Direct Interventions for Language and Auditory Processing Disorders

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Training Metalinguistic Strategies
- Memory
- Non-Speech Cues, Rhythm and Stress

Training Language Processing
- Similes, Metaphors, Antonyms, Synonyms (H/O)
- Figurative Language (H/O)
- Cohesion: Inference (H/O and Power Point)

Training with Technology
TRAINING METALINGUISTIC STRATEGIES:
AUDITORY MEMORY
MEMORY

- Auditory Memory: Recall of auditory information in a variety of forms

- Auditory Memory: A Process (Gail Richards, 2001)
MEMORY: EFFECT ON ACADEMIC SUCCESS

• CHALLENGES:
  - RECALLING ACADEMIC MATERIAL
  - RECALLING SOCIAL INFORMATION
  - RECALLING SOUND-SYMBOL RELATIONSHIPS
  - USING WORKING MEMORY ON DEMAND
  - INTEGRATING NEW INFO WITH EXISTING INFO

(Lanter, 2005)
MEMORY: MODEL (Levine, 2002) AND IMPROVEMENT STRATEGIES

- SHORT TERM MEMORY
  - Brief retention, new info (released, forgotten)

  - Deficiencies:
    - Chunking info
    - Registering info quickly
    - Making attention and memory work together
MEMORY: ST, REMEDIATION

- START WITH VISUAL PATTERN
- VISUALIZATION: Charts, Graphs, Pictures
- CHUNKING AND REPETITION
- PARAPHRASING
- MNEMONIC:
  - ABBREVIATION (CEO)
  - ACROSTIC (KING PENGUINS CONGREGATE ON FROZEN GROUND SOMETIMES)
  - ACRONYM (HOMES)
MEMORY: ST, REMEDIATION
ACTIVITY: VISUALIZATION

Goal: Increase memory skills for a list/sequence of items and build confidence

Use velcro pictures or stickers:

• First person posts and names picture
• Next person adds a picture and names both
• Same person covers pics with paper and repeats sequence, pointing to general location
• Continue for each person’s turn until they can no longer repeat
• Younger children, 6 items; age 10 and above, up to 16 items
MEMORY: ST, REMEDIATION

ACTIVITY: CHUNKING

• 1950s George Miller study, “Magical Number 7, Plus or Minus Two”

• Chunking: Dividing a large group of words, numbers, or items into smaller, related units

• No right or wrong way
MEMORY: CHUNKING

Example: Phone Number: 5816647
Example: Grocery List: 3 Breakfasts

Eggs
Flour
Milk
Bacon
Baking Flour
Butter
Syrup
Cereal
Blueberries
MEMORY: CHUNKING

Sequence with pause
Rhyme
Space: Touch knee, nose, foot ear =
     Touch ear, nose knee, foot
Category
Alphabet
ACTIVE, WORKING MEMORY

- Info you need to complete a task
- Requires linking old skills to new system

**Deficits:**

- Cannot remember information just read
- Cannot hold onto parts of task long enough to completion
- Cannot bind parts of memory together
ACTIVE, WORKING MEMORY: REMEDIATION

- Identify main points while listening; underline while reading
- Review main points at appropriate breaks
- Identify key words and ideas in commands, auditory, written passages
- See handouts
LONG TERM MEMORY

• The Warehouse for preserving knowledge, skills, life experiences

**Deficits:**

• Cannot file information as pairs
• Difficulty following procedures
• Inability to remember rules as patterns
  – (including letter-sound correspondence)
LONG TERM MEMORY: REMEDIATION

• Linking (Setting Light Cues)
• Physically Rehearsing (Learning to Parallel Park)
• Writing Information Down
• Drawing Diagrams, Charts, Graphs
• Repeated exposure to memory tasks
  – See Handouts
TRAINING METALINGUISTIC STRATEGIES:

Non-Speech Acoustical Cues
The Medium is the Message

- **BLINK**: Malcolm Gladwell:
  
  - 93% of a Message is delivered via the nonverbal;
  
  - 7% is delivered via the word choice
METALINGUISTICS: NON-SPEECH CUES

• Metalinguistics:
  - The ability to reflect on language objectively
  - The ability to recognize the rules of humor, multi-meaning words, ambiguity, figurative language (simile, metaphor)
  - The ability to change meaning of a message presented, in conversation, or in reading out loud, with the use of non-speech cues
  - Ultimately, the ability to segment words into syllables and sounds and to read
METALINGUISTICS: NON-SPEECH CUES

• Children Who Lack Skills: GET IN TROUBLE:
  – May have poor musical ability
  – May have little or no expressive affect
  – May have difficulty perceiving expressive affect in others
    May misunderstand or confuse humor vs. sarcasm, a question vs. a statement or command, etc.

ALL CRITICAL, PROSODIC CUES THAT KEEP US SOCIA LLY APPROPRIATE
NON-SPEECH CUE: PROSODY

• Rhythm
• Stress
• Intonation

All show:

Emotional State

Intent: Statement, Command, Question

Mood: Ironic, Sarcastic, Sympathetic, Etc.
PROSODY COMPONENT: RHYTHM

The perceived regularity of prominent units in speech

One option: Begin with Music Activities (handouts)

Work heavily with:

PAUSE
NON-SPEECH CUE:  RYHTHM: PAUSE

3 Reasons for Pause:
Calls importance to word, phrase
Gives receiver time for thought
Gains back lost attention
NON-SPEECH CUE: RHYTHM: PAUSE

Activities to Encourage Pause:

• Discrimination: Raise hand
• Mark Script with hash mark: Gradually fade script marks (Demo)
• Practice with ambiguous sentences where pause placement changes meaning
Dear John:

I want a man who knows what love is all about you are generous kind thoughtful people who are not like you admit to being useless and inferior you have ruined me for other men I yearn for you I have no feelings whatsoever when we’re apart I can be forever happy will you let me be yours

Gloria
NON-SPEECH CUE: STRESS

• To “punch up” or emphasize a syllable, key word, or phrase to relay meaning
• Use of stress clarifies what could be an ambiguous sentence
• Technique: Increase pitch and intensity (loudness)

“I’ve told you THREE TIMES to clean your room.”
NON-SPEECH CUE: STRESS

Order of Activities:

Discrimination, then Demonstration, of appropriate stress for meaning in:

Syllable

Word Pairs

Word in Phrase

Word in Sentence
Training Language Processing

- **Cohesion**: Links that hold the text together: Sentences or clauses CONNECT via grammar (As, And so, Therefore) or via word meaning/semantics
- **Inference**: A cohesive skill: Drawing a conclusion based on evidence
Inference

• A complex skill important to life

• Differential:
  - Observation: What I see
  - Inference: What I figure out
    • Cartoon
Beers’ Types of Inferences

• Pronoun antecedent
  • We just got a new puppy. THAT ball of energy is taking over our lives.

• Meaning of unknown word from context

• Understanding Intonation

• Identifying a character’s beliefs/motivation

• Identifying character relationships (H. Lecter and Clarice)
Beers’ Types of Inference

- Understanding a person’s view of the world
- Recognizing bias
- Relating what happened in the text/film/meeting to our own world knowledge
- Highest Order: Coming to a conclusion by combining clues with our own background knowledge
How to Teach Inference

- www.havefunteaching.com
- YouTube: The film Snap: No Dialogue
- Novels: The Stranger: Van Allsburg
- Comics: Eliminate speech bubbles
- Aesop’s Fables: Online: Eliminate Moral
- Guess the Definition from context
How to Teach Inference

• Visual Puns
  - Doctor + Doctor
  - Shcryame

Poetry

KIS Strategy: Key Words, Infer, Support:
  Underline key words in text
  Make inferences using words or facts
  List background knowledge used to support answers
How to Teach Inference

• Minute Mysteries

• Wordless Books: The Ocean, E. Condra
Using Technology to Teach

• The IPAD
  – ASHA: No Position Statement
  – What It Can Do:
    • Email
    • Internet
    • Movie Player
    • Music Player
    • E Book Reader
    • WORD: Virtual Keyboard
IPAD

• APPS: 150,000 Topics
• Advantages to Kids and Adults:
  – No mouse
  – Lightweight 1.5 lbs.
  – 10 Hour Battery
• Special Ed Apps
• Speech/Language Apps
  – PDD/Autism
  – Fluency
  – Articulation
  – Language
  – Pragmatics
IPAD APPS

- Signing
- ABA
- AAC
- Some designed by SLPs
- DEMO
Ipad Apps for Processing

• Tappy Tunes or Glee:
  - For Intonation, Pause, Rhythm
  - Language and Music: Highly Related
    • Tones and Words
    • Create organized sequences
    • Rich rhythm and melodic structure
    • Syntactic Systems! (Order)
IPAD Apps for Processing

• Tappy Tunes or Glee
• Martha: Temporal dynamics of brain activity during AP
• As a listener hears a melody, brain activity evolves
• Person better organizes all incoming, auditory information
IPAD Apps for Processing

- If I understand melody and timing in music, I better understand the same in auditory information and then the same in Reading
- Notes = syllables
- Understanding syllables = better Reading and Spelling
Who Does What?

- Roles of each team member
- Evidenced-Based Practice in APD treatment

Assistive Listening Devices

- As an environmental modification
- As a treatment tool

Auditory Training Programs

- Speech processing in quiet and in noise
- Interhemispheric Transfer
- Dichotic Listening Programs (Audiologists)
Information processing is the change (processing) of information in any manner detectable by an observer. – Wikipedia, the free encyclopedia
The Interdisciplinary Processing Team

Audiology
Speech-Language Pathology
Occupational Therapy
Psychology
Optometry
Central Auditory Processing Disorders
Central Auditory Processing Disorders/ Auditory Processing Disorders

The ability to hear the message accurately.
Auditory processing disorder (APD) is broadly defined as a deficit in the processing of information that is specific to the auditory modality. It may be associated with difficulties in listening, speech understanding, language development and learning. In its pure form, however, it is conceptualized as a deficit in the processing of auditory input.

» (Consensus Conference, 2000)
Non-modality-specific cognitive processing and language problems may manifest themselves in auditory tasks (i.e., as listening problems); however, diagnosis of (C)APD requires demonstration of a deficit in the neural processing of auditory stimuli that is not due to higher order language, cognitive, or related factors.

Behavioral Characteristics

• Family or teachers are concerned about child’s hearing
• Poor reading and/or spelling skills
• Child often mishears information (i.e. “hot” for “hop”)
• Difficulty hearing in noisy environments
• Parents most common complaint: Their child just doesn’t seem to “get it”
Role of Audiologist

- Manage and coordinate the transdisciplinary team effort
- Assess the status of the peripheral auditory system prior to any diagnostic CAP testing
- Design the specific audiologic test battery and conduct appropriate testing
  - Can control the environment
  - Can control test stimuli
  - Expert in the area of hearing and listening
Referral Criteria

• Must have normal peripheral hearing sensitivity
• Children who are at least 7 to 8 years of age
• Children must be able to understand language and be able to communicate orally
Referral Criteria

- Children with a significant speech articulation disorder are **NOT** good candidates - children must have intelligible speech
- Must be able to tolerate wearing headphones for at least one hour
- English must be primary language
Test Protocol

- History (medical, educational and behavioral)
- Routine hearing test (pure-tones, tympanometry, acoustic reflexes)
- Series of central auditory processing tests (auditory figure-ground, dichotic listening, auditory closure, temporal testing, phonemic awareness)
- Counseling and recommendations
Goals of the Audiologic Evaluation

- Identification of presence or absence of CAPD
- Identification/description of dysfunctional processes (dichotic listening, auditory decoding, temporal processing)
- Development of management strategies
Speech-Language Pathology

A **Language Processing Disorder** refers to the child’s ability to **understand the message**.
Behavioral Characteristics

- Problems with following directions
- Problems understanding stories or basic concepts
- Trouble “getting to the point” or answering questions with the appropriate information
Behavioral Characteristics

• Difficulty naming objects or people
• Difficulty knowing what to expect based on information they are given

The child may:

• Use slow or “choppy speech”
• Avoid talking
Behavioral Characteristics

The child may:

• Speak in a monotone voice or speak too loud
• Mispronounce words that sound the same
• Use hands or body language when talking
• Avoid reading books
Role of Speech-Language Pathologist

- Diagnoses written, reading, and verbal language processing and can SCREEN for APD referral to audiology
Assessment

• Children of all ages can be tested.
• The assessment will take between 1-2 hours. It will evaluate the child’s ability to understand what is spoken to and read to them and their ability to speak.
Treatment Goals Designed to Address Functional Outcomes

• To achieve a child’s maximum potential in deficit areas
Evidenced-based Practice in the diagnosis and treatment of APD (Moncrieff, Sept. 2007 in Hearing and Hearing Disorders, Research and Diagnostics)

• The principles of EBP are defined as “the conscientious, explicit and judicious use of current best evidence in making treatment decisions” and involves “integrating indiv. clinical expertise with the best available external clinical evidence from systematic research” (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996, p. 71)
Evidenced-based Practice in the diagnosis and treatment of APD
(Moncrieff, Sept. 2007, cont)

• ASHA charges practitioners to consider evidence from 3 primary sources: presenting complaints from the individual, opinions of expert authorities, and high quality peer-reviewed research (2005).

• “The major change that EBP now demands is that patient perspective and the opinions of authorities be considered ONLY against the background of high quality, rigorous scientific studies (Moncrief, 2007; Dollaghan, 2004)
• The Joint Coordinating Committee on Evidenced-Based Practice (EBP) of ASHA states that audiologists and SLP’s MUST incorporate the principles of EBP into their clinical practices to provide the highest quality care of all individuals.
Evidenced-based Practice
(from: Differential Processing Training Program, by Kerry Winget)

Skills
- Auditory Processing
- Listening

Ages
- 6 through 12

Grades
- 1 through 7

Evidence-Based Practice

According to the American Speech-Language-Hearing Association Technical Report on Central Auditory Processing Disorders (www.asha.org/members, 2005), the Clinical Guidelines of the Royal College of Speech & Language Therapists (www.rcslt.org/ resources, 2005), and research conducted by Chernek and Musiek (2002), the following therapy principles are supported:

- The ability to process sounds, to discriminate them accurately, and to interpret them correctly are critical skills for speech and language development.

- Intervention for auditory processing disorders using direct skills remediation and auditory training should incorporate a bottom-up (auditory signal and auditory training) approach.

- Auditory training activities should include acoustically controlled tasks of sound intensity, frequency and duration discrimination, as well as sound pattern recognition and sound localization.

- Recognition of auditory information in background noise simulates functional listening requirements in the classroom, community, and home environments.

The exercises in this book incorporate the above principles and are also based on expert professional practice.
Sensory Processing
Sensory Processing

(also referred to as sensory integration)

-The way in which the nervous system receives information from the senses and turns it into appropriate motor and behavioral responses

(Miller, 2009)

*hearing, vision, taste, touch and movement*
Sensory Processing Disorder (SPD)

- Exists when sensory signals are not accurately received and organized into appropriate responses

- A person with SPD has difficulty taking in, organizing, and acting upon information received through his/her senses. As a result, he experiences challenges in performing functional daily tasks and with assumption of typical life roles.
Behavioral Characteristics

• Poor coordination

• Difficulty with routine activities

• Short attention span, difficulty focusing

• Constant movement, cannot sit or stand still

• Does not like to be touched

• Poor reaction to sound

• Does not like to be in places with a lot of activity or noise
Role of Occupational Therapist

- Participate in the transdisciplinary team effort

- Evaluate the individual’s current level of functioning related to occupational roles and task performance

- Design and implement an individualized treatment plan to improve sensory processing in order to maximize participation in appropriate roles and typical daily tasks
Referral Criteria

• Persons of all ages – infant through adult

• Experiences difficulty processing sensation impacting:
  – interaction with others
  – completion of daily tasks
  – the ability to assume appropriate roles within typical environments
Evaluation Process

• History (medical, developmental, educational and behavioral)

• Clinical observation and completion of standardized and non-standardized assessment tools to determine which senses are affected and how significantly function is impacted

• Recommendations for establishment of ongoing services as appropriate
Functional Outcomes of Intervention

To improve sensory processing in order to:

- remediate inappropriate responses or challenging behaviors
- compensate for challenges that continue to impact functional task completion and limit role participation
- make environmental modifications that facilitate successful living
Pediatric Neuropsychology
Background

• Neuropsychology
  – Study of brain-behavior relationships
  – Functional neuroanatomy, and how to assess

• Pediatric neuropsychology
  – 2 year full time post-doc

• Services available
  – About 20 in Ohio, half in Cincinnati (Ala Ris)

• Beware the weekend workshopper
Typical Evaluation Format

• 1-hour parent intake interview
• 3-hour testing session
• 2-hour testing session
• 1-hour parent feedback
• School visit, when feasible
Typical Components

- Omnibus measures, typically IQ
- Adaptive behavior (critical in MR)
- Visuospatial/visuoconstructualional fx.
- Visual memory functioning
- Motor functioning
- Sensory functioning (left parietal tests)
Attention Assessment

- A critical rule-out diagnosis
- BASC a great tool, easy, cheap
- Psychomotor assessment (most sensitive)
- Divided attention (sensitive)
- Sustained attention (sensitive)
- Teacher and parent report
- Behavioral observation
- Focused attention (not very sensitive)
Language Assessment

- Verbal IQ
- Woodcock-Johnson Academic Achieve.
- Verbal fluency
- Verbal memory (WRAML, TOMAL, CVLT)
- CELF-4
- Gray Oral Reading Test
- NEPSY
- Parent and teacher reports
Other Procedures

- Parent Stress Inventory
- MMPI-A
- Category and/or Wisconsin Cards
- Mini International Neuropsychiatric Interview
- Malingering tests (rare with kids)
Visual Processing
Visual Information Processing

• A group of visual cognitive skills used for extracting and organizing visual information from the environment and for integrating this information with other sensory modalities and higher cognitive functions
Chief Complaint

• Patient (Child) has problems reading
• Problems in school
• Need SPECIFIC information regarding what types of difficulties patient is having
Symptoms - Asthenopia

- Headaches
- Double vision
- Blurry vision
- Words move on the page
- Problems copying from the board
- Get tired when reading/near work
- Head turn/tilt
Signs/symptoms

• Reverses letters
• Writes right to left
• Misspells words
• Confuses words with similar beginnings or endings (e.g. then and them)
• Problems identifying letters/numbers/words
• Better oral than written responses
Signs/Symptoms

- Difficulty in finding specific item on a page full of information/scantron
- Difficulty recognizing a word in a paragraph vs. alone
- Difficulty in remembering what was read
- Problems learning alphabet/multiplication tables
- Spelling errors
Role of the Optometrist

• To determine if there are any visual efficiency problems present (primary examination)
  – The input of the visual system
• To determine if visual processing problems are present (secondary examination)
• To coordinate referrals among specialists
Referral Criteria

- With suspected vision problems should have a comprehensive eye examination
- Does not need to know letters
- Generally ages 3 – 18
  - Most common ages 5-10 (grades K-5)
  - Can have symptoms in older children (to 16)
- No language requirements for initial exam
Test Protocol

- Initial Optometric Evaluation
  - Comprehensive history (ocular, developmental, learning)
  - Assess visual acuity and refractive error (e.g. need for glasses)
  - Assess binocular skills (eye teaming) and accommodation (focusing)
  - Assess eye tracking
  - Rule out organic causes
Subsequent evaluation

• Visual Processing Evaluation
  – Test battery

• Recommendations and referrals
Goals of the optometric exam

• Treat a visual efficiency problem if present
  – Lenses, prisms, vision therapy (orthoptics)

• Treat a visual processing problem if present
  – Therapy, modifications

• Referral for additional treatment/testing if needed
  – Audiological, Psychological (IQ), OT, Reading Specialist
• ASSISTIVE LISTENING DEVICES
Assistive Listening Device (ALD)/ FM System options

• Sound Field FM System

• Toteable FM System

• Personal In the Ear device
General Assistive Listening Device information

• Source: National Public Website on Assistive Technology:
  http://www.assistivetechn.net/at_reports/assistive_listening_devices.php

TWO companies that provide reliable ALD devices include Phonak & Oticon
Sound Field FM Systems

• The teacher wears an amplifier/transmitter & the signal is transmitted by speakers placed on each wall or in ceiling panels of the classroom. Research has found that overall classroom performance increases, but most of these systems do not increase the clarity of the primary signal, and depending upon the quality of the system, may amplify all acoustic input, making the listening environment for a child with auditory figure ground difficulties unbearable.
Sound Field FM Amplification
(speaker’s mounted on the walls or within the ceiling panels)

- Amplifies the speaker’s voice by approximately 8 – 10 dB, improving the sound-to-noise ratio of the listening environment.
- Provides uniform amplification throughout the classroom regardless of the position of the teacher or students.
- The positive impact of a sound field FM system on the academic performance of a student with an auditory figure ground deficit however, depends on:
  a) the severity of the deficit to extract a primary message from the background noise (which has not been alleviated), and
  b) The QUALITY of the system to extract/amplify only the speaker’s voice over the classroom’s ambient noise (e.g. if the system operates by amplifying ALL acoustic signals received, it will amplify not only the speaker’s voice, but the classroom noise, making the listening environment louder and more distracting than ever!)
Toteable FM System

- Teacher (or therapist) wears the amplifier/transmitter, while student has the speaker on their desk.

- Works well for grades 1 – 3, especially if desk formations are grouped because everyone in it’s proximity will benefit

- Is not typically successful for grades 4 and above, due to student’s concern of “standing out” amongst their peers

- Can be “shared” between classrooms/students

- Improved eye contact, attending skills
- Improved speech perception
- Reduction of figure-ground listening difficulties
- Reduction of listener fatigue
- Reduction of teacher stress & vocal straining
The TYPE of FM system is typically recommended by the audiologist

- Due to fiscal restraints, a school district will often purchase a toteable device under the premise that it can meet the needs of several students, however, the age level is an important consideration, as is the continuity of a clear acoustic signal throughout a child’s academic day. Providing clear and precise auditory information for some classes and not others may result in a child exhibiting anxiety or decreased attention to the teacher’s voice when the message is degraded. That circumstance could be legally dangerous for the school district if they are not providing “equal access to education” as PL 42-140 demands.
- A district’s purchase of a toteable FM system intended for use with multiple older elementary level students is likely to be a poor fiscal decision if the device is not effectively used.
Several newly developed treatment programs for children presenting poor dichotic listening skills are currently being investigated, holding the promise of evidenced-based treatment options of the future.

- Dichotic listening training (Bellis, 2003)
- Dichotic Listening ??? (Moncrief, under current development/data collection)
- Moore (2007) ???
- Differential Processing Training Program (Kerry Winget, Linguisystems 2007) ACOUSTIC TASKS: Dichotic Listening,
  
- Finally, using a unilateral “in the ear” ALD the primary message in better ear, then background noise directly to the poorer ear
Supporting documentation for a child with an APD re: obtaining an ALD or SLP service provision

- The New Americans with Disabilities Amendments Act (ADAA) passed by Congress on 9/24/08, which took effect on January 1, 2009:
  - Intention to return the law to what was originally intended by the ADA passed in 1990.
  - ADAA defines “disability” in favor of broad coverage to avoid the narrower interpretations made by the U.S. Supreme Court in cases since 1990 that often focused on the person meeting the criteria of the disability rather than current focus which is the RIGHT to access or accommodations
  - See ASHA Leader, Dec. 16, 2008 pg 4 for greater detail
Auditory Training in Quiet vs. Noise
Auditory Training in QUIET
80% accuracy

• Detection
• Discrimination
• Vigilance
• Use of Minimal Pairs
Temporal Gap Detection: leads to identification of pauses in conversation and text

- Ask the child to detect brief gaps inserted within brief bursts of white noise which are progressively shortened approaching criterion of 1 - 5 msec of gap detection.
- Use audiometer or even a child’s electronic keyboard for stimulus presentation
- Can use tape recorded samples or present live, realizing the poor temporal validity
SOUND DISCRIMINATION

(whether 2 stimuli are same/different)

FREQUENCY DIFFERENCES

• Discern pitch differences (pure tones from audiometer to begin)
• Use available programs (Away We Go offers animal sounds, pitches, Earobics for vowel discrim.: Using Farmer Fardell), Fast Forward, Computerized Speech Lab)
DI SCRI MI NATION (cont.)

- Tone Glide Discrimination
  - Determine the upward or downward direction of a fundamental frequency sweep for tone bursts of a few msecs.
  - Initially, the clinician can simply whistle sweeps or use *Away We Go!* (Martha) Or FF, but as accuracy improves, will need more valid stimuli from audiologist
DISCRIMINATION (continued)

• Temporal tone order discrimination
  - tones with long & short durations, presented with audiometer or keyboard
  - listener task is to discriminate tone order
    • e.g. High - low - low
    • child can use colored poker chips or stacks of Leggos to represent the High vs. low tones, which removes verbal components from the task
Pitch Discrimination Therapy
Example
Vigilance
(sustained attention)

• Listener required to sustain attention to a continuous stream of auditory stimuli (such as environmental sounds, syllables, or words) and respond (e.g. raising hand or tapping table) when a particular target stimulus is heard. Computerized example is Earobics 2 Hippo Hoops (guest) for vowel vigilance.

• Failure to detect = inattention

• False positives = impulsivity
Auditory Training of Minimal Pairs
(Christine Sloan)

Discrimination of minimal syllable pairs of stop-consonants and fricatives consonants and short vowels (to reduce temporal cues in aiding consonant discrimination)

voicing pairs; p/b, t/d, k/g; f/v, s/z

- place discrim. Pairs; t/k, p/t, p/k, b/d, b/g, d/g; s/sh, z/v, sh/ch,
Sloan discrimination tasks continued

Therapy progression includes:

- sound in syllables
- minimal pair WORDS
- minimal pair contrasts of words embedded in sentences
Computerized minimal pairs

• **Away We Go!: Dog Deals the Deck** (guest)

• Can do this with your own minimal pair cards made using Boardmaker, using Sloan’s suggested hierarchy of phonemes (typically strident and voicing errors are most common, as they provide less visual cues to the listener).
Auditory Training in BACKGROUND NOISE
Auditory Training (sound field); Targets in Noise

- Identification of pictures of rhyming words or Earobics 1 Bog Frog
- Identification of minimal pairs (e.g. refer to C. Sloan’s hierarchy if clinician presents at table, or Earobics 1, Farmer Fardell)
- Identification of sentence accuracy: foils include key word errors of 1 phoneme (i.e. “The word “top” begins with a D” or John’s key fell off his cheecane”)

Cincinnati Children’s
change the outcome™
Vary the tasks when training in noise

- Recall of a series of multi-syllabic words
- Following complex directions: either with increased number of attributes (Thinkin’ Things I) or grammatical constructs (e.g. subordinate clauses) as in the CELF-3, or following complex directions (I Spy computer games: Fantasy)
Background Noise Hierarchy

(refer to handout)

• Progression of background noise presented in sound field could include:
  – white noise (turn radio between stations)
  – non-lyrical music (jazz or classical)
  – lyrical music
    • 1. child does not recognize/know/like
    • 2. child KNOWS words or likes
  – competing conversation
    • 1. radio talk shows or T.V. shows of no interest
    • 2. radio talk shows or T.V. show of GREAT interest
Background noise maker
Sound Level Meter (Radio Shack; $60)
Environmental Modifications

Signal to Noise Ratios (from Geffner, ASHA Schools Conference, 2005)

- Adults need at least a +6 dB signal-to-noise ratio for maximum communication

- Children with normal hearing acuity require a +10 dB signal-to-noise ratio (Crandell & Smaldino, 2004)

- Children with “high risk” listening conditions require +12 to 20 dB s/n ratio

[Image 490x36 to 576x756]
Therapy materials with pre-made stimuli

- Earobics 2 Firefly: but student must progress through levels in quiet first
- Linguisystems: The Central Auditory Processing Kit
- Differential Processing Program
- Phenomenon from Dr. Brown (developed in the U.K.)
I Pad or I Pod Apps

• Signal/noise ratio
  - App by Tmsoft
  - Provides ambient sounds of the environment & “crowded room”
  - Available for download on: iTunes for IPhone, IPad and IPod Touch, Blackberry, Windows Mobile phone, Android, Palm WebOS
  - Can control pitch and loudness (so also can use as a discrimination task of when it changes)
Signal/noise ratio App

• “crowded room” used to create a competing signal
• Filter out ground noise
• Overlay on top of podcasts, audiobooks for a Dichotic Listening Task
• Can be on timed intervals
• Provides tasks to identify pitch changes when they occur to use as discrimination task
Treatment programs for Phonological awareness skills can be used as part of auditory training stimuli.
Clinician presented phonological awareness programs

• Phonological Awareness Kit (Robertson & Salter)

• Lindamood Auditory Conceptualization – 3 program (for students through 21 years of age: addresses multi-syllabic, complex syllable + phoneme manipulations of non-sense words + phoneme manipulations of non-sense words i.e. phoneme change= intrepable to inFLApable or syllable change = contiveness to conPLAYtiveness)

• Christine Sloan’s or LiPS program
Computer-based phonological awareness programs

- Earobics 1, 2 or Adolescent versions
- Differential Processing Program
- Phonemic Synthesis program (Jack Katz)
- Goldman-Fristoe-Woodcock Auditory Conceptualization series
- Brain Train
Interhemispheric Transfer
Interhemispheric Transfer
What it is...

• Difficulty transferring information from the spatial area of the brain to the language area of the brain and a weakness in integrating and separating information presented to each side simultaneously.

• Difficulty bringing information together, such as sound symbol association or a connection between emotional affect and speech.
What it looks like…

- **Key day-to-day behaviors.**
- trouble knowing "how to" do some task
- tends to "watch and wait"
- poor starter, poor transitions, needs more time
- lots of "I don't know," "I don't get it" or "I have no idea”
- Variable trouble in noise
- Variable impact on communication
- Academic effects in reading recognition, spelling, writing skills, other integrative tasks
Treatment for Interhemispheric Transfer

Treatment and management goals are typically accomplished through three component approaches that are employed concurrently:

- direct skills remediation
- compensatory strategies
- environmental modifications
  - ASHA, 2005
Interhemispheric Transfer
(for binaural integration)

• Name objects out of sight by touch of the left hand and describe their attributes.

• Draw a picture using your left hand (of limited complexity) and describe WHILE drawing: can use matching pictures or build memory by following directions.
• Execute verbal directions presented in LE via FM system, with left side of body (tap your hand on your knee, jump on L foot, snap L fingers, etc.)
Interhemispheric Transfer of more complex information

- Have the child listen to a chapter of a book on tape or CD, using ear bud “headphones” so that the auditory information is presented ONLY to the weaker ear. The clinician or parent can listen to the passage using the other ear bud, to insure knowledge of the chapter’s content.

- The elementary school-aged child can then be asked to summarize the chapter, while the younger child or language-impaired child would answer questions about the content.

- Do this each therapy session, AND at least 3 – 4 times at home (limit to 10 – 15 minutes maximum)
Literactive.com (reading material for preschool, kindergarten and grade 1 students available on-line)
Guided Reading: numerous choices of age appropriate books read aloud
Ear Protector example
Ear Protectors (slightly enlarged)
Treatment for Interhemispheric Transfer

Exercises are important additions to auditory training programs because Transfer:
Underlies binaural hearing and binaural processing

Therapy can involve both unimodal
(understanding the relationship between prosody and acoustic features) and multimodal
(writing to dictation; verbally describing a picture while drawing)

ASHA, 2005
Direct Remediation*

- Interhemispheric activities
- Dichotic Listening Training
- Localization Training
  - Bellis, Teri 2006
What to work on...

Interhemispheric activities:

- **Verbal to Motor transfers**: Find a specific object with left hand from a grab bag (you describe it, they find it)
- **Motor to verbal transfer**: Find object with their left hand and verbally describe it (shape, texture, etc.)
- **Music therapy**: Coordination of both hands (ex. Piano, guitar)
- **Singing**: Linguistic output (left-side) and melodic expression (right-side)
- **Drawing**: Describing the picture as they draw
Ways to work on it...

**Recommended games/activities:**

- **Verbal to Motor transfers**
  - Feely bag (ex. Ned’s head)
  - Twister
  - Battleship
  - Brain Warp

- **Motor to verbal transfer**
  - Feely bag (ex. Ned’s Head)
  - Blind Man’s Bluff
  - Obstacle Course
Ways to work on it…

• **Music therapy**
  - Name that tune
  - Bop-it

• **Singing**
  - Piano lessons
  - Karaoke

• **Drawing**
  - Coloring book
  - Version of Pictionary
Treatment Programs for Dichotic Listening
Deficits in Dichotic Listening will be determined by the audiology assessment to determine weaker/stronger ear

- Dichotic Listening involves the processing of different information presented in each ear simultaneously (i.e. digits, rhyme. CV’s, Staggered Spondaic Words (SSW), Competing Sentences, etc.). The listener is asked to repeat the words heard, identify whether they are the same/different, or only repeat the stimuli heard in a specified ear.
Task Definitions

• Binaural Integration – recall of both the left and right ear stimuli

• Binaural Separation – recall of stimulus from only one ear while ignoring stimulus in the other ear

• Dichotic skills are less developed in preschoolers because they can’t determine which stimulus is more important, however they can be trained to do so (J. Ferre & G. Richards, 2010 ASHA Convention presentation)
Goal of Dichotic Listening Programs

• To bring the LE performance up to the normal range, while retaining the good right ear performance.
Dichotic Interaural Intensity Difference (DIID) training program (developed by Frank Musiek)

- An auditory rehabilitation program that improves dichotic listening skills by presenting a sound in one ear at a quieter level than the other ear.

- Its premise is based upon brain plasticity, and neuromaturation of the auditory system that results in slower processing of stimulus presented to the LE vs. RE (a pattern evident until approximately 12
DIID cont.

• It’s premise is based upon brain plasticity, and neuromaturation of the auditory system that results in slower processing of stimulus presented to the LE vs. RE (a pattern evident until approximately 12 years of age, or in individuals with a lesion of the corpus collosum)
Protocol for the DIID program

• Purpose: strengthen the weaker neural connections under progressively more challenging listening conditions.

• Protocol: to reduce the amount that the weaker connections are suppressed by the stronger connections, the presentation level in the better ear is decreased until the left ear performs normally, then the presentation level in the better ear is gradually increased over time.
DIID Program

• Program is typically conducted by an audiologist due to program specifications of determining “crossover” point of the brain’s processing of stimulus in each ear & the progressive nature of stimulus intensity level increases. Dr. Musiek states that a laptop could be substituted for a 2-channel audiometer, since it can be calibrated and present a stereo signal.
DIID program specs

- Typical formal training schedule in the clinic is 15 – 30 minutes per appointment, 3 – 4 times a week. # of weeks is strictly patient dependent.
DHD supplemental home programming

- Through either a portable audio device that can balance the left and right stereo channels to create the same levels heard in the clinic, so that the stronger signal is directed toward the weaker ear OR
- Use a laptop in the same manner, since most operating systems allow the use to adjust the output balance, instructing the patient to “modify the balance until the stimulus becomes just easy enough to understand in the poorer ear without removing the better ear stimulus entirely.”
Another home program binaural separation task to supplement the DIID program

• 20 min. session: Listen to a word list or story through a CD player with earbud earphone in weaker ear, while playing background noise of a radio or TV talk show heard by the other ear. Adjust the intensity level of the CD player until the performance of repeating the words or paraphrasing the content of the paragraph (while story is place on “pause”) is 70 – 80%. 
For the rascally parents that will never get to the library to obtain the materials to complete the home program……..

Or the SLP who has NO time to do the same for therapy training sake…..
Recommendations for dichotic listening tasks at home

• Have the child listen to a chapter of a book on tape or CD, using ear bud “headphones” so that the auditory information is presented ONLY to the weaker ear. The clinician or parent can listen to the passage using the other ear bud, to insure knowledge of the chapter’s content.

• Materials can be obtained through the family’s public library or checked out through the school’s library.

• Books should be chosen by the CHILD re: topic and interest level, but content level (NOT reading level) should match the child’s comprehension level.
Dichotic Listening home program suggestions continued

- For younger, or language-impaired children, the associated pictures from the book may be shown during simultaneous listening (with the text covered by a piece of paper or post-it note) to facilitate attention and comprehension.
Dichotic Listening home program suggestions continued

- Preschoolers, language-impaired elementary students, or children with a dual diagnosis of ADHD, may require the following presentation progression:
  - Primary message presented via earbud in weaker ear while stronger ear is occluded by ear protector or pillow child is laying upon
  - Primary message presented in weaker ear while stronger ear is exposed to typical household noise from other rooms
  - Primary message presented in weaker ear while stronger ear is exposed to competing message within the same room (i.e. talk show on radio or T.V.)
Dichotic Listening home program cont.

- The elementary school-aged child can then be asked to summarize the chapter, while the younger child or language-impaired child would answer questions about the content, similar to prompts when book reading.

- Adjust timing of prompts to the child’s attention/retention level (i.e. preschoolers require 1 Q per page, while 1st graders can respond to 1 Q per 3 pages, etc.).
Excellent website for computerized games, sorted by age or topic.
Portaportal.com “Games for K”

For Fine Motor Skills

- Aven's Corner
- Mix Match
- Seaside Stickers
- Oschy
- Decorate the Dollhouse
- Billy Bear Stickers
- Keyboard-o-Rama
- Dressing Lechy
- Lechy's Friends
- Dress the Teddy
- Break Out
- Making Faces
- Meddybemp's Ghost Walk
- Sticker Shapes
- Pick a Duck
- Crickweb
Sorts by topic: music, shapes, language, sorting, etc.

<table>
<thead>
<tr>
<th>Music &amp; Other Stuff</th>
<th>Shapes, Colors, Patterns, &amp; Art</th>
<th>ABCs &amp; Language</th>
<th>Numbers, Sorting, &amp; Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>DoodlePad</td>
<td>FisherPrice</td>
<td>Starfall</td>
<td>Count Your Chickens</td>
</tr>
<tr>
<td>Meddybemp's Easter</td>
<td>Fish Price Games</td>
<td></td>
<td>Number Train</td>
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<tr>
<td>UFO Game</td>
<td>Crawford the Cat</td>
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<td>Mister Elephant's Memory</td>
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<tr>
<td>Arthur Goes to School</td>
<td>Coloring Online</td>
<td></td>
<td>TimeWorks</td>
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<tr>
<td>The Kidz Page</td>
<td>Make a Monster</td>
<td></td>
<td>Hidden Numbers</td>
</tr>
</tbody>
</table>
Pete’s Powerpoint Station: sorts by age
Zoodles.com (games for K level)
Zoodles description (cont.)

A team of Stanford educated educational experts have filled Zoodles with engaging, playful activities—like puzzles, games and videos.

We keep adding new content so your child stays motivated to come back again and again to explore.

We customize the experience to your child

- We adapt our service to your child’s skills and learning style.
- It’s so easy that your child can play on their own—which gives them confidence.

We give parents the tools to guide and monitor their child’s progress

- Through our Parent Dashboard, you can shape and customize your child’s learning experience by customizing the sites, characters, and games they can play with.
- We provide you with regular progress reports that keep you up-to-date on your child’s activities.
- We allow you to focus your child’s educational activities in the areas you want. So you can focus your child’s time on the educational areas (like reading, math, science, etc.) that you want!

We ensure that all of our content is educational in nature.

SIGN UP FREE!
For the MAJOR rascally parent that will not “have the extra time” to complete the home program, given all their household demands

We completely understand, and have a completely convenient, “right now” alternative....
APD Therapy from the palm of your hand (from ASHA 2010 Convention: Donna Geffner & Bunnie Schuler)

- Mobile and pocket-size training can be:
  - Intensive, exploiting plasticity and cortical re-organization theories
  - Extensive, ever-changing
  - Maximizing generalization
  - Engaging format that provides generous feedback and reinforcement!
Research supports Mobile technology as a viable means to achieve comprehensive treatment programming

- **Bottom Up**: Direct skills remediation & Auditory training
- **Top-Down**: Compensatory Strategies (i.e. cognitive, metacognitive and lang. strategies)
- **Environmental Modifications**: signal/listening environment enhancements & classroom, social
Web-based

- Posit Science
  - Brain Games: Visual, Auditory,
  - Can use the website to trial and see if you want to purchase it