

## **"A Convergent Approach to Assessing/Managing Spoken Language Processing Disorders**

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### **Overview of Presentation**

- **Spoken Language Processing Testing- Audiology Perspective**
- **How do Spoken Language Processing and Speech-Language assessments complement each other?**
  - *- the goal is to derive a comprehensive profile to guide management*
- **Management of Processing Related Difficulties:**
  - ◆ **Specific Techniques**
  - ◆ **Environmental Modifications/Compensations**
  - ◆ **General Compensatory Strategies**

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### **Spoken Language Processing Testing- Audiology Perspective**

RHSC uses tests that allow us to determine if a SLP disorder is present, the specific difficulties, and, in turn, the severity of the various underlying problems. In turn, we use the findings to guide individualized management.

This approach contrasts with other facilities that may use CAP tests for pass/fail and implement general strategies, or, that try and focus on "pure auditory deficits", which I feel is difficult to do in a clinic setting and is self-limiting.

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## Referrals to RHSC

### Typical Reasons for Referral

#### Children

- suspected of ADHD (hyperactivity/impulsivity or inattentive type)
- academic difficulties, especially in reading, spelling, phonics, math
- poor receptive and expressive language skills (in most cases, the children seen at RHSC for CAP testing do not have a diagnosed speech/language disorder)

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## Reasons for Referrals- cont'd

#### Children- continued

- difficulties following directions, comprehension, sequencing and/or retention (yet, no apparent hearing loss)
- difficulty listening in background noise
- break down if someone talks quickly

If parents or teachers have concerns about listening, comprehension or retention, there usually is an underlying problem that should result in a CAP referral.

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## Reasons for Referrals- cont'd

#### Adults

- **increased listening difficulty at home and/or work:**
  - usually the individual schedules a hearing assessment and no hearing loss is determined. Subsequently, this individual may be referred on for a SL-P evaluation.
- **returns to school and experiences listening difficulties:**
  - usually, the client may have had difficulty in school when they were younger but awareness of CAPD and its management was unknown.

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### RHSC Referral Criteria

RHSC Audiology accepts referrals for anyone aged five years and older with normal hearing and normal cognitive ability.

There are others in the field that use seven years of age as a cutoff criteria. It appears this is based on the premise that:

- there are few tests appropriate for use with adequate norms for under 7 years of age
- children under 7 years of age exhibit much variability in testing (e.g., can't sit still/unreliable over sustained testing)
- may be too hard for most of these children to attend too long without results being compromised
- great variability in neuromaturation at young ages

Yet, these authors state the importance of early intervention and will initiate management based on observations and other professionals' input.

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### Referral Criteria- cont'd

In contrast, I feel:

- ◆ if children as young as 2-3 years of age can be assessed by SLPs, psychologists, etc. then I believe audiologists have the skills to assess children as young as five on a CAP test battery
- ◆ the tests that I deploy have norms (& standard deviations) down to the age of five
- ◆ with sufficient breaks, praise, etc., one can obtain reliable results

*If I had the tools, I would evaluate at even younger ages (early intervention also applies to these children).*

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### Referral Criteria- cont'd

- ◆ In general, I would like the child to be evaluated by a speech & language pathologist (basic language test battery), educational or child psychologist, possibly an occupational therapist, etc., prior to the CAP evaluation.
- ◆ However, if there is no known history of cognitive delays or hearing loss, I may see a child first and based on the findings refer to the SLP or psychologist (thus guiding them to specific test batteries).
- ◆ In addition, even if testing is initially done by related professional, based on my results I may suggest further testing by the referring professional.

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## Interdisciplinary Assessment of Processing Domains

### Role of the SLP

◆ If the client is seen first for a spoken-language processing evaluation, the SLP should use the results of that evaluation, as well as the presenting difficulties, to guide further language assessment- if deemed necessary.

\* Note: it is possible that an SLP may initially have conducted a basic language test battery but subsequent to an auditory processing evaluation may conduct further testing based on the new results obtained.

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## Spoken Language Processing Skills Examined at RHSC

1. Aspects of Phonological Awareness/Phonics
2. Lexical Decoding Speed
3. Short-Term Memory retention (Fading-Memory)
4. Auditory-Linguistic Integration
5. Sequencing (and Temporal Patterning)
6. Temporal Resolution
7. Span of Apprehension (Short-Term Memory Span)
8. Auditory Attention
  - Selective Attention (Figure Ground, Binaural Separation)
  - Divided Attention
  - Sustained Attention/Vigilance
  - Impulsivity

\*\* see Appendix for the various tests that may be employed at RHSC

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## OVERVIEW OF MANAGEMENT TECHNIQUES

The information derived from the Spoken Language Processing test battery is used to provide treatment recommendations to assist parents, professionals, and clients (if adults), including:

1. Specific therapeutic approaches and/or recommendation for further testing.
2. Environmental modifications, such as classroom acoustics, teacher presentation style, use of overheads/power point, earplugs during testing/ study time, ALDs, etc.
3. Compensatory strategies, program modifications, accommodations, etc.

*It would take too long to describe all of the management approaches. The following is a flavor of approaches that can be applied.*

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## Overarching Concept in Implementing Management Strategies

As much as possible, teach new concepts in a familiar routine, thus minimizing the processing load.

Analyze the task demands (stimulus/response load). Always start at a level that ensures success and slowly add complexity, be it in stimulus complexity or task requirements.

Teach to the level of automaticity to ensure generalization of skills to everyday life.

Teach the individual strategies (preparation, repair strategies, etc.) that they can employ listening in class, conversation, etc.

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## Specific Techniques for SL-PD Children

### Phonological and Phonemic Awareness

- Curricular programs such as Lindamood Phoneme Sequencing, Wilson, or, Phonemic Synthesis: Blending Sounds into Words.
- Computer programs, such as Earobics (three versions: 4-7; 7-10; adolescent/adults) and Fast ForWord for Language

*\*\* In addition, there are a myriad of other products that can be used to address this area. Of course, the choice of product (and starting point) will depend on the nature of the problem as well as the age of the individual.*

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## Audiological Finding: Lexical Decoding Speed

Depending on the specific test findings, one can work on:

- Semantic Knowledge: labeling, word (multiple) meanings, antonym/synonyms, semantic categories, semantic relations, semantic mapping, etc.)
- Strategies for learning unknown words:
  - context (topic/sentence) cues; identify word roots
- Morphological/Syntactical Knowledge
- If phonological representations are poor, work on phonological awareness skills may increase lexical decoding speed

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### Lexical Decoding Speed

Exercises such as cloze tasks that use sentences in which words are left out (My mother baked a c...) or use nonsense words embedded in sentences (figuring out the word's meaning) are other techniques that can be used.

#### Examples of cloze activities

- ◆ may start with well known rhymes and leave out words
- ◆ ask what word comes next but give first sound  
" My mother baked a c\_\_\_\_ "

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### Lexical Decoding Speed

- ◆ ask what word come next (no sound)?  
" When I'm tired, I lie down in my \_\_\_\_\_ "
- ◆ embed nonsense words or novel words in sentences and child figures out what the word means from context  
"He was holding a floggood in his hand to keep the rain off him"

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### Lexical Decoding Speed

Another technique of working on speech processing speed (while simultaneously working on aspects of language recall, comprehension, following directions, etc.) is by:

- ◆ initially speaking at 1.5 or 2x slower rate (pausing between words rather than lengthening sounds-distorts), inserting lengthened pauses between grammatical clauses and stressing key words
- ◆ altering one variable at a time, begin to approach natural speaking rate/stress patterns as a function of success until students able to successfully do tasks at normal rate/patterns

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### **Audiological Finding: Integration**

- Conversational Skills
- Figurative Language (e.g., idioms), Ambiguous Sentences, Humor
- Inferencing
- Problem Solving

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### **Integration**

#### **Conversational Skills**

- Develop topic maintenance, topic initiation, clarification requests and pronominal reference
  - ↳ Focus on one area at a time
  - ↳ Teach rules for conversation
  - ↳ Work on awareness of prosody, facial expression and body language
  - ↳ Use scripting and role playing
  - ↳ Videotape and analyze conversations of others and self

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### **Reading Difficulties per SLP/School Personnel Testing**

- Phonics
- Word Decoding (Attack)
- Reading Fluency
- Reading Comprehension (do as a function of time)

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## Spelling Difficulties per SLP/School Personnel Testing

### Spelling

- Phonemic Awareness
- Phonics
- Word Analysis Strategies
- Morphological Analysis
- Mental Imagery

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## Writing Difficulties per SLP/School Personnel Testing

### Skills needed:

- Planning and organizing
- Drafting
- Revising and editing
- Knowledge of text structure (narrative, expository)
- Language knowledge: discourse, sentences, words
- Writing conventions
- Revising and editing

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## Writing Difficulties- cont'd

### General principles of intervention

- Students need many opportunities to engage in the writing process
- Focus on writing *process* (topic area/structure, organizational aspects, etc.) as well as *product*
- Students discover how to write by writing
  - SLPs provide explicit instruction and scaffolding
- Use authentic writing and consider their audience

\*\* There are also software programs to address writing difficulties such as Draft Builder and Inspiration (Kidspiration, etc.)

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### Writing Review Strategy

- ◆ For older students, after having completed a written assignment, they should either read out loud to themselves what they have written or have someone else read to them (while they follow along)
- ◆ This may allow the student to pick up on and correct any organizational issues, spelling errors, and any punctuation errors

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### Short-Term/Working Memory

Techniques that improve attentional allocation: develop an individual's ability to establish and focus on the key concepts presented/read (verbal or written) rather than focusing equally on each word, which, in turn, reduces the load on attentional resources.

In addition, techniques such as active processing (thinking about/analyzing), restating the information to oneself, elaborative rehearsal, and, visual imagery may be effective in improving short-term, and, in turn, long-term retention of auditorily presented/reading material.

\*\* Recall that visualization may be difficult for children with integration difficulty.

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### Rote Memory

Grouping, use of rhythm to chunk, visualization, rehearsal, elaborative "active" processing, mnemonics when it can apply, are techniques that can be used to expand recall.

*These techniques are useful for memorization of digits, facts, geographic locations, etc., but not engaged in general spoken language processing.*

For digits, as part of rehearsal, the individual should repeat all of the previous items of a natural chunk (grouping) before adding the new one, and so on.

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## Sequencing

One can work on this via focusing on different aspects via:

- ◆ ordering pictures to accurately reflect logical sequence of events
- ◆ story telling (narratives)/re-telling
- ◆ directions, increasing in #; techniques vary by age (will be covered later on)
- ◆ increasing sentence complexity (active, conjunctives, passive, subordinate clauses, etc.). The DeVilliers have done work in this area with deaf kids using pictures to force correct sequence.
- ◆ phonemes/graphemes
- ◆ software such as Brain Train for overarching sequencing skills

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## Organization of Thoughts/Actions

Employ techniques that work on executor functioning by improving anticipatory and monitoring/regulatory strategies by helping the individual to:

- ◆ determine goals,
- ◆ develop internalized plans with specific start/end points
- ◆ monitor the success at each of the various steps and make adjustments as needed

The above is especially useful for those with CES deficits, such as Behavioral Inhibition Disorder (ADHD).

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## Prosodic Training

As mentioned earlier, in my clinic I have seen few individuals with a prosodic deficit. But if based on the SL-P and/or SLP evaluation, there appears to be a prosodic deficit, one can do the following:

1. Present two tones and ask if same/different (frequency, intensity, duration).
2. Present three tones (two same and one different by loudness, pitch, duration) and ask which one is the oddball.
3. Present three words (two same and one that differs by loudness or pitch) and ask child which is the oddball.
4. Present tonal patterns (no more than three elements) that can differ in loudness, inter-stimulus interval, rhythm (two slow/one fast) and ask child to imitate by clapping, tapping on table.

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### Prosodic Training –cont'd

5. Present tonal pattern (two, then three) and have child hum pattern.
6. Hum back declarative versus Y/N questions.
7. Present sentences 3-4 words and ask which word more stressed than others (can use same sentence and change word stressed).

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### Speech-in-Noise Desensitization Training

- ◆ different stimuli (e.g., words, spondees, sentences) can be presented in the presence of noise either monaurally, diotically, or in sound-field.
- ◆ the initial signal-to-noise ratio is presented at a favorable level, then noise level is raised. When performance reaches criteria level (vary as a function of stimulus), noise level is raised again. Goal is to reach levels achieved by normals.

*Please note that may have to derive norms since so many types of stimuli, types of noise available.*

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### Auditory-Linguistic Integration

#### Tasks to integrate suprasegmental and linguistic information

These include working on:

- A. Stress patterns within words (per'-mit versus per-mit')
- B. Stress patterns within sentences (emphasizing key words such as subject or verb)
- C. Highlighting the different intonation patterns in yes/no questions versus statements
- D. Ambiguous sentence meanings (the correct meaning depending on perceiving where the stress occurs within the sentence). Example: "Look out the window." versus Look out. The window."

*Can start with exaggerated stress/contours; more natural over time*

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### Integration- cont'd

#### Improving inter-hemispheric processing/ transmission:

Moncrieff and Musiek have developed a new training procedure "Dichotic Interaural Intensity Difference-DIID" to decrease dichotic differences.

- ◆ patients listen under earphones to competing digits, words, sentences (with matched sets)
- ◆ information initially presented to the left ear (MCL) louder than competing stimulus in the right ear
- ◆ as patient performance improves, level in right ear increased

Waiting commercial use of DIID program (Moncrieff & Musiek).

*In the meantime, one can do above steps but present competing story in right ear.*

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### Music Therapy

Recent research by Nina Kraus and colleagues suggest that music training may facilitate:

- ◆ an improved ability to perceive suprasegmental aspects of speech (thereby, assisting with socio-pragmatic aspects of language)
- ◆ improved ability to process segmental aspects of speech, and, in turn, phonological representations in long-term memory
- ◆ improved listening in noise

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### Facilitating Improved Comprehension

In addition to various informal ways of improving comprehension (such as concept building, facilitating organization of thoughts, problem solving, etc.), there is also an excellent commercial program that has been developed by Nancy Bell "Visualizing and Verbalizing for Language Comprehension and Thinking" .

This program stimulates spoken language comprehension, reading comprehension, verbal expression and higher order thinking skills. This program also works on strategies for retaining information in short-term/working memory, following oral directions, and integrating/relating concepts.

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## Environmental Modifications

### 1. Modification of Listening Environment

The goal is to reduce noise levels and reverberation (echoing). Examples include: carpeting, acoustically treated tiles, drapes, etc.

### 2. Power Point Presentations/Overhead Projectors

These allow for speech-reading, increased talker loudness (projecting forward allows for increased talker intensity), while still providing for a visual reference to information at hand. Both of these techniques are better than the blackboard. For middle and high school, power point presentations allow for accompanying handouts (3 slides/page with adjacent lines to take notes), while overhead projector allows for ad-libbing.

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## Environmental Modifications- cont'd

### 3. Provision of Instructions

Instructions should be provided when there is little commotion (such as students preparing to leave for recess/lunch or when going home). If assignments are on the blackboard, the teacher should allow the students to write instructions down before elaborating on the assignments. For those with severe organizational skills, check of agenda or provision of written homework assignments.

### 4. Use of Earplugs

The use of earplugs in test taking or quiet study times may allow the student to better focus on the material at hand without using mental resources to block out external stimuli.

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## Environmental Modifications- cont'd

### 5. Test-taking in a Separate Room

This can minimize the amount of noise and less of a psychological need to rush in order to finish at the same time as other students.

### 6. Preferential Seating

Sitting in the front rows (if traditional seating, 2<sup>nd</sup> row to allow for better viewing of students on side/behind when they talk) is often recommended to increase the perceived intensity of the teacher's voice (thus, making it easier to process information). This is a good technique if the teacher never strays too far from his or her desk.

In reality, preferential seating does not exist too often in real life. Thus, #7 is often recommended.

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### Environmental Modifications- cont'd

**7. Enhancement of the desired speech signal**

Examples include use of assistive listening systems such as PA systems, FM sound-field & personal systems (that resemble hearing aids) and the most complex technique of all, that is, moving closer to the listener.

The key aspect of assistive listening systems is that it essentially mimics being close to the listener (i.e., decreases the distance between the talker/listener); in turn, this maintains the intensity of the talker's voice, thus, keeping it sufficiently louder than the background noise.

These systems allow the brain to develop clearer phonological representations in long-term memory, thus, facilitating in the long-term, improved lexical decoding speed, and, an improved ability to process information in competing noise (i.e., without use of a system).

Last, these systems are also useful for 2<sup>nd</sup> language learners.

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### Environmental Modifications- cont'd

**8. Strategies for Gym/Cafeteria Settings**

Individuals with an SL-PD will likely have difficulty hearing in a physical education class or cafeteria setting.

This is likely due to many factors, including:

- ◆ much noise present
- ◆ effects of reverberation
- ◆ distance between talker and student (especially in gym)

Thus, strategies, such as being in close proximity to the talker; (B) clear enunciation; and (C) insertion of pauses between each direction will help the student better process directions in this setting.

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### Compensatory Strategies

**1. Modification of talker delivery style**

Depending on the listener's difficulty, this may include using clear speech "newscaster's speech style, insertion of pauses, extra inflection/stress, sentences of less grammatical complexity, etc. This makes it easier for the listener to "keep up".

A conceptual formula that can guide speakers presenters is:

"The more complex the material, the more important it is to slow down the overall rate in which material is presented- not by exaggerating speech patterns but by articulating words clearly, emphasizing prosodic stress patterns within speech, inserting pauses between clauses and concepts to provide additional processing time, and the use of visuals".

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### Compensatory Strategies- cont'd

#### 2. Familiarizing the Listener to Topic/Information Beforehand

The more familiarity the listener has with the topic/content, the less they have to rely on the acoustic signal, and, the more they can use their linguistic/world knowledge to help process the incoming information. For students, this can be done by informing students/parents of the content, vocabulary, concepts prior to being covered in class (pre-viewing or pre-teaching techniques).

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### Compensatory Strategies- cont'd

3. For important events or information (older children) involving multiple steps, the teacher or parents at home can highlight the sequence of steps to be followed (blackboard or paper).

The talker can also state one direction at a time and have the individual first repeat/internally visualize each direction and then summarize these directions at the end (unless too young or significant integration difficulty-check with student if can do it). This will ensure that the child has retained all key information; in addition, this serves as a training technique.

For older students, may just insert longer pauses between directions and then have them summarize at the end to ensure what they have processed/retained.

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### Compensatory Strategies- cont'd

#### 4. Clarification of information presented

For important directions, content, etc., the talker can check with the listener to determine if the information has been perceived correctly. For example:

- The talker can ask the listener to repeat the instructions/directions in their own words to ensure that the listener has processed and is able to recall all of the information provided.

#### 5. Extended Time for Task

If the individual needs additional processing time, they would likely benefit from extended time. Self-esteem issues may need to be considered/addressed.

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### Compensatory Strategies- cont'd

6. If possible, difficult subject matter is covered in the morning when the student is less likely to be fatigued. If the child is in middle/high school, avoid having two difficult subjects back-to-back.

For adults, the goal would be to arrange meetings in the morning or have handouts made available.

7. If divided attention difficulties are present and in later middle or high school (or work), the individual will benefit from outlines, handouts, guided notes (such as power point slides, three slides/page with adjacent lines for adding notes), and, if necessary, a "designated" note taker.

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### Compensatory Strategies- cont'd

8. If student has significant spelling difficulties present, on tests where content crucial element (rather than spelling) then spelling variance be applied. If spelling deemed crucial, then notebook computer with spell checker be provided (depends on keyboarding skills), or, availability of word bank.

Assistive technology to minimize writing requirements (auto-capitalization, word predictions, punctuation) to reduce overall mental load is another alternative.

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### Overarching Learning Technique

Upon learning a new concept, an individual should:

- ◆ verbally summarize/describe how the various components relate to each other
- ◆ determine the logical sequence in which events occur
- ◆ internally visualize the various relationships, and, if the child is old enough
- ◆ map the relationships onto paper (e.g., by flow-charting)

These techniques will not only facilitate the encoding and integration of concepts but also long-term retention and increase decoding speed.

***"Comprehension is Key to Long-Term Retention"***

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### Summary

1. Knowledge of the underlying processes engaged in spoken language processing is critical if we are to have an understanding of how underlying processing deficits can occur and be manifested.
2. Through the careful selection of test instruments, much can be done to correctly determine the underlying deficits causing the particular problems being experienced.
3. In turn, much can be done to alleviate these difficulties and to enhance the academic, vocational and/or quality of life of individuals with SL-PD.

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### Appendix: RHSC's Spoken Language Processing Test Battery

The following slides highlight the various tests that may be used at RHSC to assess the various processing skills that are thought to be key in processing spoken language (as well as subsequent skills- such as reading, writing, and spelling that are heavily reliant on achieving adequate spoken language processing skills.

Please note that RHSC- Audiology has a set battery to assess these processing skills, while the Speech department will strategically employ various tests depending on the nature of the processing skill(s) to be explored.

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### RHSC's Spoken Language Processing Test Battery- Audiology

- ◆ Test of Auditory Perceptual Skills- Revised
  - Auditory Numbers Forward, Auditory Word Memory, Auditory Sentence Memory
- ◆ Phonemic Synthesis Test
- ◆ Lindamood Auditory Conceptualization test
- ◆ Staggered Spondaic Word test
- ◆ Speech-in-Noise test
- ◆ Competing Sentences Test
- ◆ Pitch Pattern Sequences test (verbal & non-verbal)
- ◆ Random Gap Detection test
- ◆ Auditory Continuous Performance Test (when applicable)

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**RHSC's Spoken Language Processing  
Test Battery- Audiology/Speech-  
Language Pathology**

It would be impossible to go over all of the possible tests that can be used to assess SLP.

The tests used are based on procedures that allow us to (1) assess the key processes described earlier as those involved in the processing of spoken language; (2) provide a comprehensive profile, yet are cost effective in terms of time spent/dollars charged; and (3) complement the testing done by professionals in other disciplines.

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**Short-Term/Working) Memory Span**

**Test of Auditory Perceptual Skills-Revised  
(normed 4 -17:11)**

1. Auditory Numbers Forward: (digits, one/second, monotone voice)
2. Auditory Word Memory (unrelated words, one/second, monotone voice)
3. Auditory Sentence Memory (sentence recall, increasing sentence length)

The first two tests have no contextual information (rote-memory tasks), while sentences have linguistic redundancy (syntactic, semantic, prosodic) as well as world knowledge comes into play.

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**Phonemic Synthesis Test**

Phonemic Synthesis Test (6+ years; also Phonemic Synthesis Picture Test for 5-6 years) - Precision Acoustics

This test involves blending 3-4 speech sounds that are presented @ 2 seconds apart to determine the target word.

Phonemic synthesis is an excellent predictor of reading ability for single/novel or infrequently used words.

Significant deficits may also be predictive of reading speed/effort and possible articulation difficulties.

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## Phonological Awareness/Phonics

### Lindamood Auditory Conceptualization Test (normed 5-18:11)

- Super Duper Publications

The LAC test uses colored blocks for the listener to represent speech sounds heard. Six tasks:

1. Discrimination of isolated speech sounds:  
/sh/ /sh/ /sh/    ❏ red, red, red  
/f/ /th/ /sh/    ❏ red, blue, green
2. Sequencing of isolated speech sounds:  
/p/ /p/ /ch/    ❏ /blue/, /blue/, /green/

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## LAC- cont'd

3. Manipulations within syllabic context:

/a/    ❏ /red/  
/ap/    ❏ /red-green/  
/pa/    ❏ /green-red/  
/pap/    ❏ /green-red-green/  
/pip/    ❏ /green-yellow-green/

4. Determining # syllables in non-words
5. Manipulation of syllables within non-words (similar to #3 for speech sounds)
6. Manipulation of either speech sounds or syllables in multi-syllabic non-words (but not simultaneously)

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## Phonemic Awareness

- ◆ **SLP: More in-depth assessment of phonemic awareness**
  - **Standardized Tests**
    - ◆ **Comprehensive Test of Phonological Processing (CTOPP) (Wagner et. Al., 1999)**
      - **Elision, Sound Blending, Sound Segmentation**
      - **Blending and Segmentation of real and nonsense words**
      - **Rapid Naming (letters, digits, colors, objects)**
      - **Phonological Working Memory (non-word repetition)**

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### Phonemic Awareness

- ◆ SLP: More in-depth assessment of phonemic awareness
  - ◆ Phonological Awareness Test-2 (PAT-2) (Robertson & Salter, 2007)
    - Rhyming, syllable blending and segmentation, sound isolation, sound blending and segmentation, substitution
    - Letter-sound knowledge
    - Non-word Decoding

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### Phonemic Awareness

- ◆ SLP: More in-depth assessment of phonemic awareness
  - Standardized Tests
    - ◆ Pre-reading Inventory of Phonological Awareness (Dodd, et. al., 2003)
      - Rhyming, syllable segmentation, alliteration, sound isolation, sound segmentation
      - Letter-sound knowledge

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### Phonemic Awareness

- ◆ SLP: Standardized Tests – assessing 1-2 skills
  - Phonological Awareness Skills Program Test (Rosner, 1999)
    - ◆ Deletion, substitution
  - Test of Phonological Awareness (Torgesen & Bryant, 1994)
    - ◆ Sound Matching – initial, final

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## Reading and Spelling

### Reading Assessment

- **Word Recognition Skills**
  - **Word Identification (sight reading)**
  - **Word Decoding (decode nonsense words)**

Woodcock Reading Mastery Tests-Revised  
(Woodcock, 1987)

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## Reading and Spelling

### Reading Assessment

- **Text level reading**
  - **Accuracy (words read correctly), rate, fluency**
  - **Reading Comprehension**

Gray Oral Reading Test-4 (Weiderholt Bryant, 2001)  
Gray Silent Reading Test Weiderholt & Blalock, 2000)

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## Reading and Spelling

### Reading Assessment

- **Reading Miscues**
  - **Insertions, Omissions, Substitutions**
  - **Self corrections and Repetition**
  - **Analyze for syntactic acceptability, semantic acceptability, graphic similarity, sound similarity, self-correction**

Reading Miscue Inventory (Goodman,  
Watson & Burke, 1987)

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## Reading and Spelling

- **Spelling Assessment**
  - **Test of Written Spelling (Larsen, et. al., 1999)**
  - **Spell Performance Evaluation for Language and Literacy (SPELL) (Masterson et. al., 2002)**
    - **Identifies underlying linguistic deficits in phonemic awareness, orthographic knowledge, vocabulary, morphologic knowledge and mental orthographic images**

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## Staggered Spondaic Word (SSW)

### Staggered Spondaic Word (SSW) test (normed 5+ years) -Precision Acoustics

Item:

	Non-Competing	Competing	Non-Competing
Right Ear	Up	Stairs	---
Left Ear	---	Down	Town

There are 40 items in all, alternating between right ear first and left ear first items. There are many patterns (both quantitative and qualitative-behavioral)- that can be obtained.

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## Lexical Decoding Speed

The SSW test is an excellent instrument for determining the presence of lexical decoding speed difficulty.

Order Low-High Effect: significantly more errors on the second spondee than the first. It is likely due to the slower processing speed resulting in longer span of processing/attention to first word. By the time ready to process neural representation of second word it has either degraded or disappeared completely.

*There are other signs as well (such as delayed responses, etc.)*

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### Lexical Decoding Speed

SLP Testing (ruling out knowledge issues):

- Semantic Skills
  - Vocabulary, Antonyms, Synonyms, Multiple Meaning words, Word Definitions
    - PPVT-4, EVT, LPT3, Word Test2-E, CELF-4, CASL
- Morphology/Syntax
  - CELF-4, TOLD-P3, Language Sample

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### Lexical Decoding Speed

SLP Testing:

- Word Retrieval Ability
  - Single-word level
    - Test of Word Finding-2
  - Discourse level
    - Test of Word Finding in Discourse
    - Language Sample with maze analysis: Story retell and conversation

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### Fading-Memory

The SSW test is very useful in identifying Fading-Memory signs.

Order High/Low effect: significantly more errors on the first spondee than the second (likely due to insufficient inability to allocate attentional resources quickly/effectively, resulting in first word fading rapidly from short-term memory). May see more errors on first phoneme (Phonemic Synthesis Test, first digits in Digit Span)

*There are other signs as well (such as quick responses, etc.).*

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## Integration

As mentioned, the term "auditory-linguistic integration" broadly refers to processes that involve the inter-hemispheric transmission and/or coordination of information across processing regions, including:

1. Selective/Divided Attention on dichotic listening tasks (i.e., different stimuli presented to ears in competing fashion).
2. Verbal labeling (left-hemisphere) of rhythmic patterns (right hemisphere).

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## Integration- cont'd

Dichotic tasks are sensitive to ear differences, as manifested as a right ear dominance effect (in normals, greatest in youngest and older clients- 55+ years). Extremely common finding in those with processing disorders.

The right ear difference is greatest for sentences (higher linguistic complexity) and least for digits (low complexity).

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## Integration- cont'd

### 1. Competing Sentences Test (Willeford 5+ years)- Auditec

- originally proposed scoring is by correct meaning; Bellis recently scores by quadrants correct (norms 7+ years)
- using a selective attention task, the patient repeats sentence heard from "target" ear and ignore competing ear
- LD children usually display significantly lower score in left versus right ear
- divided attention task (more sentences correct from right ear)

### 2. SSW test

- divided attention to competing words; if integration deficit present, then left competing condition is significant (also much greater # of errors than right ear if latter also significant)

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### Integration- cont'd

#### 3. Pitch Pattern Sequences test (child version = 6-8 years; adult = version 9+ years) - Auditec.

Test items are comprised of two high and one low pitched signals, or vice-versa, presented in any sequence. Subjects respond by whistling or humming, tapping on designated objects, or verbally (e.g., saying high-high-low). The tones in the child version have longer inter-stimulus intervals and greater frequency separations.

An integration deficit is indicated when the individual can successfully hum the pattern but has significant difficulty labeling them (either errors or delayed responses). Mirror reversals are likely different and may reflect retrieval errors.

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### Integration

#### SLP Testing:

- **Prosody**
  - **Difficulty processing prosodic cues**
    - **Informal observation of comprehension of sentences when stress and intonation are varied**
    - **Structured tasks of processing: vary the stress on words and determine number of units being produced**

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### Integration

#### SLP Testing:

- **Prosody**
  - **Difficulty processing prosodic cues**
    - **Emotional Prosody – observe response to words conveyed with different emotions**
  - **Difficulty producing prosodic cues**
    - **Observe intonation and stress patterns during a variety of language sampling conditions**

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## Integration

### Figurative Language

- Idioms, similes, metaphors, proverbs, humor
- Interpreted using contextual cues, situational cues and mental imagery (Nippold & Duthie, 2003)
- Standardized tests can be used
  - CASL, TLC
- Informal tasks – better option
  - Interpret meaning of figurative expressions commonly heard within environment

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## Integration

### Conversational Skills

- Individual must attend to facial expression, body language in addition to oral language to interpret messages
- Individual must divide attention to accomplish this
- Conversational samples in both paired and group settings

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## Integration

### Conversational Skills

- Analyze topic initiation, topic maintenance and turn taking skills
- Analyze ability to look at partner, respond with appropriate facial expressions
- Analyze pre-suppositional skill; takes listener perspective; uses clear referents
- Analyze repair strategies
- Analyze response delays

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## Temporal Resolution

### **Random Gap Detection Test (Keith; 5+ years) - Auditec**

- ◆ evaluates temporal resolution through the determination of the smallest time interval that can be detected between two closely presented stimuli.
- ◆ designed to identify a temporal processing disorder that may be related to a phonological processing deficit or problems of auditory discrimination, receptive language, and/or reading.

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## Sequencing

### **SSW Test**

- sequencing errors are present when the patient recalls at least three of the single syllable words (out of four present in each item) but in the wrong order

### **Pitch Pattern Sequence Test**

- if the patient is unable to correctly hum the pattern back, is the problem one of global sequencing or is it what Bellis would call a prosodic deficit (unable to perceive the overall temporal pattern). I've seen too few cases of this, so Bellis may be right but it may be worthwhile to examine.

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## Sequencing/Organization

SLP Testing:

### Sequencing

- Oral Directions
  - Token Test for Children-2 (McGhee et. al., 2007); CELF-4 (Semel, et. al., 2003)
- Assess informally within classroom

### Organization

- Story Generation and Story Re-tell
- Test of Narrative Language
- Analyze for story grammar, cohesion, inference

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## Organization

- Written Language
  - Examine the following skills:
    - Planning and organizing
    - Knowledge of text structure (narrative, expository)
    - Language knowledge: discourse, sentences, words
    - Writing conventions
    - Spelling (likely more affected on first written drafts than spelling quizzes)

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## Selective Attention

### Competing Sentences Test (CST)

- by examining % correct, suggests level of difficulty patient may experience listening in the presence of competing talkers

### Speech-in-Noise test (Katz; normed 5+ years)- Precision Acoustics

- presents single syllable words embedded in a shower type noise at a +5 dB signal-to-noise ratio
- this is a lower order (figure-ground) test likely involving CANS pathways up to auditory cortex, while the CST also involves higher order processing regions (corpus callosum, language/prosodic areas)

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## Divided Attention

### Competing Sentences Test (unpublished norms in Pinheiro and Musiek)

- RHSC research corroborates the ranges listed but norms needed
- patient required to recall both sentences (both sentences must be recalled correctly for an item to be considered correct)
- if any underlying processing deficit present, then likely to have significant findings on this test

The updated **SCAN-C** (Psychological Corporation) has norms on divided attention task but uses a directed attention task versus free recall.

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### Sustained Attention/Impulsivity

#### Auditory Continuous Performance Test (Keith; 6+ years)- Psychological Corporation

The ACPT assesses attention and vigilance over a sustained period of time- approximately 10 minutes. The test consists of a simple word-identification task, whereby, the listener listens to a list of words (repeated six times) and is requested to raise his or her thumb every time the word "dog" is heard and ignore occurrences of any other words.

Scoring looks at: (a) # of inattentive errors (miss word dog); (b) # impulsive errors (raise hand to word other than dog); (c) # of inattentive + impulsive errors; (d) vigilance decrement (# errors 1st column versus last column)

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### Sustained Attention/Impulsivity- cont'd

Keith states that if total # errors exceed normal limit, then child at risk for ADHD.

We feel that the pattern of errors must also be considered:

1. If predominantly inattentive errors, likely decoding speed difficulty underlying sustained attention difficulty.
2. If high number of delayed responses, supports decoding speed difficulty.
3. If at least 1/3 errors are impulsive, then likely supports ADHD/H-I finding.

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### Impulsivity/Behavioral Inhibition- cont'd

#### SSW Test

There are a number of behavioral indicators on the SSW test that are indicative of impulsivity, inhibition deficit. These include:

- ◆ saying "yes", nodding head to "Are you ready?", when told not to
- ◆ patient repeats "Are you ready?"
- ◆ quick responses may be indicative of impulsivity – also, quick responses on Phonemic Synthesis Test
- ◆ plus all of the behavioral signs (jumping around, blurting out, etc.)

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