Language Processing Disorder: Neurological Underpinnings, Assessment, and Remediation
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This presentation provides attendees with an in-depth opportunity to learn about language processing disorder in the pediatric population. Included is a review of neurological underpinnings; necessary components of a comprehensive assessment; and, the linear process of language processing remediation.

Language processing is…

> "the ability to interpret or attach meaning to information
> received through the auditory channel
> which is then used to formulate a response"
>
> (Richard & Hanner, 1987, p. 7)

○ Language Processing Disorder (LPD) describes the *inability* to effectively interpret or efficiently attach meaning to information received through the auditory channel, which leads to difficulty in formulating a response.

○ **<u>A true processing disorder can only occur in the absence of an identifiable language disorder.</u>**

Characteristics:

- ○ **Age-expected language development** (potential deficits are more subtle than screeners pick-up)
- ○ Average IQ
- ○ Poor grades despite average IQ/potential
- ○ Poor Word retrieval - lengthy circumlocutions (elaborate descriptions)
- ○ On cruise control/auto-pilot- zone out because auditory information is too fast/fleeting
- ○ Struggle with subtleties in language - incorrect word use; doesn't get jokes
- ○ Typical hearing results
- ○ "Mystical Choice"- can't "read into" questions; can't pull the information
- ○ Increased response latency - typical response time is 2-4 seconds; lots of 'I don't know'
- ○ Concrete interpretation
- ○ Generic language/word choice
- ○ Self-talk- rehearsal and self-cuing
- ○ Recognizes things are wrong, but cannot correct it

<u>The Organization of the Brain:</u>
- **1ˢᵗ Functional Unit**- Reticular Formation
  - Structures – The midbrain, pons, and medulla oblongata
  - Fx. – Responsible for the neurological readiness/arousal of the CNS to interact with the environment.
- **2ⁿᵈ Functional Unit**- Specific Interpretation
  - Structures – The parietal, occipital, and temporal lobes
  - Fx. – Responsible for isolating neural impulses into discrete area for analysis, storage, coding, and organization.
- **3ʳᵈ Functional Unit**- Executive Function
  - Structure – The frontal lobe
  - Fx. – Responsible for active responses through motoric expression to stimuli that have been processed in the second functional unit.

<u>:The Zones of the 2ⁿᵈ Functional Unit:</u>

Each lobe of the 2nd functional unit has a primary, secondary, and tertiary zone with discrete functions.

<u>The Primary Zone (P)</u>
Receives the incoming neural impulses.
- Visual information enters the cortex of the occipital lobe.
- Tactile information enters the cortex of the parietal lobe.
- Auditory information enters the cortex of the temporal lobe.

<u>The Secondary Zone (S)</u>
Processes information and attaching meaning to sensory input received by the primary zone.
- Visual meaning or processing occurs in the occipital lobe.
- Tactile processing occurs in the parietal lobe.
- Auditory meaning or processing occurs in the temporal lobe.

<u>The Tertiary Zone (T)</u>
Higher level processing is completed in this zone (building on the processing that has already occurred in the Secondary Zones).
- Integrates new information with old (stored) information and integrates neural impulses among sensory modalities.
- "The Tertiary Zone is where information from all cortices is integrated (tactile, visual, auditory) and where the neurological system transfers from a passive, receptive processing of input to an active, expressive output"

(Richard, 2017, p. 26)

"Interpretation is completed by decoding, organizing, associating with previous information, and storing in memory for future use."

<div align="right">(Richard, 2017, p. 26)</div>

Manifestation of LPD:

- Avoids responding to questions or requests
- Delayed responses
- May repeat questions or responses to self, audibly or inaudibly
- Frequent use of "I don't know"
- Use of filler words
- Difficulty with critical-thinking abilities
- Issues with word-retrieval which leads to circumlocution, or providing a lengthy description/response without identifying target word
- Use of non-specific words
- Child may present with poor grades, although IQ scores are likely average.
- Incorrect use of words as the child will often replace the target word with a similar word in sound or definition
- Difficulty understanding sarcasm, jokes, etc.

<div align="right">(Richard & Hanner, 1987, p.7)</div>

The Role of the SLP:

- SLPs must carefully consider the cognitive-communicative and language-related factors associated with CAPD or LPD to determine the diagnosis.

- SLPs diagnose Language Processing Disorder; they do NOT diagnose Central Auditory Processing Disorder (audiologists' domain).

- SLPs are involved in the evaluation, diagnosis, intervention, and remediation process for clients with suspected/diagnosed Language Processing Disorder.

<div align="right">(ASHA, 2017)</div>

The Evaluation Process:

- A differential diagnosis
- Evaluation and diagnosis is completed **by an SLP.**
- The SLP is looking to rule-out (r/o) or substantiate the potential presence of any subtle language issues.
- A differential diagnosis is necessary to substantiate the presence of language processing disorder.

○ A true processing disorder can only be determined in the absence of an identifiable language disorder.

<u>The Differential Screening Test for Processing (Richard & Ferre, 2006):</u>
May be used as a preliminary screening tool to differentiate between levels of auditory and language processing to identify whether further evaluation is warranted

  ○ Skills are evaluated in the acoustic, acoustic-linguistic, and linguistic levels

<u>Differential Diagnosis:</u>
○ A speech-language pathologist must impose the neuropsychological model on the tests chosen.

○ The following assessments may be given as part of this comprehensive assessment:
  Illinois Test of Psycholinguistic Abilities 3- Primary Zone
  Test of Auditory Processing Skills 4- Primary Zone
  Language Processing Test 3: Elementary- Secondary Zone
  The Word Test 3: Elementary- Secondary Zone
      PPVT-5
      EVT-3
  The Listening Comprehension Test 2: Elementary- Secondary Zone
  The Test of Semantic Skills- Secondary Zone
  Comprehensive Assessment of Spoken Language 2- Tertiary Zone/Clinical
  Evaluation of Language Fundamentals 5- Tertiary Zone
  Test of Problem Solving 3: Elementary- Tertiary Zone
  Behavior Rating Inventory of Executive Function 2- Executive Functions
  Behavioral Assessment of the Dysexecutive Syndrome in Children- Executive Functions
  Functional Assessment of Verbal Reasoning and Executive Strategies- Executive Functions
                                                                    (Richard, 2017, p. 72-74)

○ Adjunct Areas of LP Assessment
  Auditory Memory (TAPS-4)
  Word Retrieval (TWF-3)

<u>Language processing remediation:</u>
○ A Hierarchical Approach

○ A systematic approach to remediation that is based on the cognitive hierarchy.

○ Should teach students compensatory strategies and cueing techniques to compensate for deficits in language processing abilities.

○ The clinician must first determine the client's ability level related to language processing, in order to identify the level of LPR to start with.

○ If a client struggles to reach a specific goal within the outlined program, the clinician may return to the previous short-term objective or language processing unit until mastery is achieved.
                                                                    (Richard & Hanner, 1987)

- ○ Remediation is arranged from most simple to most complex language processing demands to reflect developmental progression
- ○ Units correspond to levels of language processing, including:
  - ○ Labeling
  - ○ Functions
  - ○ Associations
  - ○ Categorization
  - ○ Similarities
  - ○ Differences
  - ○ Multiple Meanings
  - ○ Attributes
- ○ Intervention begins at the unit prior to an identifiable breakdown (based on the LPT-3 results).

(Richard & Hanner, 1987, p. 7)

LPR: Compensatory Cueing Hierarchy:

- ○ This hierarchy is designed to help students compensate for language processing deficits, as it provides needed organization and structure to the language system to improve overall efficiency of processing.
- ○ Clinicians are to begin training at the center of the diagram shown (naming), and gradually work outward as the client progresses.
- ○ When training is complete, cueing works in the reverse order, starting with the outer level of the diagram and working toward the center to retrieve the target word.
- ○ In teaching the compensatory cueing hierarchy, clinicians should change the cueing system frequently to find the most effective, facilitative pathway for the client.

Bottom to Top; Top to Bottom (Naming to Additional Time, then Additional Time to Naming):

- ○ Additional Time
  - ○ This assists students in retrieving information appropriately and independently by acknowledging that processing may be slow alleviating some of the time pressure.
- ○ Stimulus Repetition
  - ○ As it often takes children with LPD longer to process incoming stimuli, children may lose focus of the stimulus and require repetition to refocus and process the information independently.
- ○ Question Prompts
  - ○ WH-questions may be used to help the client focus on associative information which facilitate word-retrieval or a target word. Clinicians will initially ask the questions, but as the skill progresses, the client will generate the question to self-cue.
- ○ Additional Information
  - ○ The clinician provides supplemental information associated with a target word to facilitate word retrieval.
- ○ Naming
  - ○ The clinician provides the target word in verbal or written form. This is to be used only when all other techniques are unsuccessful, and may help with future recall attempts.

(Richard & Hanner, 1987)

<u>Sample Present Level of Performance:</u>

The client currently presents with a mild-moderate language processing disorder. The disorder is characterized by breakdowns in the cognitive/processing hierarchy (secondary zone) at the level of categorizations and primary differences. Breakdown in higher level of processing (tertiary zone) is noted in ability to effectively predict outcomes and sequence events.

The client's communication skills are characterized by: frequent "filler words" (i.e.- stuff), phrases (i.e.- that's all I know, I don't know), ongoing need for clarification/repetition. He benefits from visual/verbal cues and facilitative prompts during structured tasks, and responds well to verbal redirection when distracted.

<u>Potential Goal Targets:</u>

○ Long Term Goal: To improve the client's social/academic communication skills consistent with age-level peers in order to: Effectively attach meaning to/process incoming auditory content; Interpret content through coding, organizing, associating, and storing; Integrate content into meaningful experiences/information within academic and clinical settings at or above 90% accuracy.

○ Short Term Goals:
  ○ 1a- The client will identify and state relevant associations, based on or presented/curricular themes and content during structured therapy tasks at or above 85% accuracy.
  ○ 1b- The client will identify and state relevant categorical markers and members based on presented/curricular themes and content during structured therapy tasks at or above 85% accuracy.
  ○ 1c- The client will name a minimum of three subcategory items for each presented category, based on presented/curricular themes and content, during structured therapy tasks at or above 85% accuracy.
  ○ 1d- The client will identify and state synonyms and antonyms related to presented/curricular vocabulary and concepts during structured therapy tasks at or above 85% accuracy.
  ○ 1e- When presented with items/words/pictures/objects, the client will discriminate and explain the primary similarity during structured therapy tasks at or above 85% accuracy.
  ○ 1f- When presented with items/words/pictures/objects, the client will discriminate and explain the primary difference during structured tasks at or above 85% accuracy.

<u>Supplemental Training for Older Students:</u>
Supplemental LPR training may be necessary for students at a more advanced level to work on more abstract processing tasks, as LPR itself only addresses the basic levels of language processing

○ The following materials could be used to supplement intervention for these students:
  ○ File for Intermediate Language Exercises (FILE)
  ○ Manual of Exercises for Expressive Reasoning (MEER)

- Handbook of Exercises for Language Processing (HELP)

◦ For these higher levels of processing, it is important to continue to use compensatory cueing strategies
  ◦ This allows the student to gain confidence in their ability to utilize these strategies, self-cue, and take the time needed to retrieve information and provide an appropriate response.

(Richard & Hanner, 1987, p. 8)

<u>After Remediation:</u>
Skills Generalization!
  ◦ As the child's processing skills improve, it is essential to target generalization of skills to ensure the most functional and effective outcomes.
  ◦ To do so, you may create conditions that mimic real life situations such as:
    ◦ Adding time pressure
    ◦ Give 3-second time limit between answer and initiation of response
    ◦ Imposing a time delay
    ◦ Wait for a signal or complete a task before answering question
    ◦ Adding competing stimuli
    ◦ Background noise, music, etc. during session
    ◦ Adding competition
    ◦ Create pressure by having the client and their peers play a game, while rewarding the first student to respond.
(Richard & Hanner, 1987, p. 8)

<u>References:</u>
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Thank you!