Auditory Processing Disorders: Diagnosis and Intervention

What is APD?
Who should be tested?
Why should a child be tested?
When should a child be tested?
Presenters

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What is Auditory Processing Deficits (APD): Bellis

- A problem or dysfunction in the central auditory system (CAS).
- An “input” disorder that affects the way auditory information is processed at a variety of levels of the CAS.
- Hearing, thinking and attention abilities are important variables—synergistic issues: positive and negative.
- Language and/or learning deficits may or may not have APD.
Auditory system: Simplified schematic

O Right temporal  X Left Temporal
Corpus Callosum

Afferent and Efferent Pathways

Auditory pathways of brainstem

Auditory nerve  Auditory nerve
Right Ear  Left Ear
APD test behaviors: Sharma et al

- Problems with sound localization and lateralization
- Problems with auditory discrimination, auditory pattern recognition, and temporal aspects of auditory information.
- Compromised comprehension with reduced verbal cues such as degraded speech and in the presence of competing auditory signals.
Computer analogies

- Child behaves as if always in “dial-up mode” but needing to learn in a “comcast environment”
- Child has difficulty “minimizing” information and “recalling” what was minimized---compromising multiple stepped instructions.
Potential Comorbidities of APD: Sharma et al.

- Heterogeneous group: diverse profiles related to diverse auditory weaknesses.
- Receptive and expressive language delay
- Reading disorders
- Written language disorders
APD Auditory Symptoms

- Difficulties listening in noise
- Difficulties with verbal comprehension regardless of listening environment
- Difficulties with phonetic analysis: decoding
- Difficulties recalling or sequencing auditory information
- Difficulties performing multi modal tasks involving auditory input
- Needs repetition of verbal instruction
- Delayed response to verbal instruction
- Tendency to “zone out” during verbal instruction
- Attention deficits may be a symptom of fatigue for lengthy auditory tasks; related to need to compensate.
Potential Effects of APD

- Spelling deficits—decoding, poor word attack skills
- Reliance upon sight vocabulary
- Reading deficits: phonetic weaknesses
- Reading and verbal comprehension deficits
- Poor written expression—maybe better verbal expression
- Difficulty writing notes from auditory instruction
- Difficulties with word math problems yet normal calculation skills.
- Difficulties interpreting social pragmatic cues of speech related to temporal cues and intonation patterns.
- Difficulties comprehending complex grammatical structures.
“Only a diagnostic central auditory evaluation conducted by an audiologist can diagnose an auditory processing deficit (APD)

Teri James Bellis, PhD.
When the Brain Can’t Hear”.

Audiologist’s role in processing testing

- Unique contribution of audiometric data
- Monitors maturation of central auditory system
- Determines neurological function
- Evaluates Auditory system in isolation from other sensory modalities
Who should be tested?

- Can the child participate in the APD test?—language, attention, peripheral hearing level
- Normative data: 5 years to adults on some subtests
- Abnormal teacher observations on CHAPS
- Age inappropriate reading skills
Why should a child be tested?

- To enhance educational management and/or verify concerns of Child Study Team
- To evaluate language and OT implications
- To delineate strategies in global problems
- To assess degree of listening deficit
  - "Listening is where hearing meets brain"...Douglas Beck PhD. Oticon Corp.
When should a child be tested for an APD problem?

- CST results indicate likelihood of an APD
- Lack of progress with existing placement/plan.
- Educational environment has changed.
- Concern regarding reading weaknesses.
- Evidence of Sensory Integration weaknesses
- Receptive and or Expressive Language problems
- Teacher Observations
- Reading deficits
Contribution of audiometric data

- Peripheral hearing loss: differential diagnosis
- Auditory neuropathy and APD: differential diagnosis
- APD: differential diagnosis of lower level processing vs higher level processing deficits
- Left hemisphere vs right hemisphere weaknesses
- Negative Synergy: auditory & cognition...Schum and Beck, June 2008 www.audiologyonline.com
- Auditory signal tested as isolated sensory function
Monitoring maturation of Auditory processing system

- Dichotic tests: SSW, dichotic digits, competing words, competing sentences
- Rt competing ear—left hemisphere function: usually dominant ear
- Lt competing ear—right hemisphere function: usually non dominant ear
- Normative data for asymmetry between ears
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Functional implications

- **left hemisphere dysfunction**—primary auditory cortex (abnormal right competing ear)—auditory decoding, phonetic analysis, phonemic manipulation
- **Right hemisphere dysfunction** (abnormal left competing ear)—comprehension problems, memory weaknesses, prosodic weaknesses, nonverbal learning weaknesses.
- **Significant asymmetry**—auditory integration weaknesses, slower processing speed, auditory visual integration.
- **Right hemisphere dominance**: neurologically based language deficit
Report qualitative observations

• Look for pattern between subtests
  ----task analysis similarities

• Analyze child’s behavior during testing especially if no pattern is noted
  ----seizure type behavior
  ----evidence of global development disorder or attention issues
Task analysis

- **Auditory input, verbal output: receptive, expressive**
  - SSW, filtered speech, auditory figure ground, competing words and sentences, dichotic digits, compressed speech, pitch pattern, phonemic synthesis
- **Language variable**— subtest dependent
- **Auditory motor**—auditory continuous test
- **Visual language**— rapid naming test
Deficit specific recommendations

listening, language, learning/academic, cognition

- Right hemispheric dysfunction: integration implications
- Left hemispheric dysfunction: decoding implications
- Prosodic deficits—temporal disorders
- Higher order language and organizational deficits: short term and working memory (auditory association areas and frontal lobe—executive function respectively)
Bottom up strategies

- Peripheral hearing losses, auditory decoding deficits: "audition matters more as cognition deficits become significant"...Douglas Beck PhD.---

- Audibility of conversational speech, phonetic skills, phonemic analysis, spelling.

- Treatment and therapy can habilitate
Top down strategies

• “Cognition matters more as Audition declines”…Douglas Beck PhD.

• Short term and working memory, comprehension, written expression, note taking strategies, use of contextual cues, internal and external visualization strategies, understanding multiple stepped instructions, multi staged problems and complex grammatical structures.

• Strategies enhance learning efficiencies
Integration processing weaknesses

- Significant asymmetry between ears: dichotic testing
- Balance and fine motor problems
- Processing of multiple sensory inputs
- Multi modal approach to learning needs definition
- Auditory visual integration problems and reading
- “dial-up response” behavior vs. “comcast” behavior
Enhance learning efficiencies

- Empowers student
- Reallocate learning resources
- Reduced fatigue and enhanced attention
- Reduce task anxiety
- Reduce negative synergy
Network with Fellow Professionals

• Language therapists
• Occupational therapists: sensory integration
• Learning specialists
• Reading specialists
• Educational Psychologists
TEAM APPROACH !!

GO TEAM
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Maegan Mapes AuD CCC-A

www.remaudiology.com
Bibliography

- Bellis, Teri James PhD, When the Brain can’t Hear, Atria books.