UTTERANCES
PHRASING RATE STRESS LDNSS PITCH QUALITY LARYN RESON
PROSODY
VOICE
QUALITY


B
SAMPLE INFORMATION AND EXCLUSION CODES Source: CS
NO. OF UTTS
%RESP
%DIFF
% EXCLUSION CODES
EXCLD CODED INVOLV JUDGE CONT ENVIR RGSTR STATE TOTAL
M 19.6 24.0 14.3 4.8 42.7 0.9 1.6 3.9 42.7
SD 9.1 0.0 - - 12.5 2.4 3.4 5.2 11.4
PERCENTAGE OF UTTERANCES
CONTENT/CONTEXT
ENVIR
REGISTER
STATE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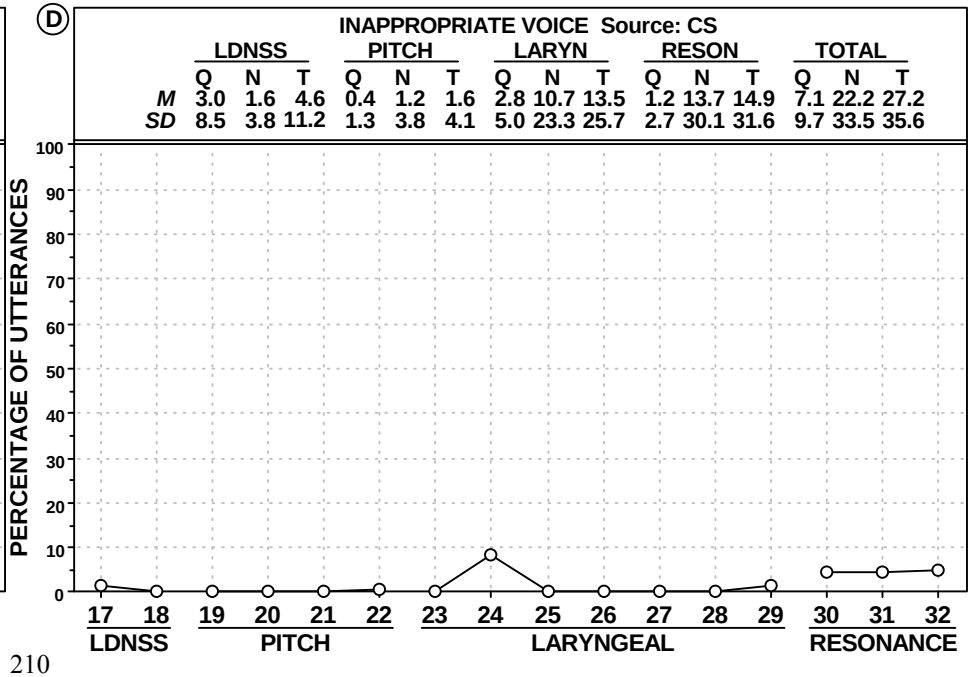
INAPPROPRIATE PROSODY Source: CS
PHRASING
RATE
STRESS
TOTAL
Q N T Q N T Q N T Q N T
M 0.0 11.7 11.7 0.0 2.0 2.0 3.6 4.8 8.4 3.6 16.7 19.0
SD 0.0 9.7 9.7 0.0 4.1 4.1 4.6 5.5 8.8 4.6 11.9 13.9
PERCENTAGE OF UTTERANCES
PHRASING
RATE
STRESS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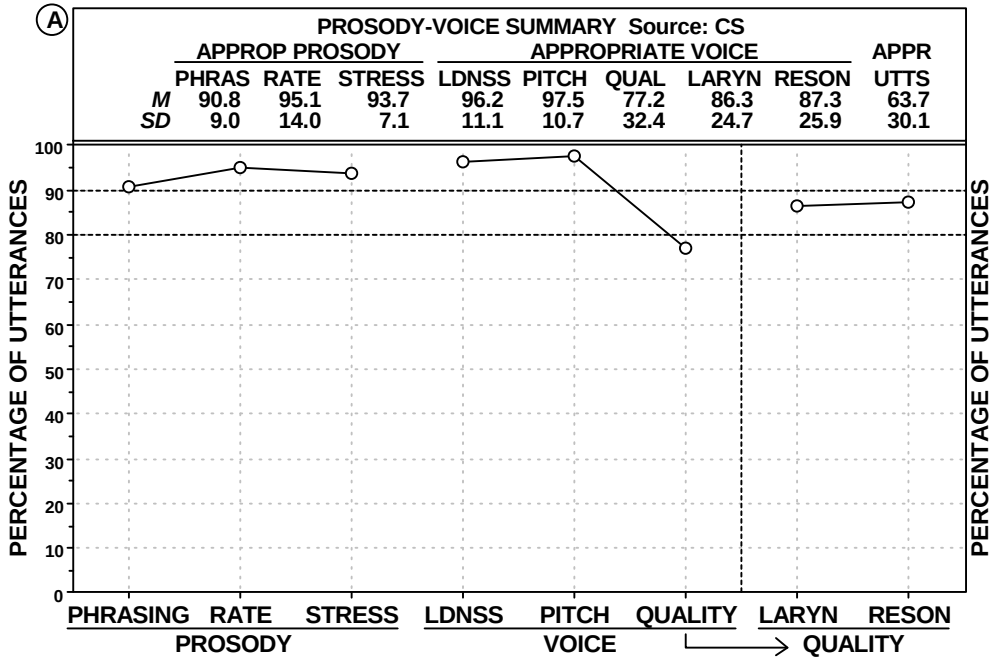
INAPPROPRIATE VOICE Source: CS
LDNSS
PITCH
LARYN
RESON
TOTAL
Q N T Q N T Q N T Q N T Q N T
M 3.0 1.6 4.6 0.4 1.2 1.6 2.8 10.7 13.5 1.2 13.7 14.9 7.1 22.2 27.2
SD 8.5 3.8 11.2 1.3 3.8 4.1 5.0 23.3 25.7 2.7 30.1 31.6 9.7 33.5 35.6
PERCENTAGE OF UTTERANCES
LDNSS
PITCH
LARYNGEAL
RESONANCE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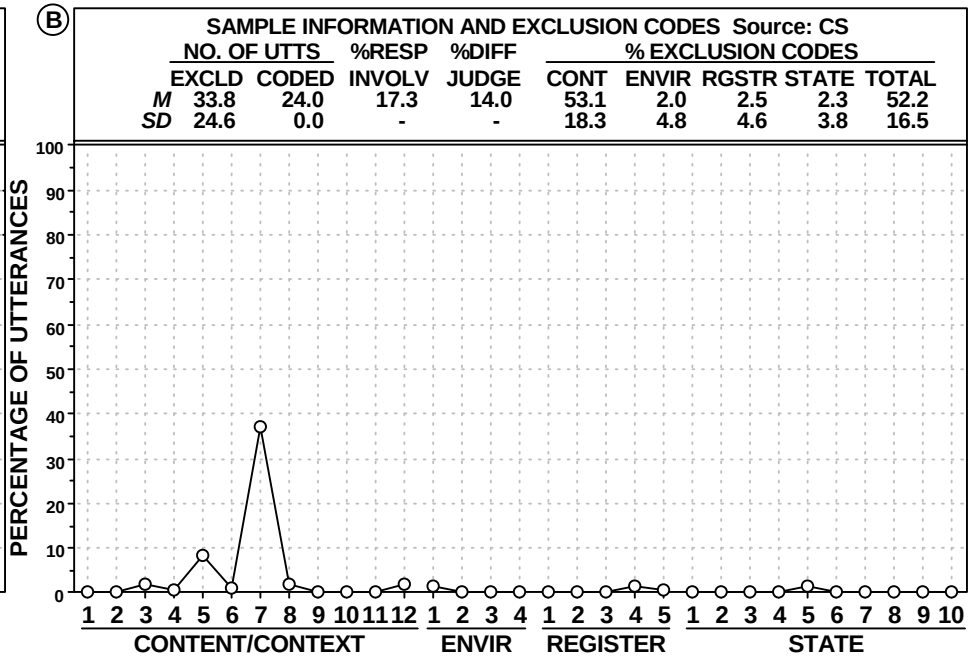
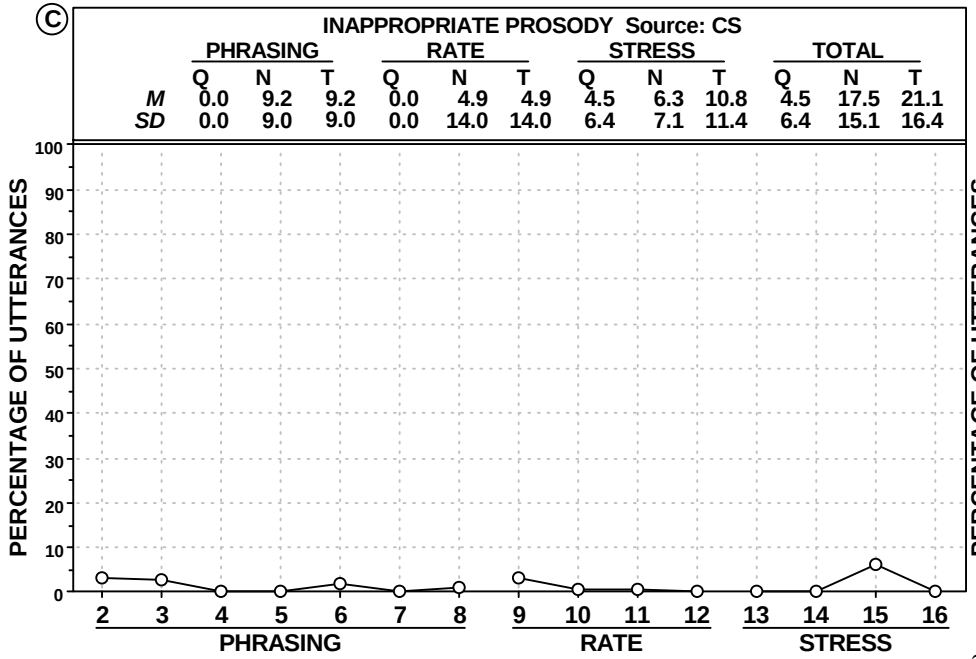
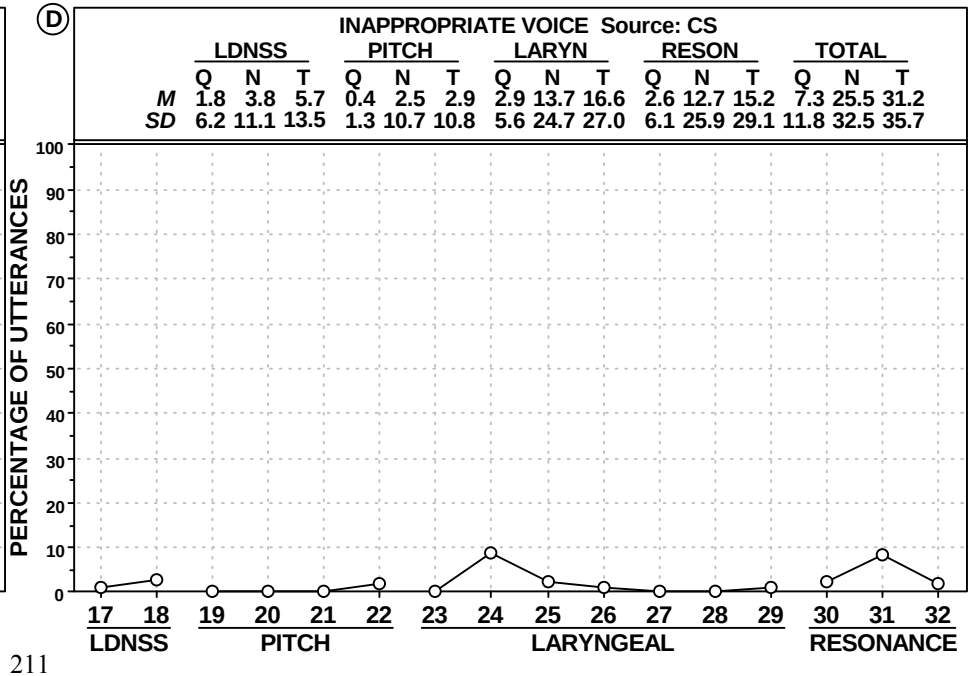
PROSODY-VOICE SUMMARY Source: CS
APPROP PROSODY
APPROPRIATE VOICE
APPR
PHRAS RATE STRESS LDNSS PITCH QUAL LARYN RESON UTTS
M 90.8 95.1 93.7 96.2 97.5 77.2 86.3 87.3 63.7
SD 9.0 14.0 7.1 11.1 10.7 32.4 24.7 25.9 30.1
PERCENTAGE OF UTTERANCES
PHRASING RATE STRESS LDNSS PITCH QUALITY LARYN RESON
PROSODY
VOICE
QUALITY


B
SAMPLE INFORMATION AND EXCLUSION CODES Source: CS
NO. OF UTTS
%RESP
%DIFF
% EXCLUSION CODES
EXCLD CODED INVOLV JUDGE CONT ENVIR RGSTR STATE TOTAL
M 33.8 24.0 17.3 14.0 53.1 2.0 2.5 2.3 52.2
SD 24.6 0.0 - - 18.3 4.8 4.6 3.8 16.5
PERCENTAGE OF UTTERANCES
CONTENT/CONTEXT
ENVIR
REGISTER
STATE


C
INAPPROPRIATE PROSODY Source: CS
PHRASING
RATE
STRESS
TOTAL
Q N T Q N T Q N T Q N T
M 0.0 9.2 9.2 0.0 4.9 4.9 4.5 6.3 10.8 4.5 17.5 21.1
SD 0.0 9.0 9.0 0.0 14.0 14.0 6.4 7.1 11.4 6.4 15.1 16.4
PERCENTAGE OF UTTERANCES
PHRASING
RATE
STRESS


D
INAPPROPRIATE VOICE Source: CS
LDNSS
PITCH
LARYN
RESON
TOTAL
Q N T Q N T Q N T Q N T Q N T
M 1.8 3.8 5.7 0.4 2.5 2.9 2.9 13.7 16.6 2.6 12.7 15.2 7.3 25.5 31.2
SD 6.2 11.1 13.5 1.3 10.7 10.8 5.6 24.7 27.0 6.1 25.9 29.1 11.8 32.5 35.7
PERCENTAGE OF UTTERANCES
LDNSS
PITCH
LARYNGEAL
RESONANCE

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign: Findings | Participants Positive on Sign: %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| **Vowels** | | | | | |
| | **1** | **Decreased Percent vowels correct** | **15/31** | **48.4** | **SF** |
| | **2** | **Decreased Percent vowels correct non-rhotic** | **11/31** | **35.5** | **SI** |
| | **3** | **Decreased Percent vowels correct revised** | **11/31** | **35.5** | **SI** |
| **Consonants** | | | | | |
| | **4** | **Decreased Percent consonants correct** | **13/31** | **41.9** | **SF** |
| | **5** | **Decreased Percent consonants correct - early** | **9/31** | **29.0** | **SI** |
| | **6** | **Decreased Percent consonants correct - middle** | **9/31** | **29.0** | **SI** |
| | **7** | **Decreased Percent consonants correct - late** | **9/31** | **29.0** | **SI** |
| | **8** | **Decreased Percent consonants correct adjusted** | **14/31** | **45.2** | **SF** |
| | **9** | **Decreased Percent consonants correct revised** | **13/31** | **41.9** | **SF** |
| | **10** | **Decreased Percent consonants correct revised - early** | **10/31** | **32.3** | **SI** |
| | **11** | **Decreased Percent consonants correct revised - middle** | **9/31** | **29.0** | **SI** |
| | **12** | **Decreased Percent consonants correct revised - late** | **17/31** | **54.8** | **SF** |
| | **13** | **Decreased Percent consonants in the inventory** | **4/31** | **12.9** | **I** |
| | **14** | **Decreased Percent consonants in the inventory - early** | **0/31** | **0.0** | **I** |
| | **15** | **Decreased Percent consonants in the inventory - middle** | **5/31** | **16.1** | **I** |
| | **16** | **Decreased Percent consonants in the inventory - late** | **4/31** | **12.9** | **I** |
| | **17** | **Increased Absolute omission index** | **12/31** | **38.7** | **SI** |
| | **18** | **Increased Absolute omission index - early** | **7/31** | **22.6** | **SI** |
| | **19** | **Increased Absolute omission index - middle** | **8/31** | **25.8** | **SI** |
| | **20** | **Increased Absolute omission index - late** | **11/31** | **35.5** | **SI** |
| | **21** | **Increased Absolute substitution index** | **14/31** | **45.2** | **SF** |
| | **22** | **Increased Absolute substitution index - early** | **9/31** | **29.0** | **SI** |
| | **23** | **Increased Absolute substitution index - middle** | **8/31** | **25.8** | **SI** |
| | **24** | **Increased Absolute substitution index - late** | **14/31** | **45.2** | **SF** |
| | **25** | **Increased Absolute distortion index** | **6/31** | **19.4** | **I** |
| | **26** | **Increased Absolute distortion index - early** | **14/31** | **45.2** | **SF** |
| | **27** | **Increased Absolute distortion index - middle** | **1/31** | **3.2** | **I** |
| | **28** | **Increased Absolute distortion index - late** | **5/31** | **16.1** | **I** |
| **Vowels and Consonants** | | | | | |
| | **29** | **Decreased Intelligibility index** | **18/31** | **58.1** | **SF** |
| | **30** | **Decreased Percentage of phonemes correct** | **14/31** | **45.2** | **SF** |
| | **31** | **Decreased Percentage of phonemes correct revised** | **13/31** | **41.9** | **SF** |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **0/31** | **0.0** | **I** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **8/31** | **25.8** | **SI** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **2/31** | **6.5** | **I** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **1/31** | **3.2** | **I** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **1/31** | **3.2** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **5/31** | **16.1** | **I** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **5/31** | **16.1** | **I** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **31** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **72.1** | | **Frequent (F): 60.0-79.9%** | **0** |
| **Standard Deviation** | **23.7** | | **Somewhat Frequent (SF): 40.0-59.9%** | **11** |
| **Range** | **23.7 - 100.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **14** |
| | | | **Infrequent (I): 0.0-19.9%** | **13** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| **Vowels** | | | | | |
| | **1** | **Decreased Percent vowels correct** | **8/21** | **38.1** | **SI** |
| | **2** | **Decreased Percent vowels correct non-rhotic** | **7/21** | **33.3** | **SI** |
| | **3** | **Decreased Percent vowels correct revised** | **8/21** | **38.1** | **SI** |
| **Consonants** | | | | | |
| | **4** | **Decreased Percent consonants correct** | **11/21** | **52.4** | **SF** |
| | **5** | **Decreased Percent consonants correct - early** | **7/21** | **33.3** | **SI** |
| | **6** | **Decreased Percent consonants correct - middle** | **6/21** | **28.6** | **SI** |
| | **7** | **Decreased Percent consonants correct - late** | **12/21** | **57.1** | **SF** |
| | **8** | **Decreased Percent consonants correct adjusted** | **17/21** | **81.0** | **VF** |
| | **9** | **Decreased Percent consonants correct revised** | **17/21** | **81.0** | **VF** |
| | **10** | **Decreased Percent consonants correct revised - early** | **8/21** | **38.1** | **SI** |
| | **11** | **Decreased Percent consonants correct revised - middle** | **5/21** | **23.8** | **SI** |
| | **12** | **Decreased Percent consonants correct revised - late** | **17/21** | **81.0** | **VF** |
| | **13** | **Decreased Percent consonants in the inventory** | **1/21** | **4.8** | **I** |
| | **14** | **Decreased Percent consonants in the inventory - early** | **0/21** | **0.0** | **I** |
| | **15** | **Decreased Percent consonants in the inventory - middle** | **0/21** | **0.0** | **I** |
| | **16** | **Decreased Percent consonants in the inventory - late** | **1/21** | **4.8** | **I** |
| | **17** | **Increased Absolute omission index** | **8/21** | **38.1** | **SI** |
| | **18** | **Increased Absolute omission index - early** | **7/21** | **33.3** | **SI** |
| | **19** | **Increased Absolute omission index - middle** | **6/21** | **28.6** | **SI** |
| | **20** | **Increased Absolute omission index - late** | **9/21** | **42.9** | **SF** |
| | **21** | **Increased Absolute substitution index** | **17/21** | **81.0** | **VF** |
| | **22** | **Increased Absolute substitution index - early** | **6/21** | **28.6** | **SI** |
| | **23** | **Increased Absolute substitution index - middle** | **6/21** | **28.6** | **SI** |
| | **24** | **Increased Absolute substitution index - late** | **16/21** | **76.2** | **F** |
| | **25** | **Increased Absolute distortion index** | **6/21** | **28.6** | **SI** |
| | **26** | **Increased Absolute distortion index - early** | **3/21** | **14.3** | **I** |
| | **27** | **Increased Absolute distortion index - middle** | **3/21** | **14.3** | **I** |
| | **28** | **Increased Absolute distortion index - late** | **6/21** | **28.6** | **SI** |
| **Vowels and Consonants** | | | | | |
| | **29** | **Decreased Intelligibility index** | **5/21** | **23.8** | **SI** |
| | **30** | **Decreased Percentage of phonemes correct** | **12/21** | **57.1** | **SF** |
| | **31** | **Decreased Percentage of phonemes correct revised** | **16/21** | **76.2** | **F** |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **2/21** | **9.5** | **I** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **2/21** | **9.5** | **I** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **1/21** | **4.8** | **I** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **4/21** | **19.0** | **I** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **1/21** | **4.8** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **3/21** | **14.3** | **I** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **4/21** | **19.0** | **I** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **21** | | **Very Frequent (VF): 80.0-100%** | **4** |
| **Mean** | **66.4** | | **Frequent (F): 60.0-79.9%** | **2** |
| **Standard Deviation** | **21.6** | | **Somewhat Frequent (SF): 40.0-59.9%** | **4** |
| **Range** | **23.7 - 97.4** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **15** |
| | | | **Infrequent (I): 0.0-19.9%** | **13** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Speech Competence Index (SCI): Group

| Linguistic Domain | SCI Sign No. | SCI Sign Description | Participants Positive on Sign Findings | Participants Positive on Sign %[a] | Ordinal Classification[b] |
|---|---|---|---|---|---|
| Vowels | | | | | |
| | 1 | Decreased Percent vowels correct | 23/52 | 44.2 | SF |
| | 2 | Decreased Percent vowels correct non-rhotic | 18/52 | 34.6 | SI |
| | 3 | Decreased Percent vowels correct revised | 19/52 | 36.5 | SI |
| Consonants | | | | | |
| | 4 | Decreased Percent consonants correct | 24/52 | 46.2 | SF |
| | 5 | Decreased Percent consonants correct - early | 16/52 | 30.8 | SI |
| | 6 | Decreased Percent consonants correct - middle | 15/52 | 28.8 | SI |
| | 7 | Decreased Percent consonants correct - late | 21/52 | 40.4 | SF |
| | 8 | Decreased Percent consonants correct adjusted | 31/52 | 59.6 | SF |
| | 9 | Decreased Percent consonants correct revised | 30/52 | 57.7 | SF |
| | 10 | Decreased Percent consonants correct revised - early | 18/52 | 34.6 | SI |
| | 11 | Decreased Percent consonants correct revised - middle | 14/52 | 26.9 | SI |
| | 12 | Decreased Percent consonants correct revised - late | 34/52 | 65.4 | F |
| | 13 | Decreased Percent consonants in the inventory | 5/52 | 9.6 | I |
| | 14 | Decreased Percent consonants in the inventory - early | 0/52 | 0.0 | I |
| | 15 | Decreased Percent consonants in the inventory - middle | 5/52 | 9.6 | I |
| | 16 | Decreased Percent consonants in the inventory - late | 5/52 | 9.6 | I |
| | 17 | Increased Absolute omission index | 20/52 | 38.5 | SI |
| | 18 | Increased Absolute omission index - early | 14/52 | 26.9 | SI |
| | 19 | Increased Absolute omission index - middle | 14/52 | 26.9 | SI |
| | 20 | Increased Absolute omission index - late | 20/52 | 38.5 | SI |
| | 21 | Increased Absolute substitution index | 31/52 | 59.6 | SF |
| | 22 | Increased Absolute substitution index - early | 15/52 | 28.8 | SI |
| | 23 | Increased Absolute substitution index - middle | 14/52 | 26.9 | SI |
| | 24 | Increased Absolute substitution index - late | 30/52 | 57.7 | SF |
| | 25 | Increased Absolute distortion index | 12/52 | 23.1 | SI |
| | 26 | Increased Absolute distortion index - early | 17/52 | 32.7 | SI |
| | 27 | Increased Absolute distortion index - middle | 4/52 | 7.7 | I |
| | 28 | Increased Absolute distortion index - late | 11/52 | 21.2 | SI |
| Vowels and Consonants | | | | | |
| | 29 | Decreased Intelligibility index | 23/52 | 44.2 | SF |
| | 30 | Decreased Percentage of phonemes correct | 26/52 | 50.0 | SF |
| | 31 | Decreased Percentage of phonemes correct revised | 29/52 | 55.8 | SF |

| | | | | | |
|---|---|---|---|---|---|
| **Phrasing** | | | | | |
| | **32** | **Decreased Percent Prosody Phrasing correct** | **2/52** | **3.8** | **I** |
| **Rate** | | | | | |
| | **33** | **Decreased Percent Prosody Rate correct** | **10/52** | **19.2** | **I** |
| **Stress** | | | | | |
| | **34** | **Decreased Percent Prosody Stress correct** | **3/52** | **5.8** | **I** |
| **Loudness** | | | | | |
| | **35** | **Decreased Percent Prosody Loudness correct** | **5/52** | **9.6** | **I** |
| **Pitch** | | | | | |
| | **36** | **Decreased Percent Prosody Pitch correct** | **2/52** | **3.8** | **I** |
| **Laryngeal Quality** | | | | | |
| | **37** | **Decreased Percent Voice Quality Laryngeal correct** | **8/52** | **15.4** | **I** |
| **Resonance Quality** | | | | | |
| | **38** | **Decreased Percent Voice Quality Resonance correct** | **9/52** | **17.3** | **I** |

| **SCI Scores Summary** | | | **SCI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **52** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **69.8** | | **Frequent (F): 60.0-79.9%** | **1** |
| **Standard Deviation** | **22.9** | | **Somewhat Frequent (SF): 40.0-59.9%** | **10** |
| **Range** | **23.7 - 100.0** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **15** |
| | | | **Infrequent (I): 0.0-19.9%** | **12** |
| | | | **Not Used** | **0** |

**[a] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 31 | 96.6 | -1.50 | 2.8 | 1.79 | 89.7 | -5.00 | 100.0 | 1.28 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | 31 | 100.0 | 0 | 0.0 | 0 | 0.0 | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 31 | 86.6 | -1.09 | 9.2 | 1.59 | 62.3 | -5.00 | 99.7 | 1.45 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 31 | 72.1 | | 23.7 | | 23.7 | | 100.0 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 31 | 9.7 |
| Rate | | 31 | 9.7 |
| Stress | | 31 | 12.9 |
| Loudness | | 31 | 3.2 |
| Pitch | | 31 | 3.2 |
| Laryngeal Quality | | 31 | 25.8 |
| Resonance Quality | | 31 | 19.4 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | | | | | | | | | |
| Encoding | | | | | | | | | | |
| Memory | | | | | | | | | | |
| Transcoding | | | | | | | | | | |

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 21 | 99.4 | -0.54 | 1.1 | 1.68 | 96.4 | -5.00 | 100.0 | 0.90 |
| | | | | | | | | | | |
| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | | |
| | | | n | % | n | % | n | % | | |
| | | | 21 | 100.0 | 0 | 0.0 | 0 | 0.0 | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 21 | 95.0 | -1.90 | 5.5 | 2.02 | 80.9 | -5.00 | 100.0 | 1.21 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 21 | 66.4 | | 21.6 | | 23.7 | | 97.4 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | 21 | 14.3 |
| Rate | | 21 | 0.0 |
| Stress | | 21 | 0.0 |
| Loudness | | 21 | 0.0 |
| Pitch | | 21 | 0.0 |
| Laryngeal Quality | | 21 | 14.3 |
| Resonance Quality | | 21 | 19.0 |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | | | | | | | | | |
| Encoding | | | | | | | | | | |
| Memory | | | | | | | | | | |
| Transcoding | | | | | | | | | | |

# Competence Measures Summary (CMS): Group

| Measure | Abbreviation | n | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intelligibility Index | II | | % | Z | % | Z | % | Z | % | Z |
| | | 52 | 97.7 | -1.12 | 2.6 | 1.79 | 89.7 | -5.00 | 100.0 | 1.28 |

| Ordinal Intelligibility Index | OII | | High | | Moderate | | Low | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | n | % | n | % | n | % | |
| | | | | | | | | | |

| Percentage of Consonants Correct | PCC | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| | | 52 | 90.0 | -1.42 | 8.9 | 1.80 | 62.3 | -5.00 | 100.0 | 1.45 |

| Speech Competence Index | SCI | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | |
| | | 52 | 69.8 | | 22.9 | | 23.7 | | 100.0 | |

| Prosody-Voice Screening Profile | PVSP | | % of Participants with Inappropriate (<80%) Scores |
|---|---|---|---|
| | | | % |
| Phrasing | | | |
| Rate | | | |
| Stress | | | |
| Loudness | | | |
| Pitch | | | |
| Laryngeal Quality | | | |
| Resonance Quality | | | |

| Syllable Repetition Task | SRT | | Mean | | Standard Deviation | | Minimum | | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | Z | % | Z | % | Z | % | Z |
| Performance | | | | | | | | | | |
| Encoding | | | | | | | | | | |
| Memory | | | | | | | | | | |
| Transcoding | | | | | | | | | | |

**MOTOR SPEECH MEASURES AND SUMMARIES:**

**Traumatic Brain Injury (TBI)**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| Vowels | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 3/25 | 12.0 | I |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 3/25 | 12.0 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 5/25 | 20.0 | SI |
| | 4 | Increased Duration of Corner Vowels | | X | 9/31 | 29.0 | SI |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 9/31 | 29.0 | SI |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 1/5 | 20.0 | SI |
| | 7 | Reduced % Vowel Target Consistency | X | | 2/9 | 22.2 | SI |
| Consonants | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 9/31 | 29.0 | SI |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/27 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 3/25 | 12.0 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 11/22 | 50.0 | SF |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 10/23 | 43.5 | SF |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 9/23 | 39.1 | SI |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 7/30 | 23.3 | SI |
| | 15 | Increased All Consonant-Consonant Duration | | X | 6/28 | 21.4 | SI |
| Vowels and Consonants | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 10/31 | 32.3 | SI |
| | 17 | Increased DMI Class: Duration % | X | | 12/31 | 38.7 | SI |
| | 18 | Increased % of Epenthesis Errors | X | | 9/31 | 29.0 | SI |
| Phrasing | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 13/31 | 41.9 | SF |
| Rate | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 8/31 | 25.8 | SI |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 8/31 | 25.8 | SI |
| Stress | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 4/31 | 12.9 | I |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 3/25 | 12.0 | I |
| Loudness | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 1/30 | 3.3 | I |
| Pitch | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 2/31 | 6.5 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 1/31 | 3.2 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **1/31** | **3.2** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **2/31** | **6.5** | **I** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **3/31** | **9.7** | **I** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **5/31** | **16.1** | **I** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **6/30** | **20.0** | **SI** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **6/31** | **19.4** | **I** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **31** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **79.4** | | **Frequent (F): 60.0-79.9%** | **0** |
| **Standard Deviation** | **11.3** | | **Somewhat Frequent (SF): 40.0-59.9%** | **3** |
| **Range** | **48.3 - 96.7** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **15** |
| | | | **Infrequent (I): 0.0-19.9%** | **14** |
| | | | **Not Used** | **0** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| Vowels | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 2/18 | 11.1 | I |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 4/18 | 22.2 | SI |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 5/18 | 27.8 | SI |
| | 4 | Increased Duration of Corner Vowels | | X | 7/21 | 33.3 | SI |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 9/21 | 42.9 | SF |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 0/0 | | |
| | 7 | Reduced % Vowel Target Consistency | X | | 0/0 | | |
| Consonants | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 3/21 | 14.3 | I |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/18 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 0/14 | 0.0 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 2/10 | 20.0 | SI |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 12/20 | 60.0 | F |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 10/20 | 50.0 | SF |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 11/21 | 52.4 | SF |
| | 15 | Increased All Consonant-Consonant Duration | | X | 2/21 | 9.5 | I |
| Vowels and Consonants | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 10/21 | 47.6 | SF |
| | 17 | Increased DMI Class: Duration % | X | | 7/21 | 33.3 | SI |
| | 18 | Increased % of Epenthesis Errors | X | | 6/21 | 28.6 | SI |
| Phrasing | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 9/21 | 42.9 | SF |
| Rate | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 7/21 | 33.3 | SI |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 8/21 | 38.1 | SI |
| Stress | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 4/21 | 19.0 | I |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 1/16 | 6.3 | I |
| Loudness | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 0/21 | 0.0 | I |
| Pitch | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 3/21 | 14.3 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 3/21 | 14.3 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **5/21** | **23.8** | **SI** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **5/21** | **23.8** | **SI** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **2/21** | **9.5** | **I** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **5/21** | **23.8** | **SI** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **8/21** | **38.1** | **SI** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **7/21** | **33.3** | **SI** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **21** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **73.7** | | **Frequent (F): 60.0-79.9%** | **1** |
| **Standard Deviation** | **13.6** | | **Somewhat Frequent (SF): 40.0-59.9%** | **5** |
| **Range** | **40.0 - 93.1** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **13** |
| | | | **Infrequent (I): 0.0-19.9%** | **11** |
| | | | **Not Used** | **2** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

# Precision-Stability Index (PSI): Group

| | PSI Sign | | | | Participants Positive on Sign | | Ordinal Classification[c] |
|---|---|---|---|---|---|---|---|
| Linguistic Domain | No. | Description | Assessment Mode[a] | | Findings | %[b] | |
| | | | P | A | | | |
| Vowels | | | | | | | |
| | 1 | Reduced Dispersion of Corner Vowels from Center | | X | 5/43 | 11.6 | I |
| | 2 | Reduced Dispersion of Corner Vowels from ^ | | X | 7/43 | 16.3 | I |
| | 3 | Reduced Average Pairwise Distance of Corner Vowels | | X | 10/43 | 23.3 | SI |
| | 4 | Increased Duration of Corner Vowels | | X | 16/52 | 30.8 | SI |
| | 5 | Increased Duration for Middle Vowels and Diphthongs | | X | 18/52 | 34.6 | SI |
| | 6 | Reduced % Vowel Phoneme Target Consistency | X | | 1/5 | 20.0 | SI |
| | 7 | Reduced % Vowel Target Consistency | X | | 2/9 | 22.2 | SI |
| Consonants | | | | | | | |
| | 8 | Reduced % Correct Glides | X | | 12/52 | 23.1 | SI |
| | 9 | Increased Relative Distortion Index: Sibilants | X | | 0/45 | 0.0 | I |
| | 10 | Reduced % Dentalized Sibilants of Distorted Sibilants | X | | 3/39 | 7.7 | I |
| | 11 | Increased Relative Distortion Index for Early Consonants | X | | 13/32 | 40.6 | SF |
| | 12 | Decreased 1st Moment on /s/ Initial Singletons | | X | 22/43 | 51.2 | SF |
| | 13 | Increased Sqrt 2nd Moment of the /s/ Initial Singletons | | X | 19/43 | 44.2 | SF |
| | 14 | Increased Sqrt 2nd Moment of the /s/ initial, and /s/ and /z/ final singletons | | X | 18/51 | 35.3 | SI |
| | 15 | Increased All Consonant-Consonant Duration | | X | 8/49 | 16.3 | I |
| Vowels and Consonants | | | | | | | |
| | 16 | Increased Diacritic Modificatiion Index (DMI) Class: Place % | X | | 20/52 | 38.5 | SI |
| | 17 | Increased DMI Class: Duration % | X | | 19/52 | 36.5 | SI |
| | 18 | Increased % of Epenthesis Errors | X | | 15/52 | 28.8 | SI |
| Phrasing | | | | | | | |
| | 19 | Increased PM errors: % of Addition, Breath, Repeat, or Long | X | | 22/52 | 42.3 | SF |
| Rate | | | | | | | |
| | 20 | Reduced Average Syllable Artic Rate (without pauses) | | X | 15/52 | 28.8 | SI |
| | 21 | Increased Average Syllable ms (without pauses) | | X | 16/52 | 30.8 | SI |
| Stress | | | | | | | |
| | 22 | Increased % of Prosody Voice (PV) 15/16 EE (Excessive/Equal Stress) codes of all coded utterances without fast/acceleration. (uncircled & circled) | X | | 8/52 | 15.4 | I |
| | 23 | Increased % of PV15/16 EE codes of all PV15/16 codes. (uncircled & circled) | X | | 4/41 | 9.8 | I |
| Loudness | | | | | | | |
| | 24 | Decreased Intensity Difference dB Fricative+Vowel | | X | 1/51 | 2.0 | I |
| Pitch | | | | | | | |
| | 25 | Decreased F0 for all delimited Vowels & Diphthongs | | X | 5/52 | 9.6 | I |
| | 26 | Decreased Range of Characteristic F0 for delimited Vowels/Diphthongs | | X | 4/52 | 7.7 | I |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Laryngeal Quality** | | | | | | | |
| | **27** | **Increased % Jitter for Vowels** | | **X** | **6/52** | **11.5** | **I** |
| | **28** | **Increased % Shimmer for Vowels** | | **X** | **7/52** | **13.5** | **I** |
| | **29** | **Decreased HNR dB for Vowels** | | **X** | **5/52** | **9.6** | **I** |
| **Resonance Quality** | | | | | | | |
| | **30** | **Increased % Inappropriate Resonance** | **X** | | **10/52** | **19.2** | **I** |
| | **31** | **Decreased F1 /ɑ/ (Nasal)** | | **X** | **14/51** | **27.5** | **SI** |
| | **32** | **Decreased F2 for High Vowels (Nasopharyngeal)** | | **X** | **13/52** | **25.0** | **SI** |

| **PSI Scores Summary** | | | **PSI Signs Summary** | |
|---|---|---|---|---|
| | | | **Number of signs with each ordinal classification** | |
| **Count** | **52** | | **Very Frequent (VF): 80.0-100%** | **0** |
| **Mean** | **77.1** | | **Frequent (F): 60.0-79.9%** | **0** |
| **Standard Deviation** | **12.5** | | **Somewhat Frequent (SF): 40.0-59.9%** | **4** |
| **Range** | **40.0 - 96.7** | | **Somewhat Infrequent (SI): 20.0-39.9%** | **14** |
| | | | **Infrequent (I): 0.0-19.9%** | **14** |
| | | | **Not Used** | **0** |

**[a] A: Acoustic; P: Perceptual**

**[b] Increased/Decreased reference ≥ 1.25 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012;Scheer-Cohen et al., 2013).**

**[c] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**TBI: Younger Group**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **11** | **35.5** | **SI** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **7** | **22.6** | **SI** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **5** | **16.1** | **I** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **3** | **9.7** | **I** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **6** | **19.4** | **I** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **3** | **9.7** | **I** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **4** | **12.9** | **I** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **3** | **9.7** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **1** | **3.2** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **1** | **3.2** | **I** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **0** | **0.0** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **2** | **6.5** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **6** | **19.4** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **0** | **0.0** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **2** | **6.5** | **I** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **1** | **3.2** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **1** | **3.2** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **2** | **6.5** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **1** | **3.2** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **10** | **32.3** | **SI** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **2** | **6.5** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **2** | **6.5** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **3** | **9.7** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **1** | **3.2** | **I** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **4** | **12.9** | **I** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **2** | **6.5** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **1** | **3.2** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **0** | **0.0** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **1** | **3.2** | **I** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **2** | **6.5** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **1** | **3.2** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **3** | **10.0** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **31** |
| **Mean Percentage Score** | **91.3** |
| **Standard Deviation** | **8.1** |
| **Range** | **67.6 - 100.0** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **87.1** | **91.1** | **88.7** | **93.5** | **94.0** |
| **Mean DSI Percentile Score** | **70.8** | **67.9** | **66.1** | **63.4** | **65.7** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **3.2** | **6.5** | **3.2** | **3.2** | **3.2** |

**TBI: Older Group**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **6** | **28.6** | **SI** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **1** | **4.8** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **5** | **23.8** | **SI** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **7** | **33.3** | **SI** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **2** | **9.5** | **I** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **2** | **9.5** | **I** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **2** | **9.5** | **I** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **6** | **28.6** | **SI** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **1** | **4.8** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **1** | **4.8** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **1** | **4.8** | **I** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **1** | **4.8** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **0** | **0.0** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **1** | **4.8** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **4** | **19.0** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **0** | **0.0** | **I** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **1** | **4.8** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **0** | **0.0** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **2** | **9.5** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **3** | **14.3** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **3** | **14.3** | **I** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **0** | **0.0** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **2** | **9.5** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **1** | **4.8** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **0** | **0.0** | **I** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **1** | **4.8** | **I** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **2** | **9.5** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **4** | **19.0** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **1** | **4.8** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **5** | **23.8** | **SI** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **1** | **4.8** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **2** | **9.5** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **7** | **33.3** | **SI** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **21** |
| **Mean Percentage Score** | **89.5** |
| **Standard Deviation** | **8.1** |
| **Range** | **70.6 - 97.1** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **85.7** | **89.9** | **88.1** | **91.2** | **89.5** |
| **Mean DSI Percentile Score** | **68.8** | **62.5** | **64.0** | **56.8** | **51.9** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **4.8** | **4.8** | **4.8** | **4.8** | **9.5** |

**TBI: Combined**

**Dysarthria Index (DI) and Dysarthria Subtype Indices (DSI): Group**

| Linguistic Domain | Sign No. | Description | Assessment Mode[a] | | Participants Positive on Sign | | Ordinal Classification[b] | Five Dysarthria Subtype Indices (DSI)[c] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ataxia | Spastic | Hyper-kinetic | Hypo-kinetic | Flaccid |
| | | | P | A | No. | %[d] | | | | | | |
| **Vowels** | | | | | | | | | | | | |
| | **1** | **Increased Percentage of Vowels/Diphthongs Distortions** | **X** | | **17** | **32.7** | **SI** | **X(2)** | | **X(2)** | | |
| **Consonants** | | | | | | | | | | | | |
| | **2** | **Number of Nasal Emissions** | **X** | | **1** | **1.9** | **I** | | | | | **X(2)** |
| | **3** | **Increased Percentage of Weak Consonants** | **X** | | **12** | **23.1** | **SI** | | | | | X(1) |
| **Vowels and Consonants** | | | | | | | | | | | | |
| | **4** | **Increased Diacritic Modification Index Class Duration** | **X** | | **12** | **23.1** | **SI** | X(1) | | X(1) | | |
| **Phrasing** | | | | | | | | | | | | |
| | **5** | **Increased Slow/Pause Time** | **X** | | **5** | **9.6** | **I** | | | X(1) | **X(2)** | |
| **Rate** | | | | | | | | | | | | |
| | **6** | **Increased Slow Articulation/Pause Time** | **X** | | **8** | **15.4** | **I** | X(1) | **X(2)** | X(1) | | |
| | **7** | **Decreased Average syllable speaking rate (with pauses)** | | **X** | **5** | **9.6** | **I** | X(1) | **X(2)** | X(1) | | |
| | **8** | **Decreased Average syllable articulation rate (without pauses)** | | **X** | **10** | **19.2** | **I** | X(1) | **X(2)** | X(1) | | |
| | **9** | **Increased Fast Rate** | **X** | | **4** | **7.7** | **I** | | | | **X(2)** | |
| | **10** | **Decreased Stability of syllable speaking rate** | | **X** | **2** | **3.8** | **I** | | | X(1) | **X(2)** | |
| **Stress** | | | | | | | | | | | | |
| | **11** | **Increased Excessive/Equal/Misplaced Stress** | **X** | | **2** | **3.8** | **I** | **X(2)** | X(1) | | | |
| | **12** | **Increased Reduced/Equal Stress** | **X** | | **1** | **1.9** | **I** | | | | **X(2)** | |
| **Loudness** | | | | | | | | | | | | |
| | **13** | **Decreased Stability of Speech Intensity Index** | | **X** | **2** | **3.8** | **I** | **X(2)** | | **X(2)** | | |
| | **14** | **Increased Stability of Speech Intensity Index** | | **X** | **7** | **13.5** | **I** | | X(1) | | **X(2)** | X(1) |
| | **15** | **Increased Soft** | **X** | | **4** | **7.7** | **I** | | | | **X(2)** | X(1) |
| | **16** | **Decreased Speech Intensity Index** | | **X** | **2** | **3.8** | **I** | | | | **X(2)** | X(1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pitch** | | | | | | | | | | | | |
| | **17** | **Increased Low Pitch/Glottal Fry** | **X** | | **2** | **3.8** | **I** | | **X(2)** | X(1) | | |
| | **18** | **Increased Low Pitch** | **X** | | **1** | **1.9** | **I** | | **X(2)** | X(1) | | |
| | **19** | **Decreased F0 for all vowels & diphthongs** | | **X** | **4** | **7.7** | **I** | | **X(2)** | X(1) | | |
| | **20** | **Decreased Range of char. F0 among vowels & diphthongs** | | **X** | **4** | **7.7** | **I** | | X(1) | X(1) | **X(2)** | X(1) |
| | **21** | **Decreased Stability of F0 for all vowels & diphthongs** | | **X** | **13** | **25.0** | **SI** | X(1) | | | | |
| **Laryngeal Quality** | | | | | | | | | | | | |
| | **22** | **Increased Breathy** | **X** | | **2** | **3.8** | **I** | | | | X(1) | **X(2)** |
| | **23** | **Increased Rough** | **X** | | **4** | **7.7** | **I** | | X(1) | X(1) | | |
| | **24** | **Increased Strained** | **X** | | **4** | **7.7** | **I** | | X(1) | X(1) | | |
| | **25** | **Number of utterances with [TREM] (tremulous) comment** | **X** | | **1** | **1.9** | **I** | | | X(1) | | |
| | **26** | **Increased Break/Shift/Tremulous** | **X** | | **5** | **9.6** | **I** | | **X(2)** | X(1) | | |
| | **27** | **Increased Multiple Features** | **X** | | **4** | **7.7** | **I** | | **X(2)** | **X(2)** | | |
| | **28** | **Number of Diplophonia** | **X** | | **0** | **0.0** | **I** | | | | | **X(2)** |
| | **29** | **Increased % jitter for vowels** | | **X** | **5** | **9.6** | **I** | X(1) | | | | |
| | **30** | **Decreased Stability of jitter for vowels** | | **X** | **1** | **1.9** | **I** | X(1) | | | | |
| | **31** | **Increased % shimmer for vowels** | | **X** | **6** | **11.5** | **I** | X(1) | | | | |
| | **32** | **Decreased Stability of shimmer for vowels** | | **X** | **3** | **5.8** | **I** | X(1) | | | | |
| **Resonance Quality** | | | | | | | | | | | | |
| | **33** | **Increased Nasal** | **X** | | **3** | **5.8** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | **34** | **Decreased F1 for /ɑ/ (Nasal)** | | **X** | **10** | **19.6** | **I** | | X(1) | X(1) | X(1) | **X(2)** |
| | | **Unweighted Total Possible Points** | | | | | | **12** | **15** | **19** | **11** | **10** |
| | | **Weighted Total Possible Points** | | | | | | **15** | **23** | **22** | **19** | **15** |

**[a] A: Acoustic; P: Perceptual**

**[b] Very Frequent (VF): 80.0-100%; Frequent (F): 60.0-79.9%; Somewhat Frequent (SF): 40.0-59.0%; Somewhat Infrequent (SI): 20.0-39.9%; Infrequent (I): 0.0-19.9%**

**[c] The DI includes all 34 items, unweighted. The number in parentheses is the weighting of the item for each of the 5 DSI (1 or 2 points). The criteria for a classification of CD are a DI score below 80%, two weighted DSI indices below 70%, and at least one DSI $\leq$ 10$^{th}$ %ile.**

**[d] Increased/Decreased reference $\geq$ 1.5 standard deviation units from age-sex matched, typically developing speakers (Potter et al., 2012; Scheer-Cohen et al., 2013).**

| DI Summary | |
|---|---|
| **n** | **52** |
| **Mean Percentage Score** | **90.6** |
| **Standard Deviation** | **8.1** |
| **Range** | **67.6 - 100.0** |

| DSI Summary | | | | | |
|---|---|---|---|---|---|
| | **Ataxia** | **Spastic** | **Hyper-kinetic** | **Hypo-kinetic** | **Flaccid** |
| **Mean DSI Percentage Score** | **86.5** | **90.6** | **88.4** | **92.6** | **92.2** |
| **Mean DSI Percentile Score** | **70.0** | **65.7** | **65.3** | **60.8** | **60.2** |
| **Percentage of Participants $\leq 10^{th}$ %ile** | **3.8** | **5.8** | **3.8** | **3.8** | **5.8** |

**TBI: Younger Group**

**Pause Marker Summary (PMS): Group**

**Group: 1 *n*: 31**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 30 | 96.8 | Abrupt | 31 | 1.4 | Long | 31 | 0.3 |
| PM+ | 2 | 6.5 | 2 | 6.5 | Code 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | Mild-Moderate | 0 | 0.0 | Alone | 31 | 0.2 | Repeat/Revise | 31 | 0.4 |
| PM- | 28 | 90.3 | 29 | 93.5 | Code 0 | 1 | 100.0 | 1 | 100.0 | 0 | 0.0 | Moderate-Severe | 0 | 0.0 | Change | 31 | 0.3 | Breath | 31 | 0.5 |
| ?[a] | 1 | 3.2 | 0 | 0.0 | | | | | | | | Severe | 1 | 3.2 | Grope | 31 | 0.1 | Addition | 31 | 0.1 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

**TBI: Older Group**

**Pause Marker Summary (PMS): Group**

**Group: 2 *n*: 21**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 21 | 100.0 | Abrupt | 21 | 0.5 | Long | 21 | 0.3 |
| PM+ | 0 | 0.0 | 0 | 0.0 | Code 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | Mild-Moderate | 0 | 0.0 | Alone | 21 | 0.1 | Repeat/Revise | 21 | 0.5 |
| PM- | 20 | 95.2 | 21 | 100.0 | Code 0 | 1 | 100.0 | 1 | 100.0 | 0 | 0.0 | Moderate-Severe | 0 | 0.0 | Change | 21 | 0.0 | Breath | 21 | 0.1 |
| ?[a] | 1 | 4.8 | 0 | 0.0 | | | | | | | | Severe | 0 | 0.0 | Grope | 21 | 0.2 | Addition | 21 | 0.0 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

**TBI: Combined**

**Pause Marker Summary (PMS): Group**

**Group: All *n*: 52**

| Pause Marker (PM) | | | | | Supplemental Pause Marker Signs (SPMS) | | | | | | | Pause Marker Index (PMI)[b] | | | Inappropriate Pauses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | After | | | Rate | | Stress | | Transcoding | | | n | % | Type I | n | % | Type II | n | % |
| | n | % | n | % | | n | % | n | % | n | % | Mild | 51 | 98.1 | Abrupt | 52 | 1.0 | Long | 52 | 0.3 |
| PM+ | 2 | 3.8 | 2 | 3.8 | Code 1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | Mild-Moderate | 0 | 0.0 | Alone | 52 | 0.2 | Repeat/Revise | 52 | 0.4 |
| PM- | 48 | 92.3 | 50 | 96.2 | Code 0 | 2 | 100.0 | 2 | 100.0 | 0 | 0.0 | Moderate-Severe | 0 | 0.0 | Change | 52 | 0.2 | Breath | 52 | 0.3 |
| ?[a] | 2 | 3.8 | 0 | 0.0 | | | | | | | | Severe | 1 | 1.9 | Grope | 52 | 0.1 | Addition | 52 | 0.1 |

[a] ? = Indeterminate (Shriberg, Strand, Fourakis et al., 2017)

[b] Mild = ≥90.0
Mild-Moderate = 85.0-89.9
Moderate-Severe = 80.0-84.9
Severe = <80.0

**SUMMARY SPEECH AND MOTOR SPEECH CLASSIFICATIONS:**

**Traumatic Brain Injury (TBI)**

**TBI: Younger Group**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Speech Classification | | Motor Speech Classification | | | | | | Totals | |
| | | No Motor Speech Disorder (NO MSD) | Speech Motor Delay (SMD) | Childhood Dysarthria (CD) | Childhood Apraxia of Speech (CAS) | Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS) | | n | % |
| Normal(ized) Speech Aquisition (NSA)[a] | | 16 | 2 | 1 | 1 | 0 | | 20 | 64.5 |
| Speech Errors (SE) | | 1 | 0 | 0 | 0 | 0 | | 1 | 3.2 |
| Persistent Speech Errors (PSE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| (SE/PSE) | | 1 | 0 | 0 | 0 | 0 | | 1 | 3.2 |
| Speech Delay (SD) | | 7 | 2 | 0 | 0 | 1 | | 10 | 32.3 |
| Persistent Speech Delay (PSD) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| (SD/PSD) | | 7 | 2 | 0 | 0 | 1 | | 10 | 32.3 |
| | | | | | | | | | |
| Totals | n | 24 | 4 | 1 | 1 | 1 | | 31 | |
| | % | 77.4 | 12.9 | 3.2 | 3.2 | 3.2 | | | 100.0 |

[a] Includes children younger than 9 years old with age-appropriate distortions

**TBI: Older Group**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Speech Classification | | Motor Speech Classification | | | | | | Totals | |
| | | No Motor Speech Disorder (NO MSD) | Speech Motor Delay (SMD) | Childhood Dysarthria (CD) | Childhood Apraxia of Speech (CAS) | Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS) | | n | % |
| Normal(ized) Speech Aquisition (NSA)[a] | | 10 | 3 | 1 | 0 | 0 | | 14 | 66.7 |
| Speech Errors (SE) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Errors (PSE) | | 2 | 0 | 1 | 0 | 0 | | 3 | 14.3 |
| (SE/PSE) | | 2 | 0 | 1 | 0 | 0 | | 3 | 14.3 |
| Speech Delay (SD) | | 0 | 0 | 0 | 0 | 0 | | 0 | 0.0 |
| Persistent Speech Delay (PSD) | | 2 | 1 | 1 | 0 | 0 | | 4 | 19.0 |
| (SD/PSD) | | 2 | 1 | 1 | 0 | 0 | | 4 | 19.0 |
| | | | | | | | | | |
| Totals | n | 14 | 4 | 3 | 0 | 0 | | 21 | |
| | % | 66.7 | 19.0 | 14.3 | 0.0 | 0.0 | | | 100.0 |

[a] Includes children younger than 9 years old with age-appropriate distortions

**TBI: Combined**

| Speech Disorders Classification System Summary (SDCSS): Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Speech Classification** | | **Motor Speech Classification** | | | | | | **Totals** | |
| | | **No Motor Speech Disorder (NO MSD)** | **Speech Motor Delay (SMD)** | **Childhood Dysarthria (CD)** | **Childhood Apraxia of Speech (CAS)** | **Childhood Dysarthria and Childhood Apraxia of Speech (CD & CAS)** | | **n** | **%** |
| **Normal(ized) Speech Aquisition (NSA)[a]** | | **26** | **5** | **2** | **1** | **0** | | **34** | **65.4** |
| **Speech Errors (SE)** | | **1** | **0** | **0** | **0** | **0** | | **1** | **1.9** |
| **Persistent Speech Errors (PSE)** | | **2** | **0** | **1** | **0** | **0** | | **3** | **5.8** |
| **(SE/PSE)** | | **3** | **0** | **1** | **0** | **0** | | **4** | **7.7** |
| **Speech Delay (SD)** | | **7** | **2** | **0** | **0** | **1** | | **10** | **19.2** |
| **Persistent Speech Delay (PSD)** | | **2** | **1** | **1** | **0** | **0** | | **4** | **7.7** |
| **(SD/PSD)** | | **9** | **3** | **1** | **0** | **1** | | **14** | **26.9** |
| | | | | | | | | | |
| **Totals** | **n** | **38** | **8** | **4** | **1** | **1** | | **52** | |
| | **%** | **73.1** | **15.4** | **7.7** | **1.9** | **1.9** | | | **100.0** |

**[a] Includes children younger than 9 years old with age-appropriate distortions**

## REFERENCES


Abbeduto, L., Murphy, M. M., Cawthon, S. W., Richmond, E. K., Weissman, M. D., Karadottir, S., & O'Brien, A. (2003). Receptive language skills of adolescents and young adults with Down or fragile X syndrome. *American Journal on Mental Retardation, 108,* 149-160.

Abbeduto, L., Murphy, M. M., Kover, S. T., Giles, N., Karadottir, S., Amman, A., . . . Nollin, K. (2008). Signaling noncomprehension of language: A comparison of fragile X syndrome and Down syndrome. *American Journal on Mental Retardation, 113,* 214-230.

Baylis, A. L., & Shriberg, L. D. (2017). *Prevalence of motor speech disorders in 22q11.2 deletion syndrome*. Manuscript submitted for publication.

Camarata, S., Yoder, P., & Camarata, M. (2006). Simultaneous treatment of grammatical and speech-comprehensibility deficits in children with Down syndrome. *Down Syndrome Research and Practice, 11*, 9-17.

Campbell, T. F., & Dollaghan, C. A. (1995). Speaking rate, articulatory speed, and linguistic processing in children and adolescents with severe traumatic brain injury. *Journal of Speech and Hearing Research, 38,* 864-875.

Campbell, T. F., Dollaghan, C. A., Janosky, J., Rusiewicz, H. L., Small, S. L., Dick, F.,. . . Adelson, P. D. (2013). Consonant accuracy after severe pediatric traumatic brain injury: A prospective cohort study. *Journal of Speech, Language, and Hearing Research, 56,* 1023-1034.

Campbell, T. F., Dollaghan, C. A., & Shriberg, L. D. (2017). *Speech and motor speech outcomes in children with traumatic brain injury (TBI).* Manuscript in preparation.

Davis, T. N., Camarata, S., & Camarata, M. (2016). Cross modal generalization of receptive and expressive vocabulary in children with Down syndrome. *Journal of Down Syndrome and Chromosome Abnormalities,* 2, 105. doi: 10.4172/2472-1115.1000105

Keller-Bell, Y. D., & Abbeduto, L. (2007). Narrative ability of adolescents with fragile X syndrome. *The American Journal on Mental Retardation, 112,* 289-299.

Mabie, H. L., & Shriberg, L. D. (2017). *Speech and motor speech measures and reference data for the Speech Disorders Classification System (SDCS).* (Tech. Rep. No. 23). Phonology Project, Waisman Center, University of Wisconsin-Madison.

Potter, N. L., Hall, S., Karlsson, H. B., Fourakis, M., Lohmeier, H. L., McSweeny, J. L., . . . Shriberg, L. D. (2012). *Reference Data for the Madison Speech Assessment Protocol (MSAP): A Database of 150 Participants 3-to-18 Years of Age with Typical Speech.* (Tech. Rep. No. 18). Phonology Project, Waisman Center, University of Wisconsin28 Madison.

Programs to Examine Phonetic and Phonologic Evaluation Records [PEPPER: Computer software]. (2018). Madison, WI: Waisman Center, University of Wisconsin–Madison.

Scheer-Cohen, A. R., Holt, A. S., Karlsson, H. B., Mabie, H. L., McSweeny, J. L., Tilkens, C. M., & Shriberg, L. D. (2013). *Reference Data for the Madison Speech Assessment Protocol (MSAP): A Database of Fifty 20-to-80 year old Participants with Typical Speech.* (Tech. Rep. No. 20). Phonology Project, Waisman Center, University of Wisconsin-Madison.

Shriberg, L. D. (1993). Four new speech and prosody-voice measures for genetics research and other studies in developmental phonological disorders. *Journal of Speech and Hearing Research*, *36*, 105–140.

Shriberg, L. D. (1994). Five subtypes of developmental phonological disorders. *Clinics in Communication Disorders*, *4*, 38–53.

Shriberg, L. D. (2010). Childhood speech sound disorders: From post-behaviorism to the post-genomic era. In R. Paul & P. Flipsen (Eds), *Speech sound disorders in children* (pp. 1-34). San Diego, CA: Plural Publishing.

Shriberg, L. D., Austin, D., Lewis, B. A., McSweeny, J. L., & Wilson, D. L. (1997). The Percentage of Consonants Correct (PCC) Metric: Extensions and reliability data. *Journal of Speech, Language, and Hearing Research, 40,* 708-722.

Shriberg, L. D., Fourakis, M., Hall, S., Karlsson, H. B., Lohmeier, H. L, McSweeny, J., . . . Wilson, D. L. (2010). Extensions to the Speech Disorders Classification System (SDCS). *Clinical Linguistics & Phonetics, 24,* 795-824.

Shriberg, L. D., Paul, R., Black, L. M., & van Santen, J. P. (2011). The hypothesis of apraxia of speech in children with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders, 41,* 405-426.

Shriberg, L. D., Potter, N. L., & Strand, E. A. (2011). Prevalence and phenotype of childhood apraxia of speech in youth with galactosemia. *Journal of Speech, Language, and Hearing Research, 54,* 487-519.

Shriberg, L. D., Strand, E. A., Fourakis, M., Jakielski, K. J., Hall, S. D., Karlsson, H. B., . . . Wilson, D. L. (2017). A diagnostic marker to discriminate childhood apraxia of speech from speech delay: I. Development and description of the Pause Marker. *Journal of Speech, Language, and Hearing Research, 60,* S1096-S1117. doi:10.1044/2016_JSLHR-S-15-0296

Shriberg, L. D., Strand, E. A., Jakielski, K. J., & Mabie, H. L. (2018). *Prevalence of speech disorders and motor speech disorders in eight complex neurodevelopmental disorders*. Manuscript in preparation.

Shriberg, L. D., Strand, E. A., & Mabie, H. L. (2018). *Prevalence of Motor Speech Disorders in children with idiopathic speech delay.* Manuscript in preparation.

Shriberg, L. D., & Widder, C. J. (1990). Speech and prosody characteristics of adults with mental retardation. *Journal of Speech and Hearing Research, 33,* 627-653.

Simons Foundation. (2015). *Speech disorders in individuals with 16p11.2 deletion or duplication*. Retrieved from: https://www.sfari.org/funded-project/speech-disorders-in-individuals-with-16p11-2-deletion-or-duplication/

Wilson, E. M., Abbeduto, L., & Camarata, S. M. & Shriberg, L. D. (2017). *Prevalence of speech and motor speech disorders and intelligibility correlates in persons with Down syndrome*. Manuscript submitted for publication.