Auditory Integration Training

Jeffrey David Lewine, Ph.D.

and

Sally Brockett, M.S.

The Mind Research Network for Neuroscience Discovery

Introductory Overview

Sally Brockett

IDEA Training Center

sally@ideatrainingcenter.com

Development of Berard AIT

Dr. Guy Berard – French Physician

Studied the Tomatis method

Developed more efficient method

Berard Clinic in Annecy, France

The Sound of a Miracle – AIT spreads to U.S.

Hearing Equals Behavior – English ed. published in 1993

Development of Berard AIT

Autism Research Institute – research in 1990's

Dr. Berard trains practitioners in the U.S.

Other AIT devices and methods are developed

Practitioners in 30+ countries obtain similar results when following the protocol and using Berard AIT devices

Bérard Protocol

Requires listening to modulated music for 10 hrs. to stimulate reorganization of auditory system

Neural Plasticity Theory: allows the brain to reorganize when given novel stimulation with intensity and repetition. Creates new neural connections for a more efficient system

Bérard Protocol

- 30 minutes each session
- 2 times per day w/ at least 3 hours between
- 3 years of age and older
- Headphones
- Limited Distractions
- Provided directly (on-site) by a Berard practitioner – Never a "home program"

Bérard Protocol

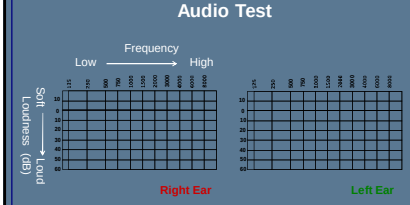
Berard AIT Equipment is evaluated and proven effective.

Currently two devices are accepted:

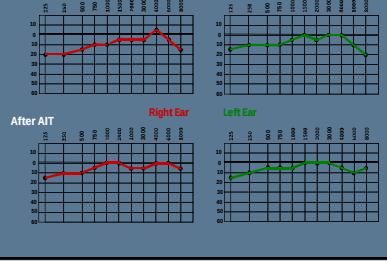
- Earducator

- Audiokinetron

Audio Test

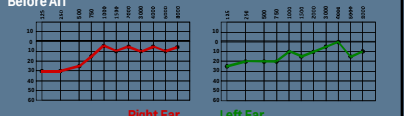


Audio Tests (ADHD)



Audio Tests (Autism)

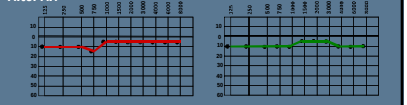
Before AIT



Right Ear

Left Ear

After AIT



Hearing Quality / Learning Ability Study

Maria Vega, Sp. Ed., Spain

Age - Years	6 – 11	12 - 16	16 - 18
Number of Students	60	50	48
Typical	30	36	29
Learning Difficulties	30	14	19
Predicted By Listening Test	**93.1 %**	**92.9 %**	**94.7 %**

How is Berard AIT Different?

- Only 10 hours of listening
- Ear health conditions evaluated prior to start

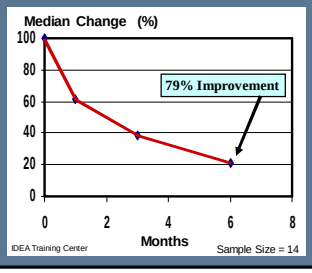
- Listening without distractions encouraged
- Listening profile obtained, whenever possible
- Documented results

How is Berard AIT Different?

- Stimulation received directly from Berard device
- Program provided directly by professional practitioner
- Parents typically note changes right away -
  73% Positive Change During First 10 Days
  - Sensory
  - Behavior
  - Language
  - Academics

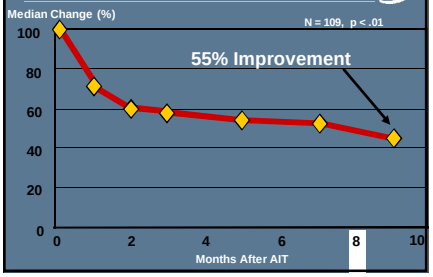
Sensory Dysfunction (Decrease)

Sensory Integration Checklist

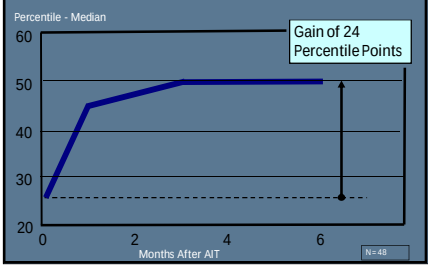


Hyperactivity

Aberrant Behavior Checklist



Attention Deficit Disorders Evaluation Scale



PHELPS Kindergarten Readiness Scale

Pre/Post AIT Results
5-year old boy

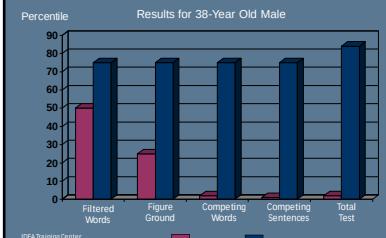
	Percentile Rank Pre AIT	Post AIT
Verbal Processing	25	75
Perceptual Processing	9	50
Auditory Processing	< 1	91
Total Readiness Score	**3**	**77**

Test of Problem Solving

Age Equivalent Scores

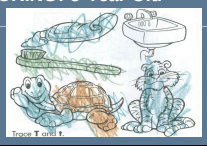
	Before AIT		After AIT
Chronological Age:	7 yr.	8 yr.	9 yr.
Explaining Inferences	4.4	5.1	9.7
Determining Causes	5.10	5.10	11.1
Negative Why Questions	6.5	6.11	8.10
Determining Solutions	5.11	6.5	9.10
Avoiding Problems	6.6	6.6	9.9

SCAN-A: Test for Auditory Processing Disorders in Adolescents and Adults

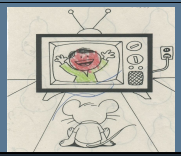


COLORING: 5-Year Old

Before AIT

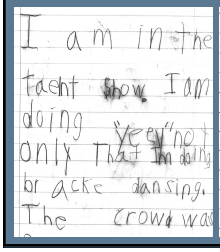


After 6 days of AIT

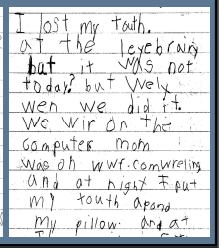


Handwriting: 7-year old

Before AIT



After 6 Days of AIT



Berard's Method Center Sweden

Transferred to Regular Education Program

Long Term Results:
One Year, 9 Months After AIT

AIT Group (16)	Control Group (18)
6 (38%)	1 (5.6%)
To Reg. Ed.	To Reg. Ed.

New Publication

Hearing Equals Behavior: Updated and Expanded

- Includes Dr. Berard's original content
- Impact of AIT on visual, auditory, and sensory processing
- Data from studies
- Theories, ear health, headphones, and more
- Reports from parents and clients

To order: sally@ideatrainingcenter.com

Auditory Integration Training: The MIND Research Network Project

Jeffrey David Lewine, Kait DePlonty, Nitin Bangera, Carly Demopoulos, Mona Stepansky

Supported by: Wallace Foundation, Cure Autism Now, DOE, and NICHD

The Mind RESEARCH NETWORK for Neurodevelopmental Disorders

Auditory Dysfunction: Sound Sensitivities in Autism

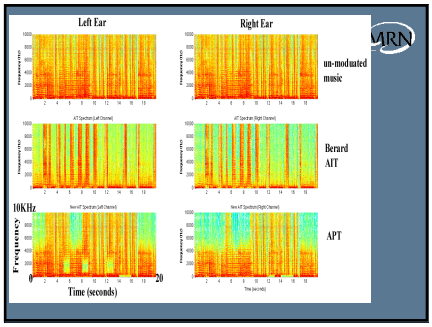
- Although sensory processing abnormalities are not part of the DSM-IV criteria with autism, it is universally recognized that sensory problems are prevalent with clinical observations and parental questionnaires indicating sensory abnormalities in 42% to 88% of school-aged children with autism.
- Auditory abnormalites are especially prevalent, with many children showing extreme discomfort when they head loud sounds such as a vacuum cleaner, baby crying, fireworks, or thunder.
- My work focuses on sound sensitivities – abnormal responses to supra-threshold sounds rather than hyperacusis – lowered sound thresholds.

Neurobiology of Sound Sensitivities

- At present, almost nothing is known about the neurobiology of sound sensitivities in autism. Many imaging and electrophysiological studies examine auditory processing, but correlation with sound sensitivities is lacking.

Therapy

- Despite a lack of understanding of the relevant biology, about 4% of children with autism receive a controversial music therapy – Auditory Integration Training, at a cost of $1000-$3000.
- Berard AIT involves listening to 10 hours of specially modulated music with random left/right ear dampening and augmentation of each of 8 frequency bands. Additional narrow band filtering may also be applied, as determined by audiological examination.
- Anecdotal reports range from: 'AIT cured my child' to 'AIT was a waste of time'. There are only a handful of 'scientific' studies, with both positive and negative findings being reported.
- Almost all of the studies were poorly designed, with reviews of AIT by professional organizations universally concluding that there is a lack of scientific data to either support or refute the use of AIT in autism.

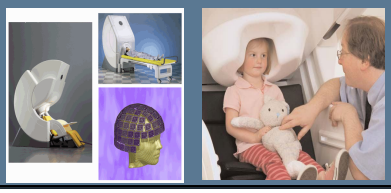


Strategy

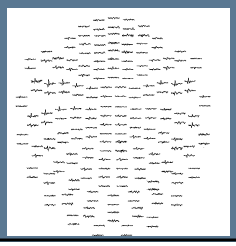
- Use functional brain imaging to explore the neurobiology of sound sensitivities.
- Perform a preliminary evaluation of the efficacy of AIT.
- Look for imaging biomarkers of AIT responsivity

MEG is one of the most powerful noninvasive tools for studying auditory function. How does MEG work?

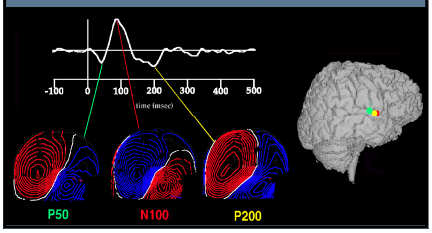
- Electrical currents in brain cells generate a surrounding magnetic field that can be measured.



MEG helps to track the spatio-temporal sequence of activity



Information on component amplitudes and latencies may be useful. Examination of contour maps and source locations can help to define information processing in health and disease.



Documenting Sound Sensitivities:

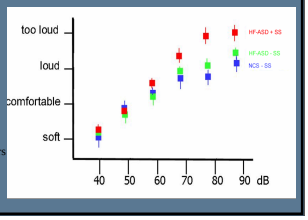
Loudness Growth Curves and Uncomfortable Loudness Levels

NCS – SS, N=15

HF-ASD-SS, N=12

HF-ASD+SS, N=16

Subjects are 8-28 years

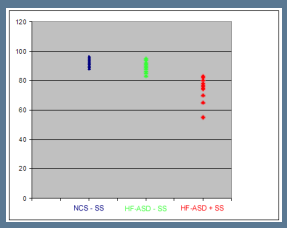


Uncomfortable Loudness Levels for Speech

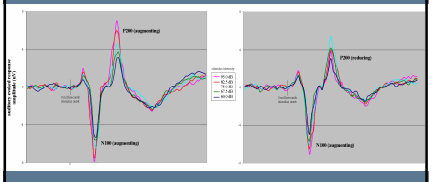
NCS – SS, N=15

HF-ASD-SS, N=12

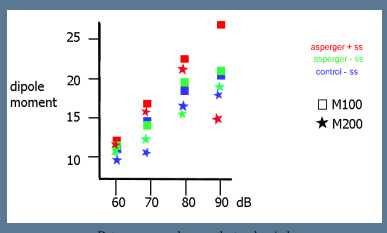
HF-ASD+SS, N=16



Augmenting versus Reducing Responses



Abnormal Reducing Patterns in Subjects with Sound Sensitivities



Data are averaged across the two hemispheres

Patterns in ASD

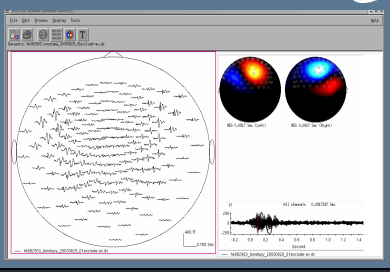
- Normal Augmentation of M1 and M2
- Flat for M1, M2, or both
- Exaggerated M1 Augmentation, M2 Reduction
- M1 and M2 reduction

- The last two patterns are especially prevalent in children with sound sensitivities

Intensity-Dependent Auditory Evoked Response Profiles

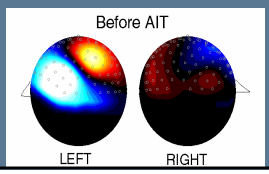
Subject	Normal augment	Flat	M1-aug Mw-red	M1-red M2-red
NCS	80%	13%	7%	0%
HFA-SS	67%	25%	0%	8%
HFA+SS	25%	13%	31%	31%

Normal Profile of Symmetric Left-Right Brain Responses



Sound Sensitivity Profile

- Some children with sound sensitivities show a relatively normal brain imaging profile whereas others show very abnormal patterns
- Case Example: Holden: 10 year-old male with Asperger's syndrome
  - Sensitive to fireworks, music, rain, thunder
  - Audiology shows sounds at 70dB rated as 'too loud'



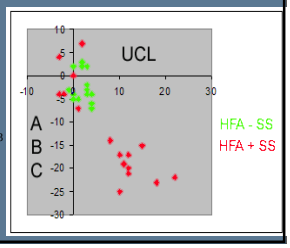
M100 Laterality Index [L-R]/[L+R] Baseline

		Baseline	
		symmetric	asymmetric
NCS [N-15]		87%	13%
HFA-SS [N=12]		83%	17%
HFA+SS [N=16]		38%	62%

AIT Efficacy: Uncomfortable Loudness Level and Aberrant Behavior Checklist

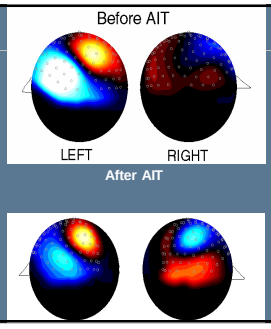
HFA-SS: Baseline versus 3 month follow-up

HFA+SS: Baseline versus 3 month follow-up with AIT



IDAER Profiles – Baseline/FU

Subject	Normal	Flat	M1-aug Mw-red	M1-red M2-red
HFA-SS	67% -> 75%	25% -> 17%	0% -> 0%	8% -> 8%
HFA+SS	25% -> 63%	13% -> 26%	31% -> 6%	31% -> 6%



M100 Laterality Index [L-R]/[L+R] Baseline

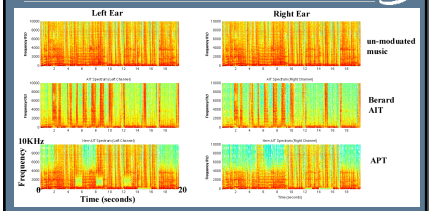
		Baseline -> Follow-up	
		symmetric	asymmetric
HFA-SS [N=12]		83% -> 83%	17% -> 17%
HFA+SS [N=16]		38% -> 81%	62% -> 19%

Interim Observations

- 7/10 Subjects who responded to AIT [based on UCL and ABC] had asymmetric profiles at baseline. Seven of these subjects had abnormal IDAER profiles at baseline. These may be imaging biomarkers predictive of good responses to treatment.
- AIT is not effective for all autistic subjects with sound sensitivities, but there does seem to be a sub-group where AIT partly normalizes auditory processing and leads to decreased sound sensitivities. Modest effects on behavior are also seen.
- Present data are limited by a lack of a placebo control and double-blind strategy. Nevertheless the data suggest that the potential efficacy of AIT warrants further exploration.
- Additional research is needed exploring the relationships between basic perceptual abnormalities and problems in behavior and cognition.

New Study

- Double –Blind Placebo Control
- Assessments include: ADI, ADOS, Audiology, CELF, CTOPP, LSA, ABC, CPI,SRS, Imaging
- Follow-up at 4 months
- Randomized assignment to:
  - Berard AIT
  - Un-modulated Music
  - New modified AIT



Resources

- www.berardaitwebsite.com- Official website for Berard AIT
- www.drguyberard.com – Dr. Berard's website
- www.ideatrainingcenter.com
- Hearing Equals Behavior: Updated and Expanded
- www.earducator.com