

SHAA CONVENTION, 2019

**Auditory Processing Disorder  
TEAM  
Assessment and Management**

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**Disclosure Statement**

- ▶ **Financial:** I receive a salary as a professor at the University of Tennessee Health Science Center.
- ▶ **Non-financial:** As part of my work with the UTHSC, I serve on two cochlear implant teams that provide pre/post cochlear implant evaluations. I have recently served a 6 year term as an ASHA Steering Committee member for SIG 9.
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**Overview of Presentation**

- ▶ Definition of APD
- ▶ Deficit Areas in APD
- ▶ APD Audiologic Assessment Report
- ▶ Description of APD Tests Typically Administered
- ▶ Auditory Processes Assessed
- ▶ APD Team Members and their Roles
- ▶ Assessment for the Speech Language Pathologist
- ▶ Typical APD Treatment and Goal Areas
- ▶ Case Studies representing each Sub-Profiles of APD
- ▶ Test Findings
- ▶ Classroom Accommodations
- ▶ Direct Intervention
- ▶ Compensatory Strategies

**Central Auditory Processing  
Defined (ASHA, 1993)**

Difficulties with:

- ▶ Sound Localization
- ▶ Auditory Discrimination and Pattern Recognition
- ▶ Temporal Resolution/Masking/Integration/Ordering
- ▶ Auditory Performance with Degraded and Competing Signals

Observed deficiency on one or more of these areas caused by a dysfunction of auditory processes as a result of a neuro-maturational delay, or it may be reflected by co-existing dysfunctions

**Auditory Processing Disorder  
Defined (Bruton Conf. 2000)**

- ▶ AP is new label to emphasize the interactions of disorders at both peripheral and central sites
- ▶ APD is a deficit in the processing of information that is specific to the auditory modality
- ▶ The deficit may be exacerbated in unfavorable acoustic environments and that may be associated with difficulties in listening, speech understanding, language development, and learning
- ▶ APD is a complex and heterogeneous
- ▶ Underlying APD is a deficit in one or more of the auditory processes listed in ASHA/1993 definition

**Auditory Processing Disorder  
Defined**

- ▶ **Katz:** AP is not what we hear, but what we do with what we hear
- ▶ **Musiek:** AP is how well the ear talks to the brain and how well the brain understands what the ear tells it
- ▶ **Bellis:** APD is when the brain can't hear

### Characteristics Observed in Auditory Processing Disorder

- ▶ Overall performance for auditory functioning is poor
- ▶ Weaknesses in receptive and expressive language skills and literacy
- ▶ Often viewed as a behavior problem
- ▶ History of chronic otitis media
- ▶ Verbal IQ poorer than Performance or Motor skills sections of IQ evaluation
- ▶ Fine/gross motor deficits
- ▶ Not reaching academic potential

### APD: Possible Deficit Areas

- ▶ Auditory Memory and Sequencing
- ▶ Auditory Closure
- ▶ Temporal Patterning, IHT and Prosody
- ▶ Phonological Awareness and Literacy
- ▶ Auditory Figure Ground/Listening in Noise
- ▶ Binaural Integration or Separation
- ▶ Vocabulary, Syntax, Morphology
- ▶ Meta-linguistics
- ▶ Math
- ▶ Poor Organization
- ▶ Reduced Self-Esteem

### Auditory Processing Disorder

- ▶ Leads to deficits in **Literacy**
- ▶ Reading decoding
- ▶ Reading fluency and automaticity
- ▶ Reading comprehension
- ▶ Spelling
- ▶ Written language skills
- ▶ Narrative language skills

### APD may cause deficits in areas that impact LEARNING !

- ▶ If a child does not develop good listening skills, then learning is impacted.
- ▶ If a child does not develop good reading skills, then learning is impacted.

*" Children who do not LISTEN and READ well are limiting their potential to continue to LEARN at the rate that other children do."*

### APD Team Assessment

- ▶ How do we determine the appropriate test battery to evaluate if we can OR cannot "listen"?
- ▶ Who is on the team?
  - ▶ Audiologist
  - ▶ Speech-Language Pathologist
  - ▶ Psychologist
  - ▶ Special Educator
  - ▶ Classroom Teacher
  - ▶ Oto-Neurologist
  - ▶ OT/PT
  - ▶ Parents
  - ▶ Child

### Contribution of the Audiologist and the Speech Pathologist

- ▶ ASHA recommends that the final diagnosis be made by the audiologist as a result of a TEAM assessment
- ▶ Team management is also recommended
- ▶ Observe behaviors and characteristics of APD
- ▶ Understand APD and how it effects academics, communication, literacy, and social/emotional skills
- ▶ Administer formal tests

### Contribution of the Audiologist

- ▶ Make the diagnosis of APD
- ▶ Specify deficient auditory processes
- ▶ Identify the specific sub-profile or type of APD
- ▶ Make recommendations for management
  - ▶ ALDs
  - ▶ Compensatory strategies
  - ▶ Environmental and teacher modifications
  - ▶ Treatment areas related to auditory processes and sub-profile of APD

### Contribution of the Speech-Language Pathologist

- ▶ Understand the audiologic test battery, auditory processes, types of APD and implications for treatment
- ▶ Understand, develop and implement effective treatment goals and strategies incorporating results of the audiologic evaluation AND the speech-language evaluation
- ▶ Consult with teachers for carry-over into the classroom and identify weak academic areas
- ▶ Consider results of other evaluations completed

### Contribution of the SLP: Assessment

▶ Vocabulary	▶ Short and long term memory
▶ Critical thinking skills	▶ Working memory and sustained memory
▶ Specific word finding	▶ Sequencing
▶ Oral reading vs. Silent reading fluency	▶ Organization of thoughts
▶ Reading comprehension	▶ Lag time in response
▶ Paraphrasing, reasoning, inferencing	▶ Figurative/meta-linguistic/pragmatic
▶ Narrative language	▶ Length and complexity
▶ Phonological Awareness	▶ Spelling
▶ Phonetic Decoding	▶ Written language

### Additional Assessment Areas For SLP : Write Goals as needed!

- ▶ Auditory Memory/Sequencing/Reasoning : short term, long term, sustained memory, working memory
- ▶ Reading Comprehension
- ▶ Reading Fluency
- ▶ Written Language Skills
- ▶ Spelling
- ▶ Phonetic Decoding/Synthesis/Analysis/Phonological Awareness
- ▶ Auditory Cohesion
- ▶ Receptive and Expressive Language

### Tests to Consider for the SLP Auditory Skills

- ▶ SCAN-3: ages 5-12
- ▶ SCAN-3A: ages 13-50
- ▶ The Listening Comprehension Test-2
  - ▶ Ages 6-11, main ideas, details, reasoning, vocabulary, understanding messages
- ▶ The Listening Comprehension Test-Adolescent
  - ▶ Ages 12-17

### Test to Consider for the SLP: Auditory Skills

- ▶ Screening Test for Auditory Processing (STAP)
  - ▶ Ages 8-13, auditory memory, auditory separation/closure, binaural integration, temporal resolution
- ▶ Auditory Skills Assessment
  - ▶ Ages 3.6-12, auditory and phonological skills, 15 min.
- ▶ Test of Auditory Processing Skills-3 (TAPS-3)
  - ▶ Ages 4-18, discrimination, segmenting, blending, number memory forward and reversed, word and sentence memory, auditory figure ground, comprehension and reasoning.

### Tests to Consider for the SLP: Auditory Skills

- ▶ Test of Memory and Learning-2 (TOML-2)
  - ▶ Ages 5-60, 30-60 min.
- ▶ Differential Screening Test for Processing (SDTP)
  - ▶ Ages 6-12, Acoustic: dichotic digits, temporal patterning, auditory discrimination; Acoustic-Linguistic: phonemic manipulation, phonic manipulation; Linguistic: antonyms, prosodic interpretation, language organization
- ▶ Developmental Test of Auditory Perception (DTAP)
  - ▶ Ages 6-19, same or different with phoneme isolation, word discrimination, rhyming, tonal patterns, environmental sounds, background noise

### Tests to Consider for the SLP: Phonological Awareness

- ▶ Test of Phonological Awareness-2 (TOPA-2)
  - ▶ Ages 5-8, isolate individual phonemes and relationships between letters and phonemes
- ▶ Pre Reading Inventory of Phonological Awareness (PIPA)
  - ▶ Ages 4-7, rhyme, syllable segmentation, alliteration, sound isolation, sound segmentation, letter sound knowledge
- ▶ Comprehensive Test of Phonological Processing (CTOPP)
  - ▶ Ages 4-25, elision, blending words/non-words, sound matching, phoneme isolation, segmenting non-words, non-word repetition, memory for digits, rapid naming of digits, colors, and objects

### Tests to Consider for the SLP: Phonological Awareness

- ▶ Linda mood Auditory Conceptualization Test -3 (LAC 3)
  - ▶ Ages 5-19, perceive and manipulate speech sounds and syllables with a visual medium
- ▶ Phonological Awareness Profile
  - ▶ Ages 5-8
- ▶ Phonological Awareness and Reading Profile Int.
  - ▶ Ages 8-14
- ▶ Dynamic Screening for Phonological Awareness (DSPA)
  - ▶ Ages 4-6, syllable and sound deletion, 10 min.
- ▶ Phonological Awareness Test-2 (PAT-2)
  - ▶ Ages 5-9, rhyming, segmentation, isolation, deletion, segmenting with manipulatives, blending, graphemes, decoding, invented spelling

### Test to Consider for the SLP: Reading

- ▶ Test of Reading Comprehension-4 (TORC-4)
  - ▶ Ages 7-17, relational vocab, sentence completion, paragraph construction, text comprehension, contextual fluency
- ▶ Standardized Reading Inventory-2
  - ▶ Ages 6-14, criterion/norm, oral and silent reading comprehension, vocabulary in context
- ▶ Test of Early Reading Ability-3 (TERA-3)
  - ▶ Ages 3.6-8.6, alphabet, conventions, meaning
- ▶ Gray Silent Reading Test (GSRT)
  - ▶ Ages 7-25, silent reading comprehension, untimed
- ▶ Gray Oral Reading Test-5 (GORT-5)
  - ▶ Ages 6-24, reading fluency, accuracy, comprehension

### Tests to Consider for the SLP: Reading

- ▶ Test of Word Reading Efficiency-2
  - ▶ Ages 6-25, sight word recognition, decoding, 10 min.
- ▶ Test of Silent Word Reading Fluency (TOSWRF-2)
  - ▶ Ages 6.3-25, word id., word meaning, word building, sentence structure, comprehension, fluency, 6 min.
- ▶ Early Reading Assessment (ERA)
  - ▶ Ages 4-8, written word vocab, rapid orthographic naming, silent orthographic efficiency, early reading index, phonological awareness, rec. voc., 15 min.
- ▶ Test of Silent Reading Efficiency and Comprehension
  - ▶ Grade 1-12, test for each grade, group adm.
- ▶ Basic Early Assessment of Reading (BEAR)
  - ▶ Ages K, oral reading fluency, criterion referenced

### Test to Consider for the SLP: Reading

- ▶ ITPA-3
  - ▶ Ages 5-13, analogies, morphological closure, syntactic sentences, sound deletion, rhyming and sentence sequencing, written vocab, sight decoding/spelling, sound spelling
- ▶ The Oral Language Acquisition Inventory-2
  - ▶ Ages PK-grade 6, phonemic awareness, print concepts, repeated sentences, story retell and comprehension, learning behaviors, criterion ref. 20 min.
  - ▶ Ages grade 4-6, expository reading and writing
- ▶ Assessment of Literacy and Language (ALL)
  - ▶ Ages PK-grade 1, concepts about print, alphabetic principle, phonemic awareness, syntax, listening comprehension, language comprehension, semantics

### Tests to Consider for the SLP: Written Language

- ▶ Writing Process Test (WPT)
  - ▶ Ages 8-19, plan write and revise original composition
- ▶ Test of Written Language-4 (TOWL-4)
  - ▶ Ages 9-18, vocab, spelling, punctuation, logical sentences, sentence combining, contextual conventions, story comprehension
- ▶ Test of Early Written Language-3 (TEWL-3)
  - ▶ Ages 4-11, basic writing, directionality, organization, letter awareness, spelling, capitalization, punctuation, proofing sentence combining, logical sentences, contextual writing, construct story with picture prompt

### Tests to Consider for the SLP: Written Language/Spelling

- ▶ OWLS-II
  - ▶ Ages 3-22, listening comprehension, oral expression, written expression, reading comprehension, spelling, capitalization, punctuation, letter formation, organization, details, and cohesion of writing
- ▶ SPELL-Links-2
  - ▶ Ages grade 2-adult, phonological awareness, orthographic knowledge, morphological knowledge, semantic relationships, mental orthographic imaging
- ▶ Test of Written Spelling-5 (TWS-5)
  - ▶ Ages 6-18 years, dictated words to spell, 20 min.
- ▶ Test of Orthographic Competence
  - ▶ Ages 6-18, letters, spelling, punctuation, abbreviation, special symbols

### Test to Consider for the SLP: Written Language/Spelling

- ▶ Test of Early Written Language-3 (TEWL-3/4)
  - ▶ Ages 4-12, and ages 9-17 30-50 min.
- ▶ Test of Written Expression
  - ▶ Ages 6-15, write essay based on picture starter
- ▶ Word Identification and Spelling Test (WIST)
  - ▶ Ages 7-19, word identification, spelling, sound symbol knowledge
- ▶ Symbol Imagery Test (SI):
  - ▶ ages 6-17, orthographic awareness/spelling, memorizing sight words, phonemic awareness

### Tests to Consider for the SLP: Social Language/Executive Function

- ▶ Executive Function Test Elementary
  - ▶ Ages 7-12, attention and immediate memory AUD, attn. and immediate memory AUD/VISUAL, working memory, flexible thinking, shifting, 60 min.
- ▶ Test of Problem Solving Adolescent
  - ▶ Ages 12-17
- ▶ Test of Problem Solving Elementary
  - ▶ Ages 6-12
- ▶ Test of Pragmatic Language-2 (TOPL-2)
  - ▶ Ages

### Tests to Consider for the SLP: Language and Others

- ▶ Comprehensive Assessment of Spoken Language
  - ▶ Ages , nonliterate language, meaning from context, ambiguous sentences, inference, paragraph and sentence comp, pragmatic judgment
- ▶ Language Processing Test-3 (LPT-3)
  - ▶ Labeling, functions, associations, categorize, similarities, differences, multiple meaning, attributes
- ▶ Test of Semantic Skills-P
  - ▶ Ages 4-8, in-depth vocabulary, components of complete definitions
- ▶ Test of Narrative Language
  - ▶ Ages 5-11
- ▶ Rapid Automatic Numbers/R Automatic Symbols
  - ▶ Ages 5-19, id. children at risk for reading difficulties

### Tests to Consider for the SLP: Language and Others

- |                |   |
|----------------|---|
| ▶ PLS-5        | ▶ TACL-4  |
| ▶ PPVT and EVT | ▶ CELF-5  |
| ▶ DTLA-4       | ▶ CELF-P2   |
| ▶ DTLA P3      | ▶ Developmental Test of Visual Perception   |
| ▶ CREVET-3     | ▶ Test of Language Competence (TLC)   |
| ▶ TELD 3       | ▶ Ages 5-18, ambiguous sentences, listening comprehension, inferring, figurative language, memory |
| ▶ TOLD P4      |   |
| ▶ TOLD I4      |   |
| ▶ TEEM         |   |

### The Tests Typically Administered for Central Hearing by the Audiologist

- ▶ Staggered Spondaic Word Test (SSW)
- ▶ Dichotic Digits- Double Pairs
- ▶ Competing Sentences Test
- ▶ Pitch Pattern Sequence Test (PPST)
- ▶ CID-22 Speech in Noise Test
- ▶ Time Compressed Sentences or Words
- ▶ Low Pass Filtered Speech
- ▶ Rapid Alternating Speech
- ▶ Competing Environmental Sounds
- ▶ Phonemic Synthesis

### Other Tests in APD Battery

- ▶ Complete audiologic evaluation
- ▶ PIPB Rollover
- ▶ Masking Level Differences
- ▶ Acoustic Reflexes
- ▶ Tympanometry
- ▶ Oto-acoustic Emissions
- ▶ ABR/MLR/P300 Evoked Potentials

### Staggered Spondaic Word Test (SSW)

- ▶ Assesses dichotic listening
- ▶ Requires the auditory process of binaural integration when linguistic cues are present
  - ▶ Binaural integration: the ability to understand and process two different messages presented simultaneously

Example: up stairs down town  
RNC RC LC LNC

### Dichotic Digits- Double Pairs

- ▶ Assesses dichotic listening
- ▶ Requires the auditory process of binaural integration when linguistic cues are not present
  - ▶ Binaural integration: the ability to understand and process two different messages presented simultaneously

Example: 1 4 (simultaneous)  
6 5 (simultaneous)  
LE RE  
repeat all four numbers

### Competing Sentences Test (CST)

- ▶ Assesses dichotic listening
- ▶ Requires the auditory process of binaural separation
  - ▶ Binaural separation: the ability to "selectively attend" and to understand one message presented while ignoring another message presented simultaneously

Example: It was a long ride by train. RE  
I thought we would never get there. LE  
Simultaneous  
tell me the sentence you hear at the right ear/  
left ear.

### Pitch Pattern Sequence Test (PPST)

- ▶ Assesses the auditory process of temporal patterning and inter-hemispheric transfer via the corpus callosum
- ▶ Requires pitch discrimination, memory, and sequencing to hum the three pitch sequence AND to label the three pitch sequence

Example: High High Low (binaural presentation)  
Hum the three pitch sequence (Rhemisphere)  
Label the three pitch sequence (Lhemisphere)

### CID-W22 Speech In Noise Test

- ▶ Assesses the auditory process of auditory figure ground
- ▶ Auditory figure ground: the ability to understand messages in the presence of background noise (+5db S/N ratio)

Example: Repeat these words (25 RE, then 25 LE)

noise Listen to the man and ignore the  
noise Compare difference in ears  
noise Compare difference in quiet and in  
noise

### Time Compressed Sentences

- ▶ Assesses the process of auditory closure and overall temporal processing skills
- ▶ Auditory Closure: the ability to "fill-in" the missing pieces of a compromised or degraded message

Example: Repeat sentences with 40 % time compression

Repeat sentences with 60% time compression  
Do for each ear and  
Compare difference between ears/ % correct

### Low Pass Filtered Speech

- ▶ Assess the process of auditory closure and overall temporal processing skills
- ▶ Auditory Closure: the ability to "fill-in" missing pieces of a compromised or degraded message

Example: Repeat words/ Say the word burn  
Passed through a low pass filter  
They sound "muffled".  
25 RE, 25 LE % correct

### Rapid Alternating Speech Test

- ▶ Assesses the process of binaural fusion
- ▶ Binaural fusion: the ability of the two ears to merge auditory input being rapidly alternating between the RE and the LE

Example: Repeat the sentence  
The children came home late from school.  
Rapidly alternating between ears

### Review of Auditory Processes Assessed during the APD Evaluation

TESTS IDENTIFY DEFICITS IN AUDITORY PROCESSES

### Auditory Processes and Tests

- ▶ **Binaural Integration:** Staggered Spondaic Word, Dichotic Digits
- ▶ **Binaural Separation:** Competing Sentences
- ▶ **Temporal Patterning/ IHT :** Pitch Pattern Sequence
- ▶ **Auditory Figure Ground:** CID W-22 in noise or SAAT
- ▶ **Auditory Closure:** Low Pass Filtered Speech, Time Compressed Sentences
- ▶ **Binaural Fusion:** Rapid Alternating Speech

## Contribution of Other Team Members

- ▶ **Psychologist:**
  - ▶ Verbal vs. Performance IQ
  - ▶ Learning style
  - ▶ Attention
  - ▶ Learning disabilities
  - ▶ Hyperactivity
  - ▶ Emotional status
  - ▶ Speech of processing
  - ▶ Effects of medications
  - ▶ Impulsivity
  - ▶ ADHA or Autism Spectrum
- ▶ **Otoneurologist:**
  - ▶ Dizziness
  - ▶ MRI to rule out retro-cochlear pathology
- ▶ **Special Educator/Teacher:**
  - ▶ Complete checklists such as CHAPPS, Fisher's Auditory Problems
  - ▶ Academic deficits
- ▶ **Occupational Therapist/Physical Therapist:**
  - ▶ Auditory visual integration
  - ▶ Fine and gross motor skills
  - ▶ Sensory integration

## Types or Sub-Classifications of Auditory Processing Disorders

### Katz / Buffalo Model

- ▶ Decoding
- ▶ Tolerance Fading Memory
- ▶ Integration
- ▶ Organization

## Bellis/ Ferre Sub-Profiles of APD

### Primary Subtypes

- ▶ **Auditory Decoding Deficit**
  - ▶ Dysfunction in the *left* hemisphere
- ▶ **Prosodic Deficit**
  - ▶ Dysfunction in the *right* hemisphere
- ▶ **Integration Deficit**
  - ▶ Dysfunction in inter-hemispheric pathways or *right* hemisphere

## Bellis/ Ferre Sub-Profiles of APD

### Secondary Subtypes

- ▶ **Associative Deficit**
  - ▶ Dysfunction in *left* associative cortex where acoustics and meaning/syntactic analysis occurs
- ▶ **Output-Organization Deficit**
  - ▶ Dysfunction 1) in temporal-to-frontal and/or efferent system 2) with audition and higher-order abilities such as receptive language and executive function

## Primary Sub-Profiles: Auditory Decoding Deficit

- ▶ The most auditory-modality specific
- ▶ Site of dysfunction is the primary auditory cortex in the language dominant hemisphere (*left hemisphere*)
- ▶ Decreased intrinsic redundancy which is more pronounced in listening situations where extrinsic redundancy is reduced

## Primary Sub-Profiles Prosodic Deficit

- ▶ Often is the auditory piece of a larger, general central processing deficit arising from a dysfunction in the *right hemisphere*
- ▶ Auditory Processes impacted:
  - ▶ Poor Temporal Patterning skills
  - ▶ Poor Auditory Discrimination of non-speech stimuli and vowels
  - ▶ Poor Binaural Separation and/or Integration



### Primary Sub-Profiles **Integration Deficit**

- ▶ Characterized by difficulty in tasks requiring inter-hemispheric transfer (*right hemisphere or corpus callosum*)
- ▶ Symptoms may be within a single modality or may be multimodality because the corpus callosum is a multimodal structure
- ▶ The auditory symptoms may be the primary factor or just one manifestation of multimodality difficulties

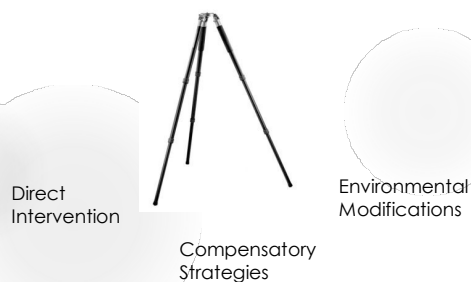
### Secondary Sub-Profiles: **Associative Deficit**

- ▶ Inability to apply the rules of language to incoming acoustic information (example: misunderstand passive voice, "the cat was chased by the dog", compound sentences, and complex linguistic messages)
- ▶ Inability to attach linguistic meaning to phonemic units of speech

### Secondary Sub-Profiles: **Output-Organization Deficit**

- ▶ Symptoms can overlap with many other disorders so evidence of an auditory deficit must be confirmed
- ▶ Inability to sequence, plan, and organize responses to auditory information or instructions
- ▶ Receptive auditory skills are good, but the ability to act upon incoming auditory information is poor

### Successful Management



### Typical APD Treatment Areas

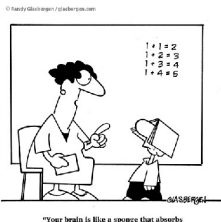
- ▶ Auditory Memory
- ▶ Auditory Discrimination
- ▶ Auditory Closure
- ▶ Auditory Cohesion
- ▶ Auditory Synthesis
- ▶ Auditory Figure-Ground
- ▶ Auditory Binaural Integration

### Case Studies: Evaluation and Management



CASE STUDY: ONE

## Decoding Deficit



"Your brain is like a sponge that absorbs knowledge, but that's not exactly how it's done."

## APD Case Study: ONE

- ▶ 12 year old in 6<sup>th</sup> grade
- ▶ Reads at 2<sup>nd</sup>-3<sup>rd</sup> grade level
- ▶ Difficulties listening in noise
- ▶ Word attack skills depressed
- ▶ Poor speller, can't spell words the way they sound
- ▶ Lower Verbal IQ
- ▶ Complains of headaches
- ▶ Poor vocabulary
- ▶ Difficulties with Spanish
- ▶ Good math computation
- ▶ Poor note-taker
- ▶ Says, "huh?" frequently
- ▶ Can't spell words the way they sound

## APD Case Study: ONE

- ▶ APD Evaluation Results:
  - ▶ SSW: poor bilaterally with right competing score poorer than left competing score
  - ▶ Dichotic Digits: poor bilaterally, right ear worse
  - ▶ Competing Sentences: poor bilaterally
  - ▶ Pitch Pattern: normal
  - ▶ Low Pass Filtered Speech: poor bilaterally
  - ▶ Time Compressed Speech: poor bilaterally
  - ▶ Speech-In-Noise: poor bilaterally
  - ▶ Phonemic Synthesis: OK, but discrim errors

## APD Case Study: ONE

- ▶ **Deficient Processes:**
  - ▶ Auditory Closure
  - ▶ Auditory-Figure Ground
  - ▶ Binaural Separation
  - ▶ Binaural Integration
  - ▶ Temporal Resolution
- ▶ Possible left auditory cortex/ left hemisphere site of dysfunction
- ▶ Type: **Auditory Decoding**

## APD Decoding Case Study: ONE

- ▶ **Classroom Accommodations:**
  - ▶ Assistive listening device
  - ▶ Preferential seating
  - ▶ Use of multimodality cues
  - ▶ Repetition
  - ▶ Note-taker
  - ▶ Pre-teach new information/vocabulary
  - ▶ Training for self-advocacy and dealing with adverse listening conditions
  - ▶ Avoid auditory fatigue/ give listening breaks
  - ▶ Frequent checks for comprehension

## APD Decoding Case Study: ONE

- ▶ **Direct Intervention:**
  - ▶ Auditory Closure
  - ▶ Binaural Integration/Separation with Dichotic Listening
  - ▶ Auditory Figure Ground
  - ▶ Auditory Discrimination
  - ▶ Phonological Awareness
  - ▶ Reading Comprehension
  - ▶ Reading Decoding and Spelling
  - ▶ Written Language and Narrative Language
  - ▶ Vocabulary Building

## APD Decoding Case Study: ONE

### ► Compensatory Strategies:

- Enhance Motivation/Avoid Fatigue
- Teach Active Listening Techniques (It's Time to Listen Program)
- Teach "Look and Listen" strategy
- Provide Attribution Training
- Teach Meta-linguistic, meta-cognitive, and meta-memory strategies
- Teach Schema Induction

## Auditory Closure Activities (CAP Kit)

- Build skills to use contextual clues to understand incomplete auditory information
- Missing Word Exercises: begin with familiar and move to less predictable
  - Humpty Dumpty sat on a .....
  - Something you eat, rhymes with bake
  - Name an animal that rhymes with house
  - When I am sleepy, I.....
  - Tom threw the .....
  - The water was so....,it took my breath away
  - Kim.....the ball with a bat

## Auditory Closure Activities (CAP Kit)

### ► Missing Syllable Exercises:

- I peeled the yellow ba...na.
- There are twenty-six letters in the al-pha...
- Sports: base....., soc....., ten.....
- Hot.....and .....plane with spondee words
- Compart....., .....tiply, to.....row

Easiest in final position, then initial position  
Most difficult in medial position

## Auditory Closure Activities (CAP Kit)

### ► Missing Phoneme Exercises

- Should tape record and use context and category cues first
- Final sounds are easiest , medial are hardest
  - Furniture: fa...l, cou....., ....air
  - Theater related: ...tor,...tain,...tress
  - Sentences: I li.....to wat...tel...vi.....
  - The ba ..y only knew how to scri...le on the pa...er.
  - She ..tepped in the ..uddle and soaked her...oes.

## Binaural Integration Activities (CAP Kit)

- Enroll in lessons to play an instrument
- Enroll in dance lessons or karate
- Play Bop-It or Simon
- Sing songs with motions (thumbkin, if your happy and you know it)
- Singing to scale (xylophone match pitch with note)
- Sing and chant while moving (bouncing a ball, walking, rocking, drawing)
  - A my name is Alice and my husbands name is Al and we live in Alabama and we eat apples
  - I like to eat eat eat eapples and benee nees.

## Binaural Integration (CAP Kit)

### ► Grab Bag

- Free choice: child feels with left hand and uses descriptive language to id what is felt
- Directed Id: clinician names object and student feels with left hand to find and describes the object
- ID by Category: collect six items from category (buttons, rocks, pens, toothpicks, dried pasta) place in bag except for one item from each pair. Display items. Choose one with his left hand, feel it, then find identical item in bag. Describe to defend choice.

### Binaural Integration (CAP Kit)

- ▶ Drawing to Directions:
  - ▶ Target Identified: Draw an envelope. Write your first name in the upper-left corner. Write your last name in the middle of the envelope. Highlight your first name with the orange crayon. Write the number 3 below your last name.
  - ▶ Target Unidentified: Draw five small circles, side by side. Write the letter V on top of the last circle. Draw two eyes on the first circle. Draw a small triangle under each circle. Draw small lines around the circles to make them look fuzzy. What? (caterpillar)

### Binaural Integration (CAP Kit)

- ▶ Paper and Pencil Activities:
  - ▶ Listen to these numbers and write down the third one
  - ▶ When I name a color get the crayon that matches it and draw a circle
  - ▶ Listen to these long vowels and write the fourth one
- ▶ Opposites:
  - ▶ Do the opposite. Hop on your right foot. Look up. Take two steps forward. Walk to the door. Stamp your feet loudly. Snap your fingers quickly. Make a happy face. Get a white crayon. Raise your hands high.

### Binaural Separation/Integration

- ▶ Dichotic Listening Training: intensity of signals presented to each of the two ears is varied systematically while children are instructed either to attend to both ears (integration) or attend to the target ear only (separation)
- ▶ Recorded material is targeted toward the interests and language levels of the child
- ▶ Manipulate the target-to-competition ratio
- ▶ Readjust the target-to-competition ratio as needed
- ▶ Complete training for 20-30 minutes daily/adapt for home use

### Dichotic Listening Training (DPT, Winget)

- ▶ Auditory training should include acoustically controlled tasks of sound intensity and sound localization. Intervention should incorporate a bottom-up approach (ASHA, 2005)
- ▶ Binaural Listening: 1-4 digit repetition in quiet and in noise
- ▶ Monaural and Alternating Listening: 1-4 digit repetition RE/LE in quiet and in noise
- ▶ Listening Localization: close/far distance in steady and variable noise
- ▶ Dichotic Listening: 1- 4 digit, phrase and sentence repetition in quiet and in noise

### Auditory Figure Ground Activities

- ▶ Practice any targeted goal in the presence of background noise/competing speech
- ▶ Consider the type of noise
  - ▶ Least challenge: predictable such as an AC or fan constant noise
  - ▶ Medium challenge: less predictable such as music, speech babble, or someone reading
  - ▶ Greatest challenge: playground or cafeteria noise
- ▶ Signal to Noise Ratio
  - Easy: stimulus is louder than noise
  - Medium Difficulty: stimulus is equal to noise
  - Most Difficulty: stimulus is quieter than noise

### Auditory Discrimination Activities (Sloan)

- ▶ Phoneme Discrimination Training and Speech-to-Print Skills
  - ▶ Christine Sloan Treatment Program:
    - ▶ discriminate speech sounds correctly
    - ▶ help child know when they have perceived a sound incorrectly or are unsure
    - ▶ improve confidence and self-esteem

## Auditory Discrimination Activities (Sloan)

- ▶ Involves the presentation of minimal contrast phoneme pairs (t vs.d)
- ▶ Phonemes are presented in isolation
- ▶ Move to discrimination of minimal contrast pairs of phonemes in consonant-vowel and vowel-consonant syllables
- ▶ Move to words of increasing complexity

## Auditory Discrimination Activities (Sloan)

- ▶ Speech to print skills are taught by sound analysis of nonsense words
- ▶ Tach...what is the middle sound? (A)
- ▶ What is the last sound? (CH)  
What is the first sound? (T)
- ▶ How would you spell this/spelling rule?
- ▶ Tatch
- ▶ Real or nonsense? Define real words

## Processing Power (Ferre)

- ▶ Processing Power (Ferre) targets phoneme discrimination training along with a variety of additional auditory and language skills such as:
  - ▶ Rhyming
  - ▶ Word Associations
  - ▶ Speech in Noise
  - ▶ Speech-Reading

## Auditory Discrimination Activities (CAP Kit)

- ▶ Same or Different Progression
  - ▶ Long vowels in medial positions of words (choke, cheek) and in phrases (tap the teeth, tap the tooth)
  - ▶ Short Vowels in medial positions of words (rat, rut) and in phrases (I want cup, I want cap)
  - ▶ Word level final position sounds (doze, dose)
  - ▶ Voiced vs Voiceless consonants (town, down)
  - ▶ Consonant Clusters (press, dress)

## Auditory Discrimination Activities(CAP Kit)

- ▶ Perceive differences in sounds presented in words and sentences. Use real and non-real words.
  - ▶ Are these words same or different?
    - ▶ Words, medial position, long vowels (tape-type)
    - ▶ Phrases, medial position, long vowels (is mean- is mine)
    - ▶ Words, medial position, short vowels (last-list)
    - ▶ Phrases, medial position, short vowels (it's a shock- It's a snack)
    - ▶ Words, final position (maze- mace)
    - ▶ Phrases, final position ( has a cold- has a colt)
    - ▶ Words, initial position, voice/voiceless consonants (cane-gain)
    - ▶ Phrases, initial position, voice/voiceless consonants ( for the time- for the dime)
    - ▶ Words, initial position, consonant clusters (cling, string)
    - ▶ Phrases, initial position, consonant clusters ( fix the stair, fix the square)

## Auditory Discrimination Activities(CAP Kit)

- ▶ Tell me each word that begins with the sound I say.
  - ▶ Low frequency: n (run, none, known)
  - ▶ High frequency sh (shape, shave, wave)
  - ▶ Blends: kr (dry, cry, fry)
- ▶ Listen for the long A sound and tell me if it is in the beginning, the middle, or the end of each word.
  - ▶ Space, ace, day
- ▶ Listen for the long A,E,I,O, U sound. Tell me the sound you hear and if it is in the beginning, the middle, or the end of each word
  - ▶ Teeth, sigh, athlete, acre
- ▶ Listen for the short I sound as in big. Tell me if it is in the beginning, the middle of each word.
  - ▶ Wish, ill, lid, if
- ▶ Listen for the short A,E,I,O,U sound. Tell me the sound and if it is at the beginning, or the middle of each word.
  - ▶ Dug, gnat, blob, exclaim

## Auditory Discrimination Activities (CAP Kit)

- ▶ Tell me if you hear the S or the Z sound in these words and if that sound is at the beginning, in the middle, or at the end of the word
  - ▶ Answer, clothes, busy, rose
- ▶ Contrast F vs V, P vs B, T vs D, K vs G, Ch vs J, PR vs BR, PL vs BL, TR vs DR, GR vs KR, AKL vs. GL,
- ▶ Point to the words you hear me say. You can point to the different words or the same word twice. (sat/hat) (sat/sat)
- ▶ Is the first/last sound in these words the same or different? (mat/lot) (sit/ sip)
- ▶ Is the first/last sound in these syllables the same or different? (ap/ip)

## Auditory Discrimination Activities (CAP Kit)

- ▶ Are the middle sounds same or different? (cat, cut)
- ▶ Are these notes/tones the same or different?
- ▶ Are these words the same loudness or different?
- ▶ What begins with this sound /p/? (pail, sail, tail)
- ▶ Listen for the long E and identify position in word. (ready, enough, neat)
- ▶ Identify morphemes at end of verbs (plays, played, playing)

## Auditory Discrimination/Perception Activities (CAP Kit)

- ▶ Show me the letter that goes with the sound I say
  - ▶ e
  - ▶ ch
  - ▶ th
- ▶ Tell me another word that begins with the same sound as
  - ▶ Apron
  - ▶ Eat
  - ▶ Iceberg
- ▶ Select card for WHO, WHAT, WHEN, WHERE, WHY, HOW to go with spoken phrase
  - ▶ It will be gone by midnight.
  - ▶ Clip it together tightly.
  - ▶ Mr. Smith and I
  - ▶ Bring it so it can be finished.

## Reading and Written Language Intervention

- ▶ Utilize programs which target phoneme discrimination, phonemic synthesis, segmentation, sound-symbol association, phonological manipulation, vocabulary (top-down and bottom-up reading/writing strategies):
  - ▶ Lindamood LIPs Program
  - ▶ Wilson Program
  - ▶ Phonological Awareness Kits and Materials
  - ▶ Lindamood Visualizing and Verbalizing
  - ▶ SPELL-Links to Reading and Writing
  - ▶ Lindamood Vanilla Vocabulary
  - ▶ Lindamood Seeing Stars
  - ▶ WKRP
  - ▶ Story Grammar Marker

## Story Grammar Marker (Maryellen Rooney Moreau and Holly Fidrych-Puzzo)

- ▶ Re-tell or Generate a Story including:
  - ▶ Character
  - ▶ Setting
  - ▶ Initiating Event/Problem
  - ▶ Internal Response
  - ▶ Plan
  - ▶ Attempts to Solve Problem
  - ▶ Direct Consequence/ Lesson Learned
  - ▶ Resolution

## Visualizing and Verbalizing (Nanci Bell)

- ▶ Gestalt imagery is a primary factor basic to the process involved in oral and written language comprehension, language expression, and critical thinking
- ▶ Sensory information connects us to language and thought

*"I make the movies when I read"*

## Visualizing and Verbalizing Components

- ▶ Explanation of WHY we need to V/V
- ▶ Picture to Picture
- ▶ Word Imaging
- ▶ Single Sentence Imaging
- ▶ Sentence by Sentence Imaging
- ▶ S by S with Higher Order Thinking Skills
  - ▶ summarize, main idea, inference, conclude, predict, extend
- ▶ Multiple Sentence Imaging
- ▶ Whole Paragraph Imaging
- ▶ Paragraph by Paragraph Imaging
- ▶ Whole Page Imaging
- ▶ Chapter and Lecture Noting
- ▶ Writing from V/V

## Visualizing and Verbalizing

- ▶ Present and teach use of structure words to aid in DETAILED visualizations and verbalizations

- |          |             |
|----------|-------------|
| ▶ What   | Movement    |
| ▶ Size   | Mood        |
| ▶ Color  | Background  |
| ▶ Number | Perspective |
| ▶ Shape  | When        |
| ▶ Where  | Sound       |

## Seeing Stars (Nanci Bell)

- ▶ The letters of language are like the stars in the universe -----  
Parts of a whole.
- ▶ "TEEOHEMOHDOUBLEAUROHDOUBLEYOU"
- ▶ "How do you spell TOMORROW?"
- ▶ Children need to learn to sound out words AND they need to "see the word in their heads" like in spelling bees!
- ▶ Screening Test is the Symbol Imagery Test

## Seeing Stars

- ▶ The ability to visualize letters in words: symbol imagery
- ▶ What do you see when I say the word FIP? Look away and try to image the word in your mind
- ▶ Now change FIP to FAP (you change the I to A)
- ▶ Now change FAP to FRAP (you see the R come after the A)
- ▶ What do you see when I say ENOUGH?
- ▶ Look away to see and hear me. What letters do you see? Try saying them backwards.

## SPELL Links to Reading and Writing (Wasowicz,Apel,Masterson,Whitney)

- ▶ Spelling, reading, and writing activities that teach critical word study skills
- ▶ Designed to improve spelling, reading decoding, fluency, vocabulary, comprehension, writing accuracy and organization
- ▶ Spelling success includes
  - ▶ Phonological awareness (relize for realize)
  - ▶ Phonics (K is never spelled ck,cc at beginning of words)
  - ▶ Vocabulary( bare vs bear, question words start with WH)
  - ▶ Word parts (morphology, prefix, suffix, root words)
  - ▶ Mental images of words (MOIs: rope not roap)

## WKRP Reading By the Rules (Wisnia Kapp, Kravitz-/Zodda)

Program involves these components:

- ▶ Multimodality
- ▶ Sound Symbol Association
- ▶ Nonsense Word Reading
- ▶ Vowel and Consonant Digraphs
- ▶ Syllables and Sounds
- ▶ Six Syllable Types
- ▶ Compound and Multisyllabic Words
- ▶ Vowel Exceptions
- ▶ Consonant Irregularities

## WKRP Reading By the Rules (Wisnia Kapp, Kravitz-/Zodda)

- ▶ Closed Syllable ends in a consonant = short vowel sound
  - ▶ Wham, tid, ces, be/gin, cus/pid
- ▶ Open Syllable = Long Vowel Sound
  - ▶ Va, te, cho, pre/vent, si/lent
- ▶ Chained Syllable
  - ▶ Roost/er, pon/toon, brook
- ▶ R Controlled Syllable
  - ▶ Ad/verb, per/fect,
- ▶ Consonant le Syllable
  - ▶ Sad/dle, pur/ple, ta/ble
- ▶ Sneaky e Syllable= vowel says its name
  - ▶ Re/mote, com/plete

## WKRP Reading By the Rules (Wisnia Kapp, Kravitz-/Zodda)

- ▶ Dividing into Syllable Types
  - ▶ Argument = ar (cons le) gu (open) ment (closed)
  - ▶ Department = de (open) part (r controlled) ment (closed)
  - ▶ Forbidden = for (r controlled) bid (closed) den (closed)
  - ▶ Misbehave = mis (closed) be (open) have (sneaky e)
  - ▶ Embroider = em (closed) broid (chained) er (r controlled)
  - ▶ Cucumber = cu (open) cum (closed) ber (r controlled)
  - ▶ Vibrate = vi (open) brate (sneaky e)
  - ▶ Retain = re (open) tain (chained)
- ▶ Count Vowel Captains
  - ▶ Bacon = a and o = 2 syllables ba/con, observance = 3

## Wilson Reading System Areas Addressed

- ▶ Phonemic Segmentation
- ▶ Sound/Symbol Relationships
- ▶ Decoding
- ▶ Encoding (spelling)
- ▶ Advanced Word Analysis
- ▶ Vocabulary Development
- ▶ Sight Word Instruction
- ▶ Fluency/Comprehension/Visualization

## Lindamood Bell LiPs

- ▶ Lindamood Phonemic Sequencing Program
- ▶ Utilizes kinesthetic, visual, and auditory modalities to teach vowel and consonant discrimination/identification
- ▶ Decoding and manipulation of nonsense and real words
- ▶ Syllabification
- ▶ Blending and segmenting
- ▶ Multimodality
- ▶ Screening test is the LAC

## LiPS Program

- ▶ Teaches "feeling" the sounds in their mouths and that "feeling" to track sounds in words
- ▶ Automaticity with this task involves also "seeing" the corresponding letters in their minds...we image the letters (symbol imagery)
- ▶ Supports sight word recognition and improving spelling beyond the "phonetically correct representations"

## Vanilla Vocabulary (Nanci Bell)

- ▶ Develops vocabulary through imagery- Visualizing and Verbalizing
  - ▶ Verbalize and gesture the visualization
  - ▶ Verbalize own sentence and definition
  - ▶ Experience words in context of story



### Vocabulary Building Activities (DPT, Winget)

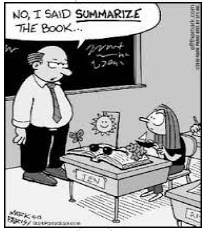
- ▶ Teach re-auditorization
- ▶ Teach contextual derivation of word meaning
- ▶ Immediate provision of definition
  - ▶ Category (what it belongs to)
  - ▶ Function (what it does/used for)
  - ▶ Form (how it looks, tastes, feels, smells)
  - ▶ Place (where it is found)
  - ▶ Materials/Parts (what it is made of)
  - ▶ Associations /Visualizations
  - ▶ Part of speech/antonyms/synonyms

### Vocabulary Building Activities (DPT, Winget)

- ▶ Reinforcement of definition
  - ▶ Associations
  - ▶ Comparisons
  - ▶ Synonyms
  - ▶ Antonyms
  - ▶ Multiple meaning words
  - ▶ Similes

### CASE STUDY: TWO

## Prosodic Deficit



### APD Case Study: TWO

- ▶ 14 year old male with difficulties making and keeping friends, prefers adults
- ▶ Normal academics but difficulty with geometry
- ▶ Difficulty following complex directions
- ▶ Poor note-taking skills
- ▶ Performance IQ is lower than Verbal IQ
- ▶ Normal language skills /speaks in monotone
- ▶ Poor musical abilities
- ▶ Reads with flat affect
- ▶ Teacher reports "bright but unmotivated"
- ▶ OT at young age due to "tactile defensiveness" and visual perceptual deficits
- ▶ ADD ruled out
- ▶ Appears depressed

### APD Case Study: TWO

- ▶ APD Evaluation Results:
  - ▶ SSW and DD: left ear deficit
  - ▶ Competing Sentences: left ear deficit
  - ▶ PPS: poor humming and labeling
  - ▶ All other tests were normal

### APD Case Study: TWO

- ▶ Deficient Processes:
  - ▶ Temporal Patterning/Inter-hemispheric Transfer
  - ▶ Binaural Separation
  - ▶ Binaural Integration
- ▶ Type: **Prosodic**
- ▶ Possible Site of Dysfunction: right auditory cortex and associated areas

## APD Prosodic Case Study: TWO

### ▶ Classroom Accommodations:

- ▶ Animated teacher placement
- ▶ Preferential seating
- ▶ Multimodality cues use of demonstrations and examples
- ▶ Avoid hints/tell exact meaning
- ▶ Repetition or rephrasing (with prosodic cues more perceptually salient)
- ▶ Note-taker
- ▶ Making frequent checks for comprehension
- ▶ Un-timed Tests
- ▶ ALD seldom indicated because difficulty is not related to the clarity of the acoustic signal

## APD Prosodic Case Study: TWO

### ▶ Direct Intervention:

- ▶ Pragmatic Language Intervention
- ▶ Reading Fluency Program/Sight Word Enhancement
- ▶ Visualizing and Verbalizing Program
- ▶ Prosody Training
- ▶ Temporal Patterning Training
- ▶ Inter-hemispheric Transfer Activities

## APD Prosodic Case Study: TWO

### ▶ Compensatory Strategies:

- ▶ Teach Schema Induction (to improve social situation interpretation)
- ▶ Teach Active Listening Strategies
- ▶ Attribution Training
- ▶ Memory Enhancement Strategies
- ▶ Dance, Drama or Music Lessons
- ▶ Games such as "Bop It"
- ▶ Teach Key Word Extraction
- ▶ Referral? Counseling

## Prosody Training (CAP Kit)

- ▶ Identify how syllabic stress patterns change the meaning of words
  - ▶ **Project** vs. **project**
  - ▶ **Object** vs. **object**
  - ▶ **Contest** vs. **contest**
- ▶ Stressed syllable changes meaning
- ▶ Steps
  - ▶ Teach definitions of both words
  - ▶ Have child point to the word you say
  - ▶ Embed word into a sentence and have the child determine which word was used based on stress and contextual cues
    - ▶ The **convict** is a repeat offender.
  - ▶ Use sabotage to keep them on their toes
    - ▶ The **convict** is a repeat offender

## Prosody Training (CAP Kit)

### ▶ Therapy tasks

- ▶ Identify correct meaning based on subtle differences in stress, temporal and other prosodic cues
- ▶ Sentence pairs
  - ▶ You mean I scream vs. You mean ice cream
  - ▶ I heard the night train vs. I heard the night train.
  - ▶ Look at the cowboy. Look at he cow, boy.
- ▶ Stress word differences
  - ▶ You can't go to the MOVIE vs. YOU can't go to the movie.
- ▶ Key word extraction: listening for specific parts of speech or specific words within sentences or passages

## Prosody Training (CAP Kit)

### ▶ Therapy tasks continued

- ▶ Exaggerated intonation and prosody during reading
- ▶ Practice changing intonation and prosody based on emotions: how would you say this if you were happy vs. angry
- ▶ Identify emotions of the speaker through listening alone

## Prosody Training

- ▶ Key word extraction: listen specifically for subjects, verbs, sounds, objects. Give a direction and ask "What was the action word?" "Who or what are you supposed to do?" "When?"
- ▶ Identify pauses in connected discourse...determine if it is the end of a sentence, embedded clause, connective

## Prosody Training (DPT,Winget)

- ▶ Identify facial expression to match emotional content of message
- ▶ Identify emotion words in sentences
- ▶ Produce sentences with appropriate emotional intonation
- ▶ Infer emotions based on situations described
- ▶ Discriminating if emotional intonation is correct
- ▶ Recognizing rising and falling intonation for sentences and questions
- ▶ Produce rising and falling intonation for sentences and questions
- ▶ Identify punctuation based on intonation
- ▶ Discriminate syllable and word stress
- ▶ Identify the word that is stressed in sentences and interpret meaning

## Temporal Patterning Training (CAP Kit)

### ▶ Nonlinguistic Patterns:

- ▶ Begin with short patterns tapped or clapped presented in pairs (child tells same or different) or (child imitates the pattern exactly)
  - ▶ clap clap clap rest clap vs. clap rest clap clap clap
  - ▶ cLAP clap CLAP vs. CLAP clap clap
  - ▶ tap TAP tap TAP vs. TAP tap TAP tap
- ▶ Patterns are altered in terms of speed, loudness, rhythm
- ▶ Patterns are presented with visual and auditory cuing, tactile and auditory cuing, and auditory cuing only
- ▶ Eventually add more elements up to 7-8

## Temporal Patterning Training (CAP Kit)

### ▶ Linguistic Patterns:

- ▶ Imitate and identify as same or different with various pitches, durations, syllables, and rhythms
- ▶ Imitates humming ( hm hm **LOhm**)
- ▶ Imitates nonsense syllables (bay bay **Hibee** bay)
- ▶ Completes pattern (slish slash slish ....)
- ▶ Label various durations and pitches ( hi lo lo hi)

## Temporal Patterning Training (CAP Kit)

- ▶ Auditory Sequential Tasks such as
  - ▶ (ball, shoe, tie: when did I say ball?)
  - ▶ (fa, da, ga: when did I say da?)
  - ▶ (tick, tack, tick: when was vowel different?)
- ▶ Word sequences can be used
  - ▶ (which of these words is different "sick sick sack")
- ▶ Sentences can be used where one word is stressed more than another
  - ▶ (You **ARE** going to the store, YOU are going to the store, You are going to the **STORE**)

## Inter-hemispheric Exercises (CAP Kit)

- ▶ Key factors in these activities are that a single or double transfer across the corpus callosum must occur and the exercises provide opportunity for repetition so as to stimulate the corpus callosum efficiently
- ▶ Appropriate for home-based therapy

## Inter-hemispheric Exercises (Terri Bellis)

- ▶ Motor-to-Verbal Transfers
  - ▶ Children find objects with the left hand and are instructed to label them verbally in terms of shape, size, texture, etc.
- ▶ Verbal-to-Motor Transfers
  - ▶ Children are instructed to find a particular object or shape with the left hand from a grab bag or behind a screen where they cannot see the objects

## Inter-hemispheric Exercises

- ▶ Music Therapy: musical instruments that require coordinated movements of the hands such as the piano with bimanual coordination
- ▶ Singing Therapy: requires both linguistic output (left hemisphere) and melodic expression (right hemisphere), listen to songs and answer questions about lyric
- ▶ Playing BOP it or SIMON

## Inter-hemispheric Exercises

- ▶ Dance Therapy: requires listening and doing with bipedal coordination
- ▶ Video games requiring visual and auditory vigilance and bimanual coordination
- ▶ Drawing pictures from verbal directions or describe pictures they have drawn
- ▶ Extracurricular sports

## CASE STUDY: THREE

# Integration Deficit



Check out more Losertoons at facebook/losertoons

## APD Case Study: THREE

- ▶ 9 year old male in 3<sup>rd</sup> grade
- ▶ History of chronic ear infections
- ▶ Dx of ADD in first grade takes Adderall daily
- ▶ Resource for reading/spelling
- ▶ Speech therapy twice weekly at school
- ▶ Can't ignore low intensity intermittent and constant noise

## APD Case Study: THREE

- ▶ Can't follow multi step commands at home or at school
- ▶ Does well in math, but not with word problems
- ▶ Struggles with reading, can't find place on page, fair comprehension when read to but can't read independently
- ▶ Can't write on lines easily
- ▶ Poor self starter "watch and wait"
- ▶ Difficulties with transitions
- ▶ "I don't get it" Memorizes spelling words, but forgets what he has memorized easily
- ▶ Poor word attack/encoding and decoding skills
- ▶ Vocabulary is reported to be age appropriate, therapy at school targets auditory memory skills

### APD Case Study: THREE

▶ APD Test Results:

▶ SCAN C:

FW= SS 12  
 AFG= SS 11  
 CW= SS 9  
 CS =SS 8  
 composite= SS 100

### APD Case Study: THREE

▶ APD Test Results:

- ▶ SSW= 80%RC, 30%LC sig. L/H ear effect=TFM Type ,Type A pattern, two reversals
- ▶ DD= 85%RE, 60%LE
- ▶ PPS= 0% label, 100% hum
- ▶ CS= 70%RE, 0%LE
- ▶ Time Compressed Speech=85%RE,75%LE
- ▶ Speech-In-Noise= normal
- ▶ Phonemic Synthesis= Abnormal, errors included forgetting the first sound of words /aper/ instead of /paper/ and /boat/ instead of /coat/. He also reduced blends /rain/

### APD Case Study: THREE

▶ Deficient auditory processes:

- ▶ Binaural Integration and Separation
- ▶ Auditory Closure
- ▶ Inter-hemispheric Transfer/Temporal Patterning
- ▶ Poor auditory attention for instructions, details, concepts, reasoning and reading comprehension

### APD Case Study: THREE

▶ APD Type= **Auditory Integration Deficit**

- ▶ Difficulty with receptive and expressive language; syntax, visual-motor integration, writing, difficulty recognizing patterns or wholes necessary for word recognition and spelling, difficulty using symbols, space and visual imagery, difficulty with rhythm and prosody, poor phonics and reading skills, don't get the "big picture"

### APD Case Study: THREE

▶ Further Speech-Language assessment results:

- ▶ PPVT III: SS 81 /10<sup>th</sup> percentile
- ▶ EVT: SS 79 / 8<sup>th</sup> percentile
- ▶ CELF-3 results ranged from SS of 3-7 with percentiles ranging from 1<sup>st</sup>-16<sup>th</sup>
  - ▶ Overall Receptive :2<sup>nd</sup> percentile
  - ▶ Overall Expressive:1<sup>st</sup> percentile
  - ▶ Total language:1<sup>st</sup> percentile

### APD Integration Case Study: THREE

▶ **Classroom Accommodations**

- ▶ Preferential seating
- ▶ Break information and directions into small parts
- ▶ Provide "how to" information
- ▶ Repeat, don't rephrase
- ▶ Un-timed tests in quiet room
- ▶ Abbreviated assignments or more time
- ▶ Note-taking assistance
- ▶ Avoid multi-modality presentation
- ▶ Hands-on experiential environment
- ▶ Provide multi-modal inputs one at a time
- ▶ ALD may not be indicated in order to "get the big picture"

### APD Integration Case Study: THREE

#### ▶ Direct Intervention

- ▶ Speech-Language Treatment to address possible receptive/expressive language delays
- ▶ Vocabulary Building
- ▶ Auditory Memory and Sequencing Activities
- ▶ Key Word Extraction for Sustained Attention
- ▶ Dichotic Listening and Localization Training
- ▶ Speech in Noise Training

### APD Integration Case Study: THREE

#### ▶ Direct Intervention:

- ▶ Auditory Closure Activities
- ▶ Auditory Cohesion Goals
- ▶ Temporal Patterning Training
- ▶ Prosody Training
- ▶ Inter-hemispheric Transfer Exercises
- ▶ Phonetic Discrimination/Decoding/Synthesis Training

### APD Integration Case Study: THREE

#### ▶ Compensatory Strategies:

- ▶ Provide education about nature of difficulties/Attribution training
- ▶ Teach recognition of difficult listening situations and problem solve
- ▶ Teach meta-memory devices
- ▶ Formal and content schema induction
- ▶ Teach "look or listen", "look then listen"

### APD Integration Case Study: THREE

#### ▶ Other Management Recommendations:

- ▶ May benefit from dance and/or music lessons, juggling, karate, or gymnastics
- ▶ Games: Bop It, Simon Says
- ▶ Activities that start with WHOLE and teach PART TO WHOLE skills such as puzzles or building models
- ▶ Pairing speech with music

### Auditory Cohesion Activities

- ▶ Name category for lists presented auditory only (divergent naming)
  - ▶ Cucumber, lettuce, carrot= vegetables
- ▶ Produce items in named category (convergent naming)
  - ▶ Tell me five farm animals.
- ▶ Identify two characteristics of two items read aloud which are similar or different and explain why (cookies/cake)

### Auditory Cohesion Activities

- ▶ Compose paired combinations and explain why they are paired
- ▶ Identify suitable endings or next turn to conversational dialogue
- ▶ Solve verbal math problems
  - ▶ The boy picked four apples and the girl picked three more than him. How many did they pick together?
- ▶ Identify suitable title for mini-stories read aloud

## Auditory Cohesion Activities

- ▶ Repeat and complete analogies
  - ▶ Apple is to red, as banana is to.....
- ▶ Repeat riddles or inferences and solve problems explaining "why?"
- ▶ Complete "IF....then" statements
  - ▶ If you're a girl, tell me the days of the week. If not, tell me the months of the year
- ▶ Answer Auditory Reasoning Questions
- ▶ Respond to True/False statements and explain "Why?"

## Auditory Cohesion Activities

- ▶ Identify and compose absurd sentences and explain why they are absurd
  - ▶ The waitress said he forgot our order.
  - ▶ I use a shovel to eat soup and ice cream.
- ▶ Identify logical reactions to problem-solving choices and explain "Why?"
  - ▶ Is July colder than December? Why?

## Auditory Cohesion Activities (CAP Kit)

- ▶ Understanding Key Words from Directions
  - ▶ Write key words from a grade level directions typically given in class onto cards and place in front of student. Read a passage and have student move them to the side when heard. Student re-tells passage from key words.
  - ▶ Can also practice same strategy with taking notes sand actually following the grade level direction
    - ▶ you are going to see the beginning of the web about helping others. Brainstorm different ways to help people. Write the ideas on the web with your pencil.
    - ▶ key words: web, brainstorm, pencil, helping others, write

## Auditory Synthesis

- ▶ Therapy exercises are meant to help the student become more aware of word segments, sound components and sound discrimination and help the student gain fluency with combining sounds into words.
- ▶ Identifying number of syllables
  - ▶ How many syllables are in the word "gorilla"
- ▶ Identifying the initial sounds
  - ▶ Which of these words start with /s/: side, hide, wide
- ▶ Discriminating sounds
  - ▶ Which word begins with a different sound: fish, wish, fast
- ▶ Blending compound words
  - ▶ Ice-cream = icecream

## Auditory Synthesis

- ▶ Blending syllables
  - ▶ Wa-ter=water
- ▶ Blending phonemes
  - ▶ /n/-/o/-/z/ = nose
- ▶ Riddles
  - ▶ I'm thinking of an animal. It has an /a/ sound. It begins with /f/ and ends with /ks/. What is it?
- ▶ Initial sound extraction and blending:
  - ▶ Tom is powerful=tip

## CASE STUDY: FOUR

# Associative Deficit



### APD Case Study: FOUR

- ▶ 9 year old in speech treatment for receptive language delay in areas of vocabulary, syntax
- ▶ Early grades were good, began having difficulty in fourth grade
- ▶ Poor social language skills

### APD Case Study: FOUR

- ▶ APD results: bilateral deficits on Dichotic Digits and Competing Sentences, all other test results were normal
- ▶ Deficits in binaural separation and integration, may be result of more generalized left-hemisphere dysfunction
- ▶ Type= **Associative**

### APD Associative Case Study: FOUR

- ▶ **Classroom Accommodations:**
  - ▶ Focus on "rules"
  - ▶ Use multi-modality cues
  - ▶ Rephrase information and repeat with smaller linguistic units
  - ▶ Comprehension checks: ask for paraphrase not repetition of what was heard
  - ▶ Pre-teach new information
  - ▶ Use organizational aids
  - ▶ Allow for foreign language substitution or modifications
  - ▶ Use multiple choice or closed set tests

### APD Associative Case Study: FOUR

- ▶ **Direct Intervention:**
  - ▶ Speech language treatment to include receptive vocabulary, syntax and pragmatic language goals
  - ▶ Teach paraphrasing and inferencing skills
  - ▶ Teach contextual derivation of word meaning
  - ▶ Teach rules of language
  - ▶ Teach discourse cohesion (conversational competence)
  - ▶ Teach meta-linguistic vocabulary

### APD Associative Case Study: FOUR

- ▶ **Compensatory Strategies:**
  - ▶ Teach Meta-memory Strategies (They expend so much energy trying to comprehend the message, there is little energy left to remember the message)
  - ▶ Training in the Rules of Language
  - ▶ Formal and Content Schema Induction

### Meta-Memory Strategies

- ▶ Chunking (breaking down long messages or lists into smaller components and grouping similar concepts/objects together)
- ▶ Elaboration (use analogies and acronyms)
- ▶ Recoding the information into a pictorial representation (visualize/imagery)
- ▶ Set task to music or motion
- ▶ Verbal rehearsal and re-auditorization



### Meta-Memory Strategies (HELP for Memory)

- ▶ Selecting and Prioritizing Information to Remember
- ▶ Coding and Grouping items for recall
  - ▶ Pairing items, categorizing, grouping by whole/part
- ▶ Using Aids to Remember
  - ▶ Memory pegs, chunking words and number and information in paragraphs, using word lists in sentences, acronyms, rhymes, catch phrases, pictures and imaging, notes, outlines, mapping, webbing, time lines
- ▶ Applying Memory Techniques
  - ▶ Selecting appropriate strategy to recall information, identifying number of steps in sequence, following sequential directions with and without pictures and symbols

### Compensatory Strategies

- ▶ Training in the Rules of Language
  - ▶ Use and meaning of tag words (first, last, before, after, next)
  - ▶ Use and meaning of discourse cohesion devices (pronouns/ additives such as and, however, although/ causal terms such as because, therefore)
  - ▶ Teach meaning of metalinguistic vocabulary: sentence, word, syllable, sound, etc.

### Compensatory Strategies


- ▶ Formal Schema Induction: training to recognize and interpret discourse cohesion devices/make predictions
  - ▶ Teach tag words (first, last, before, after)
  - ▶ Adversative terms (but, although, however)
  - ▶ Referents (pronouns)
  - ▶ Additives (and)
  - ▶ Causal terms (because, therefore)

### Compensatory Strategies

- ▶ Content or Contextual Schema Induction: teach how scripts based on context and experience assist us in interpreting the message
  - ▶ Restaurant (how many? Do you have a reservation?)
  - ▶ When message does not fit situation, ask for repetition/clarification

### Output Organization Deficit

CASE STUDY: FIVE



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"That was due today? Seriously? I need help. Where can I get some homework insurance?"

### APD Case Study: FIVE

- ▶ 9 year old with average grades
- ▶ Disorganized
- ▶ Doesn't complete assignments
- ▶ Impulsive
- ▶ Poor planner
- ▶ Difficulty following oral directions
- ▶ Word-finding problems
- ▶ Poor sequencing abilities
- ▶ Good reader but has reversals on spelling and in math
- ▶ History of articulation deficits
- ▶ "I heard it but I can't remember it"
- ▶ Poor handwriting

## APD Case Study: FIVE

- ▶ APD Evaluation Results
  - ▶ Phonemic Synthesis: normal until words contained five sounds
  - ▶ Speech in Noise: below expected scores for each ear
  - ▶ Dichotic Digits: poor (usually reported 3 of 4 digits)
  - ▶ SSW: significant number of reversals
  - ▶ LPFS: normal result
  - ▶ PPS: normal result
  - ▶ CST: normal result with errors being omission of some words at the end of the sentence

## APD Case Study: FIVE

- ▶ Type: **Output Organization Deficit**
- ▶ Deficit in temporal-to-frontal and/or efferent system
- ▶ Deficient Processes:
  - ▶ Auditory-figure-ground
  - ▶ Auditory memory
  - ▶ Auditory synthesis
  - ▶ Auditory sequencing

## APD Output Organization Case Study: FIVE

- ▶ **Classroom Accommodations:**
  - ▶ Recommend highly structured, rule-based classroom
  - ▶ Use an assignment book checked by teacher
  - ▶ Provide written instructions
  - ▶ Preferential seating
  - ▶ Trial use of ALD
  - ▶ Rephrasing using smaller linguistic units
  - ▶ Avoid auditory fatigue
  - ▶ Use positive reinforcement

## APD Output Organization Case Study: FIVE

- ▶ **Direct Intervention:**
  - ▶ Auditory Memory Activities/Speech In Noise Training
    - ▶ immediate and delayed responses
    - ▶ varying degrees of noise/speech competition
  - ▶ Auditory Sequencing Activities
  - ▶ Assess Expressive Language and target deficit areas
  - ▶ Assess Sensory Integration and Fine Motor Skills (OT)
  - ▶ Assess for ADD/ADHD

## APD Output Organization Case Study: FIVE

- ▶ **Compensatory Strategies:**
  - ▶ Teach Rules in Organization
  - ▶ Teach "It's Time to Listen" / Active Listening Strategies
  - ▶ Teach Meta-Memory Strategies
  - ▶ Teach Study and Test Taking Skills
  - ▶ Teach Note-taking and Outlining Skills

## Auditory Memory Activities

- ▶ Teach the ability to recall information
- ▶ Teach the ability to recall information in sequential order (more difficult)
  - ▶ Words, numbers, words (related and unrelated), letters, sentences, paragraphs

## Auditory Memory Activities

- ▶ Repeat numbers and words
  - ▶ forward and backward (facilitates working memory)
- ▶ Repeat sentences of increasing length and complexity
- ▶ Follow directions with increasing number of steps and complexity
- ▶ Sequence and paraphrase or interpret directions of increasing length and complexity
- ▶ Answer comprehension questions about sentences or short passages read to them

Do the above with immediate and delayed recall to increase short term and sustained memory

## Auditory Memory Activities

- ▶ Teach Compensatory Strategies
  - ▶ Provide immediate (short term) and delayed recall (sustained attention) for tasks
  - ▶ Provide visual cues and then remove them
  - ▶ Build on sequences just repeated (Jill.....Jill is a.....Jill is a cute.....Jill is a cute girl)
  - ▶ Teach Re-auditorization or Sub-vocalization
  - ▶ Teach chunking, memory pegs, chaining, use of rhythm (81927 becomes 819-27)

## Auditory Memory Activities

- ▶ Teach Compensatory Strategies

- ▶ Visualization and Imagery
  - ▶ See the picture in your mind
  - ▶ See the word or number in your mind
  - ▶ What color are the words or numbers
  - ▶ Sky write
  - ▶ Trace it on table or floor
  - ▶ Pretend to type it
  - ▶ Pretend to see yourself following the direction: make a movie in your mind

## Active Listening Strategy/SLANT

- ▶ S Sit up
- ▶ L Lean forward
- ▶ A Activate thinking and focus on topic
- ▶ N Note key information
- ▶ T Track the talker

Ellis (1991) SLANT a starter strategy

## What Have I Learned?

- ▶ I can define APD.
- ▶ I can name APD team members and describe their roles.
- ▶ I can describe the audiologic test battery and the auditory processes assessed.
- ▶ I can plan appropriate assessments to enhance goal writing and identification of weaknesses.
- ▶ I can identify Sub-Profiles of APD based on test findings and case history.
- ▶ I can recognize the appropriate classroom accommodations that are most appropriate for each Sub-Profile of APD.
- ▶ I can provide direct intervention that is most appropriate for each Sub-Profile of APD.
- ▶ I can recommend compensatory strategies that are most appropriate for each Sub-Profile of APD.

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