
APD AND RELATED DISORDERS
KAVITA KAUL

**DEBUNKING MYTHS AND PROMOTING
FACTS**

WHY TREAT EARLY?

AUDITORY SKILLS DEVELOPMENT EARLY IN LIFE

- Critical auditory skills develop early in utero
- Development of the inner ear is mainly in the first trimester and mature by the 20th wk
- Changes in inner ear development through the 8th month-
- Middle ear begins development at Week 3 and complete by wk 30 to 32
- Pinna develops adult shape by wk 20
- External Auditory Canal continues to develop until age 7 to 9

Word segmentation, which is the process of dividing connected discourse into meaningful units, such as individual words, has been shown to develop rapidly between 7.5 and 10.5 months (e.g., Jusczyk, 2002).

By 8 months of age, babies have the capacity for long-term storage of new words, which is an important prerequisite for auditory-based language learning (Jusczyk & Hohne, 1997; Houston & Jusczyk, 2003).

(I have been noticing more children with very narrow canals, small pinna size- just wonder how that may be affecting sound waves transmission)

SPEECH- LANGUAGE- COMMUNICATION- ACADEMIC SKILLS DEVELOPMENT

- Auditory Imprints
- Memory Templates
- Cognitive and Metacognitive skills
- Linguistic and Metalinguistic skills
- Proprioception- Vision and Balance-sense of body in space
- Emotional Regulation
- Regulation of all sensory inputs
- A well balanced body-mind-spirit facilitates normal development (helps channeling the mental awareness/ concentration on normal development of skills, instead of trying to constantly establish systemic homeostasis resulting in inefficient and ineffective processing along with excessive fatigue)

MANY OPINIONS WITH FEW SOLUTIONS

We look at the child from our knowledge base and perspective creating a tunnel vision

- Do we notice the whole child?
- Do we listen to the parent's intuitions?
- Do we peel the onion enough?

The best results happen when all the pieces of the puzzle are put together to make the whole

- Often just the tip of the iceberg is treated instead of assessing the rest of the iceberg underneath, primarily because of preconceived notions
- Unfortunately these notions can be very detrimental

As when the developmental pediatrician dismisses APD therapy, or the ENT doc dismisses ear infections as if it has not bearing on learning and academics.....etc etc,

In the past I have also been guilty of dismissing programs such as IM or Listening therapies, etc because ASHA does not endorse it or because of bad publicity-----

AUDITORY PROCESSING WEAKNESS CANNOT EXIST WHEN LANGUAGE SKILLS ARE STRONG AND/ OR WITHIN NORMAL LIMITS

DC – AT AGE 6 AFTER 4 YEARS OF SLP THERAPY

								Test Total	Age	
								6	6	
	RNC	RC	LC	LNC	Total		Number Correct	6		
NOE	17	24	23	11	75		Norm Limit	9		
Norm Limit	4	10	15	5	28		Significant	YES		
Significant	YES	YES	YES	YES	YES				Qualifiers	
	Rev	Ear	Order	Type A	WDS R	WDS L		Quan	Limit	Significant
NOE	2	-7	1	-1	88	80	1st Order Error	4	2	YES
Norm Limit	4	-6	7	7	91	91	2nd Order Error	3	1	YES
Significant	NO	YES	NO	NO	YES	YES	3rd Order Error	2	2	NO
	Quiet	Noise	Difference	Norm						
	Score %	Score %	Score	Limit	Significant					
Right	88	60	28	22	YES					
Left	80	68	12	23	NO					
Inter-Aural Difference			16							
Norm Limit			8							
Significant			YES							

-2.05 SIR
Very low endurance

SHORT TERM /AUDITORY MEMORY DEFICITS/COGNITIVE SCORES CANNOT BE IMPROVED

MA- STARTED THERAPY AT AGE 6

Name: Michael	2011 WISC 4	2013 WISC 4	2014 WISC 4	2016 WISC 5
Verbal Comprehension	77	79	89	92
Perceptual Reasoning	92	86	92	Visual spatial 105
				Fluid Reasoning 126
Working Memory	88	88	88	112
Processing Speed	88	83	85	105
IQ	82	79	86	111

Auditory Processing Therapy since 2011; Speech Therapy since 2011; Specialized School for Dyslexia; OG Training; Fast Forward.

AUDITORY PROCESSING WEAKNESS IS INHERENT TO AUTISM, REMEDIATION IS NOT POSSIBLE / NOT REQUIRED- THE CHILD HAS TO LEARN TO COMPENSATE SC AGE 8 YEARS

	RNC	RC	LC	LNC	Total		
NOE	34	35	37	25	131		
Norm Limit	2	5	7	3	16		
Significant	YES	YES	YES	YES	YES		
	Rev	Ear	Order	Type A	WDS R	WDS L	
NOE	0	3	-5	-1	76	76	
Norm Limit	4	2	-2	3	96	90	
Significant	NO	YES	YES	NO	YES	YES	

	Quantitative Score	Qualitative Score	Age
Number Correct	0	0	8
Norm Limit	17	15	
Significant	YES	YES	

	Quiet Score %	Noise Score %	Difference Score	Norm Limit	Significant
Right	76	36	40	22	YES
Left	76	64	12	22	NO

He presented with 70% accuracy. Errors were noted on /v, j, ch, l, b, p, u in up, n, th in think, s, t, r/. He was unable to associate word to the sound he heard.

SIR: -4.39

Did not have a sense of adequate personal space

AUDITORY PROCESSING WEAKNESS IS INHERENT TO AUTISM, REMEDIATION IS NOT POSSIBLE / NOT REQUIRED- THE CHILD HAS TO LEARN TO COMPENSATE SC AGE 9 YEARS

	RNC	RC	LC	LNC	Total
NOE	8	18	27	5	58
Norm Limit	2	4	6	1	10
Significant	YES	YES	YES	YES	YES

	Rev	Ear	Order	Type A	WDS R	WDS L
NOE	1	2	14	1	92	96
Norm Limit	1	1	3	3	95	93
Significant	NO	YES	YES	NO	YES	NO

	Quantitative Score	Qualitative Score	Age
Number Correct	20	10	9
Norm Limit	18	16	
Significant	NO	YES	

	Quiet Score %	Noise Score %	Difference Score	Norm Limit	Significant
Right	92	72	20	21	NO
Left	96	64	32	22	YES
Inter-Aural Difference			-12		
Norm Limit			-11		
Significant			YES		

SIR 1.23

Phonemic Recognition 79% acc

Phoneme Word Association 85% acc

Errors /oo in look; ch; l; sh; th in think and there; h; oo in cool; aw in call; o in pot; n/

AUDITORY PROCESSING ASSESSMENT AND TREATMENT IS NOT POSSIBLE WHEN SPEECH LANGUAGE DEFICITS ARE EVIDENT

AW 7 YEARS

- Diagnosed at eight months with 4 q deletion syndrome – She is non-verbal
- Quantitative responses were significant indicating a Decoding deficit.
- She had significant number of third order errors, also indicating a Decoding weakness (pointed to Pie/ Pipe; Bag/ Bat; Gun/ Gum; Kneel/ Knee). She had 4 errors, and norms for her age allows for 2 errors.
- Her First and Second Order errors were not significant. She also presented with 2 delays indicating decoding deficit. She was able to improve her score by 6 points when the items were presented via live voice.
- Self-regulation improved, after 16 sessions, she was able to focus fully on auditory related tasks for the first time.
- Her endurance has improved from about 15 minutes to about 45 mins. She used to get at least 2 play breaks during therapy, at this time she is able to take 1 quick break in her seat and get back to task.
- she was able to point to 14/15 words including consonant clusters presented via speakers only.
- She can tolerate up to 45 dB of background distracting noise via speakers (Speech Noise- sounds like heavy wind blowing) while the items are being presented. She used to be very aversive to this initially. It appears that she is able to tolerate up to a 15 dB speech to noise ratio. Which is a significant change in her noise tolerance skills.
- Short Term Memory has improved to repeating up to 2 digits or letters of the alphabet given extra processing time. She was only able to repeat 1 item at a time initially.

AUDITORY PROCESSING ASSESSMENT AND/ OR TREATMENT IS NOT POSSIBLE WHEN COGNITIVE DEFICITS ARE EVIDENT

SV AGE 12 YEARS

	RNC	RC	LC	LNC	Total			RNC	RC	LC	LNC	Total		
NOE	3	3	9	4	19			0	2	4	0	6		
Norm Limit	1	2	4	1	6			1	2	4	1	6		
Significant	YES	YES	YES	YES	YES			NO	NO	NO	NO	NO		
	Rev	Ear	Order	Type A	WDS R	WDS L		Rev	Ear	Order	Type A	WDS R	WDS L	
NOE	0	-7	3	3	96	96	NOE	0	-2	2	2	96	100	
Norm Limit	1	-2	2	3	94	92	Norm Limit	1	-2	2	3	94	92	
Significant	NO	YES	YES	NO	NO	NO	Significant	NO	NO	NO	NO	NO	NO	
	Quantitative	Qualitative						Quantitative	Qualitative					
	Score	Score	Age					Score	Score	Age				
Number Correct	9	8	12				Number Correct	25	23	12				
Norm Limit	23	22					Norm Limit	23	22					
Significant	YES	YES					Significant	NO	NO					
	Quiet	Noise	Difference	Norm				Quiet	Noise	Difference	Norm			
	Score %	Score %	Score	Limit	Significant			Score %	Score %	Score	Limit	Significant		
Right	96	76	20	21	NO		Right	92	72	20	21	NO		
Left	96	56	40	22	YES		Left	94	60	34	22	YES		
Inter-Aural Difference		-20					Inter-Aural Difference		-14					
Norm Limit		-10					Norm Limit		-10					
Significant		YES					Significant		YES					

AUDITORY PROCESSING DEFICITS CAN BE DIAGNOSED BY A PSYCHOLOGIST AND TREATED BY A SPEECH LANGUAGE PATHOLOGIST- NO NEED FOR APD TREATMENT
MS AGE 6 YEARS

<p>Sound Blending – The student listens to a series or syllables or phonemes and is asked to blend the sounds into a word. WJ-OL IV</p>	82	73-91	12
<p>Phonological Processing - It is comprised of three tasks. Word Access requires the examinee to provide a word that has a specific phonemic element in a specific location. Word Fluency requires the student to name as many words as possible that begins with a specified sound in 1 minute. Substitution requires the student to substitute part of a word to create a new word. WJ-Cog IV</p>	77	66-88	6
<p>AUDITORY PROCESSING - Measures the ability to discriminate, encode, employ, and synthesize auditory stimuli and is related to phonological awareness and phonological sensitivity. WJ-Cog IV</p>	91^	82-99	27

AUDITORY PROCESSING DEFICITS CAN BE DIAGNOSED BY A PSYCHOLOGIST AND TREATED BY A SPEECH LANGUAGE PATHOLOGIST- NO NEED FOR APD TREATMENT MS AGE 7 YEARS

	RNC	RC	LC	LNC	Total		Quiet Score %	Noise Score %	Difference Score	Norm Limit	Significant
NOE	8	24	25	4	61						
Norm Limit	2	7	12	2	22	Right	88	64	24	22	YES
Significant	YES	YES	YES	YES	YES	Left	88	64	24	23	YES
	Rev	Ear	Order	Type A	WDS R	WDS L					
NOE	0	-5	9	2	88	88					
Norm Limit	4	-6	8	5	90	90					
Significant	NO	NO	YES	NO	YES	YES					

	Quantitative Score	Qualitative Score	Age
Number Correct	12	6	7
Norm Limit	17	15	
Significant	YES	YES	

Phonemic Recognition accuracy: 54% accuracy.

Phoneme-Word Association accuracy: 25% accuracy

Phonemic errors: /m; n; th in think; th in they; l; h; f; k; g; u in up; o in pot; e in egg; b; a in at; d; a in ate; p; oo in boot; ou in out; s; w; oi in boy; oo in look; j ; aw in ball; v; i in it/

AUDITORY PROCESSING CAN BE EFFECTIVELY TREATED BY TRADITIONAL SPEECH THERAPY HP 11 YEARS

Parent reported Speech Therapy for Auditory Processing since 2013. Parent indicated that the residual weakness will always be there.

WISCV- July 2016

CTOPP 2016

Verbal Comprehension 92

Phonological Awareness 75

Visual Spatial 111

Phonological Memory 92

Fluid Reasoning 112

Rapid Memory 104

Working Memory 115

Blending words 6; Phoneme Isolation 5; Memory for Digits 8;

Processing Speed 83

Nonword Repetition 8; Rapid Letter Naming 9

Full Scale IQ 103

Attention Deficit Ratings were significant.

Diagnosis Auditory Processing and Attention Deficit with social and pragmatic skills weakness. Sensitive to noise.

I did PST on 11/2016- Quantitative 18 Qualitative 8 (quiet rehearsals, quick responses, and delays) (Decoding deficit)

Low average Receptive and Expressive Vocabulary with weak pragmatic skills (possible due to Auditory memory weakness).

COMMERCIALLY AVAILABLE PROGRAMS CAN REMEDIATE AUDITORY PROCESSING DEFICITS EFFECTIVELY

CU AGE 10-AGE 12

- Age 10. 2014
- SSW significant for all conditions. PST Quantitative 21 Qualitative 17.
- Qualitative significant. Competing Sentences 4; Time Compressed Sentences 3. Atypical ear advantage in right ear for both tests on SCAN-C
- Therapy recommended. Declined. Parent opted for Learning Ears Program.
- Saw him again in 2016
- Still receiving Learning Ears program. Has IEP with Speech Therapy in school
- Did PST in 2017. Age 12. Quantitative 21. Qualitative 16 (delays, quick) Decoding deficits.

All therapies and program are tools. The professional has to be knowledgeable in remediating specific weaknesses even when the same tools are used. Learning Ears claims to improve Auditory Processing.

- <http://moyerslearningsystems.com/program-description.html>

SPEECH ARTICULATION DEFICIT IS RELATED TO SPEECH AND LANGUAGE SKILLS, IT IS ONLY NECESSARY TO EVALUATE THE PERIPHERAL HEARING SKILLS SJ AGE 6

	RNC	RC	LC	LNC	Total		Quiet Score %	Noise Score %	Difference Score	Norm Limit	Significant
NOE	12	19	32	9	72						
Norm Limit	4	10	15	5	28	Right	92	64	28	22	YES
Significant	YES	YES	YES	YES	YES	Left	88	56	32	23	YES
	Rev	Ear	Order	Type A	WDS R	WDS L					
NOE	0	-6	-8	4	92	88					
Norm Limit	4	-6	-3	7	91	91					
Significant	NO	NO	YES	NO	NO	YES					

■ SIR I.35

	Quantitative Score	Qualitative Score	Age
Number Correct	22	11	6
Norm Limit	17	12	
Significant	NO	YES	

AUDITORY PROCESSING SKILLS IMPROVE WITH MEDICATION FOR ATTENTION DEFICIT CP AGE 11-12 YEARS

	RNC	RC	LC	LNC	Total		RNC	RC	LC	LNC	Total
NOE	1	3	6	3	13	NOE	0	1	3	2	6
Norm Limit	1	2	4	1	9	Norm Limit	1	2	4	1	6
Significant	NO	YES	YES	YES	YES	Significant	NO	NO	NO	YES	NO

■ DOM

RNC	RC	LC	LNC	Total	Reversals	RNC	RC	LC	LNC	Total	Reversals
0	1	3	3	7	3	0	0	0	1	1	4

Pre-Therapy: 86% recognition. Errors in /v; r; h; l; u in in up; th in think; w/ Word-Sound Association: 69% accuracy with 4 delays.

Post-Therapy: 97% recognition. Errors in /o in pot and th in think/ however was able to self-correct with minimal cues and wait time to process. 97% Word-Sound Association with 5 delays. Fatigue may result in delays.

AUDITORY PROCESSING THERAPY IS NOT EFFECTIVE

RP AGE 9 YEARS

Subtest	CTOPP 2 Percentile Rank		The Listening Comprehension Test Subtests	Percentile Rank	
	5/16	1/17		5/16	1/17
Elision	37	84	Main Idea	29	87
<i>Blending Words</i>	5	37	<i>Details</i>	42	78
Phoneme Isolation	91	84	Reasoning	86	93
Memory for Digits	63	84	Vocabulary Semantics	47	91
<i>Non-word Repetition</i>	2	50	Understanding messages	85	94
Rapid Digit Naming	75	84	Total	42	95
Rapid Letter Naming	50	84			

After APD therapy she has continued left ear weakness (LC and LNC)

Organization, morphological comprehension, and relational vocabulary weakness noted.

PSYCHOLOGIST REPORT: NO APD / WORK ON VOCABULARY -DESPITE POSITIVE SIGNS ON THE AUDIOLOGY TEST RESULTS AO AGE 9 YEARS

	Data Evaluation					
	RNC	RC	LC	LNC	Total	
NOE	4	2	18	1	25	
Norm Limit	2	4	6	1	10	
Significant	YES	NO	YES	NO	YES	
	Rev	Ear	Order	Type A	WDS R	WDS L
NOE	3	-5	-3	2	96	100
Norm Limit	1	-4	-2	3	95	93
Significant	YES	YES	YES	NO	NO	NO

	Data Evaluation				
	Quiet	Noise	Difference	Norm	Significant
	Score %	Score %	Score	Limit	
Right	96	68	28	21	YES
Left	100	64	36	22	YES
Inter-Aural Difference			-8		
Norm Limit			-11		
Significant			NO		

SIR: 4.30:

These are results after first round of therapy. There was not evidence of any integration weakness on initial testing. Had recommended CAPDOTS, however the Psychologist misled the parents.

IT TAKES MANY ROUNDS OF THERAPY SOMETIMES WITH MULTIPLE INTERVENTION STRATEGIES AH AGE 6-7 YEARS

Data Evaluation

	RNC	RC	LC	LNC	Total		
NOE	3	11	31	5	50		
Norm Limit	4	10	15	5	28		
Significant	NO	YES	YES	NO	YES		
	Rev	Ear	Order	Type A	WDS R	WDS L	
NOE	2	-6	-6	3	92	88	
Norm Limit	4	-6	-3	7	91	91	
Significant	NO	NO	YES	NO	NO	YES	

Data Evaluation

	RNC	RC	LC	LNC	Total		
NOE	3	5	25	7	40		
Norm Limit	4	10	15	5	28		
Significant	NO	NO	YES	YES	YES		
	Rev	Ear	Order	Type A	WDS R	WDS L	
NOE	1	-10	10	9	96	92	
Norm Limit	4	-6	7	7	91	91	
Significant	NO	Void	Void	YES	NO	NO	

Data Evaluation

	RNC	RC	LC	LNC	Total		
NOE	3	3	16	2	24		
Norm Limit	2	7	12	2	22		
Significant	YES	NO	YES	NO	YES		
	Rev	Ear	Order	Type A	WDS R	WDS L	
NOE	7	-4	0	2	96	88	
Norm Limit	4	-6	-3	5	90	90	
Significant	YES	NO	NO	NO	NO	YES	

Data Evaluation

	RNC	RC	LC	LNC	Total		
NOE	2	1	13	2	18		
Norm Limit	2	7	12	2	22		
Significant	NO	NO	YES	NO	NO		
	Rev	Ear	Order	Type A	WDS R	WDS L	
NOE	1	2	0	1	100	96	
Norm Limit	4	1	-3	5	90	90	
Significant	NO	YES	NO	NO	NO	NO	

IT TAKES MANY ROUNDS OF THERAPY SOMETIMES WITH MULTIPLE INTERVENTION STRATEGIES AH AGE 6-7 YEARS

- 1st SIR 3.29
- 2nd SIR 3.54
- 3rd SIR 2.50
- 4th SIR 2.50

He has had Buffalo model therapy / DOT/ CAPDOTS

(May have visual processing difficulties which can be exasperating the ability to process auditory information due to fatigue)

MENTAL FLEXIBILITY

- Children who are mentally flexible go much further in life
- Same is true with adults
- Preconceived notions may help us see and hear, but we may lose our vision and our focus in the process
- Story of A I Root- The Bee Keeper- Tried to publish initial ideas of Wright Brothers –bicycle makers
- Scientific American and other publications rejected it
- Finally got accepted and published it in the Gleanings of Bee Culture (Journal)
- Smithsonian did not even actually accept their original airplane-the Kitty Hawk flyer
- Who got the last laugh???

FINALLY DON'T BE JUST AN APD MONITOR- 😊

- <https://www.bing.com/videos/search?q=lifelock+advertisement&&view=detail&mid=0671FA0EA12A78E51F520671FA0EA12A78E51F52&FORM=VRDGAR>
- 3 pages of recommendations for APD remediation is lip service
- Recommending Speech Language Therapy for APD is more for less
- There is a need to train all professionals who diagnose and treat “APD” to understand the nature of the deficit, so that more children can get help.
- It is more than auditory memory (Psychologists), more than the ability to follow directions (Speech Language Pathologists), more than quantitative results (Audiologists) and more than reading tutoring (Reading specialists and educators) and more than prescribing an FM system for better signal to noise ratio (schools).