

QEEG and Roshi use in Autism post-toxic encephalopathy – a case study -

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Introduction

- | Autism is a complicated neurological disorder that has been treated medically, psychologically , nutritionally and with neurofeedback in past.
- | Since the complexity of this syndrome the results vary.
- | A complex combined approach is warranted.

Background

- | An 8 year old boy, after a febrile seizure at the age of two and a half, developed:
 - Recurrent headaches and abdominal aches
 - Insomnia - enuresis
 - Speech deterioration until age 4, left him speech impaired, followed by diminution of “eye contact”
 - Multiple allergies
 - Anger and Aggressive behavior
 - Uncontrollable hands movements, and facial squinting, and vocalizations

He was diagnosed “autistic” as a consequence of a toxic encephalopathy.

Pertinent medical history

- | Exposure, at birth to mold
- | Followed by Mercury and arsenic
- | 3rd DTP at 6 mos, followed by a raging fit 12 hrs later (Dx as ear infection!)
- | 4th DTP at 18 mos, vestibular changes, walking, balance impaired 24 hrs later
- | After the febrile seizure, HHV6 was detected
- | MRI showed only a slight edema cyngulum

Evaluation and Re-evaluation

- | A standard evaluation was done:
 - Complete developmental history and gathering all of the medical and psychological data
 - Behavioral rating scale, DMS IV
 - TOVA followed by IVA's
 - QEEG's (1st 03/02; 2nd 07/02; 3rd 09/02)
 - Baseline EEG on ROSHI over frontal, central and occipital regions confirming the QEEG results
 - A training session to verify the compliance
- | Allergy testing done by Immunosciences Labs., Inc., Valencia, CA

TOVA Results

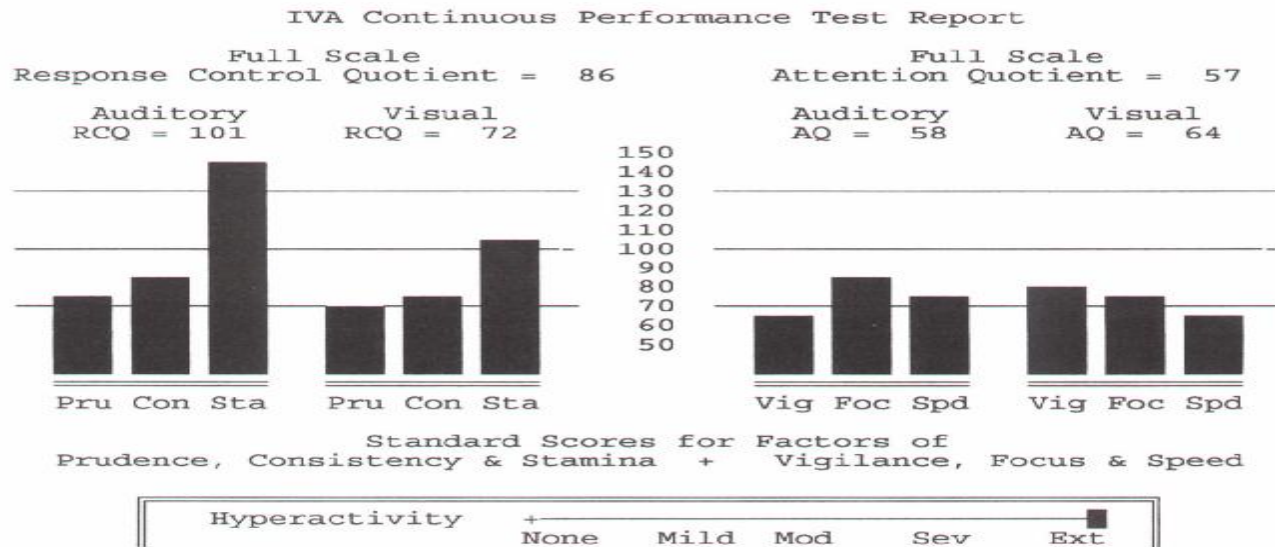
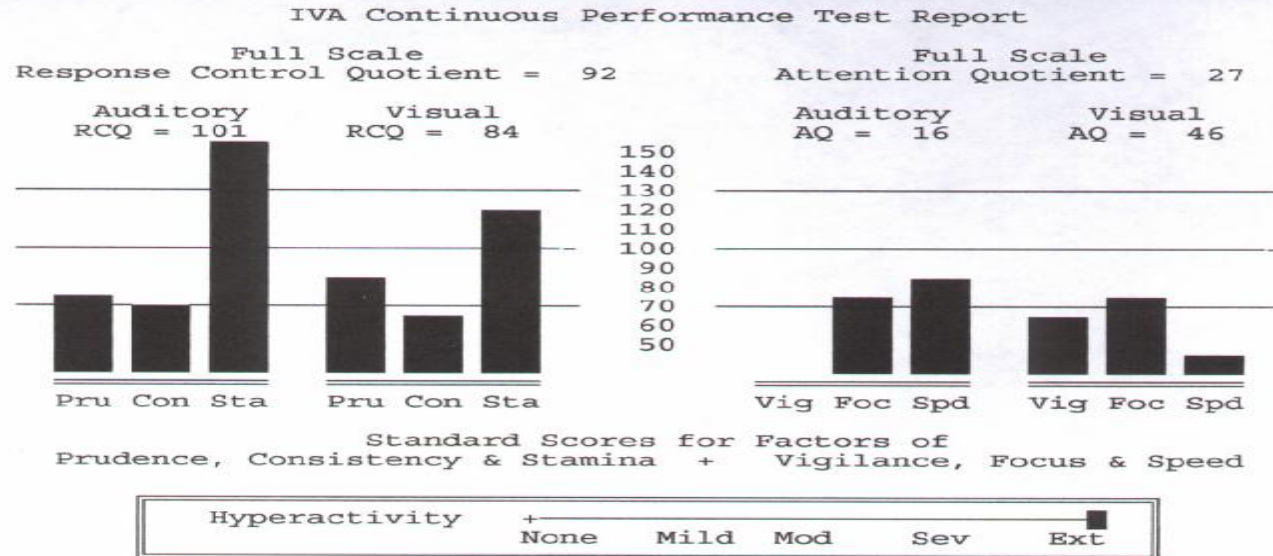
- TOVA visual test, pre-training, showed:
 - Complete visual inattention with a score of 46 % (N, 2.95 ± 3.76)
 - Very slow response time (846 ms) (N, 499.92 ± 90.05)
 - Significant variability of his response 344 ms (N, 185 ± 48.95).

Note: Norm \pm S.D. are corresponding to ♂ 8-10 y.o.

IVA Results

- | The first IVA test showed extreme hyperactivity, with:
 - Auditory vigilance (0) and
 - Visual speed of reaction (46, or 803 ms).
 - Many of the other parameters were also deviant.
 - The Persistence and the Sensory Motor Activity for the Visual Perception were not within the range of normal values, as well.

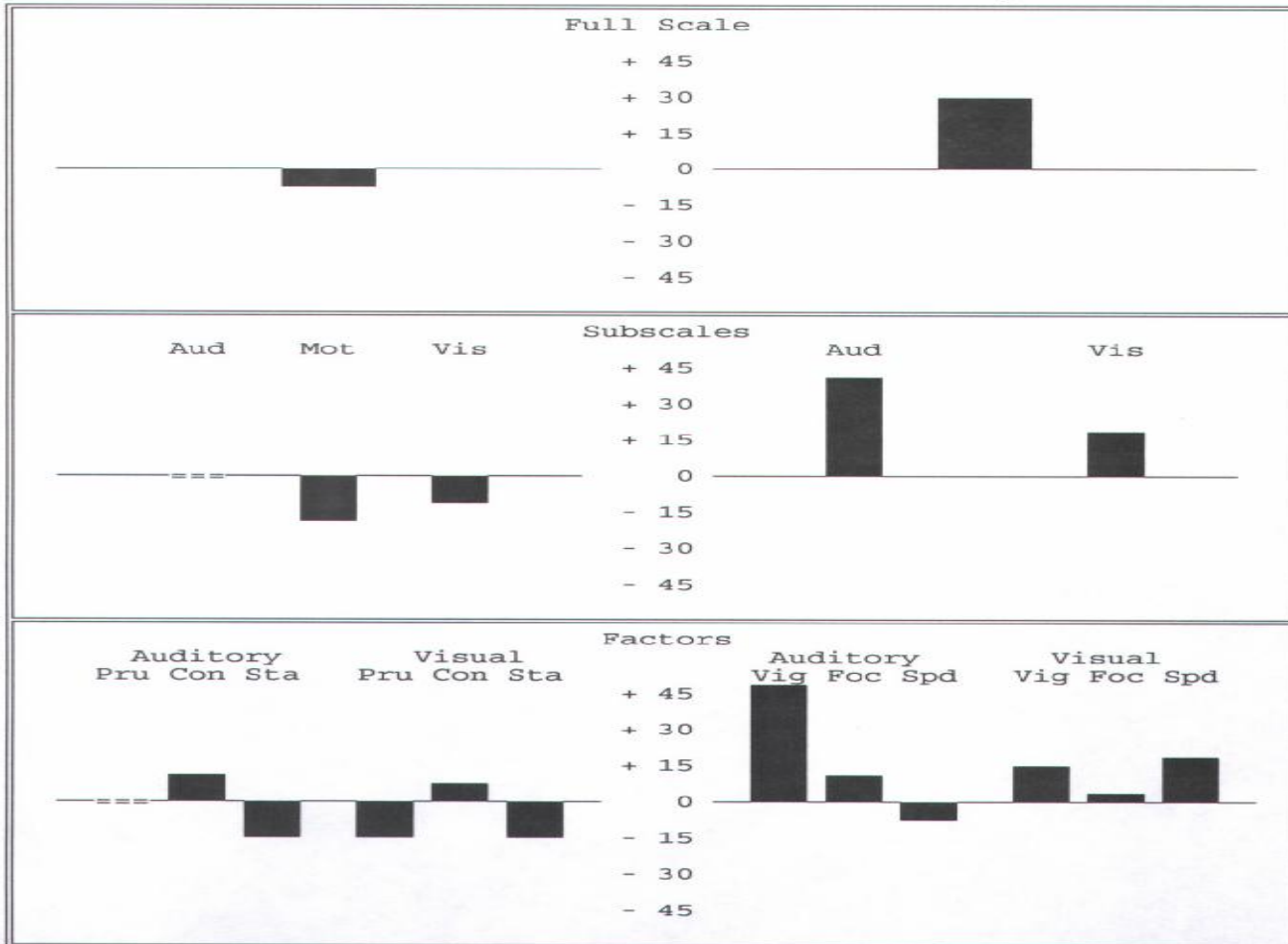
1st IVA of 4-01-2002 versus 2nd of 1-20-2003



C M Changes in Tests Dated 04-01-2002 & 01-20-2003

RESPONSE CONTROL QUOTIENTS

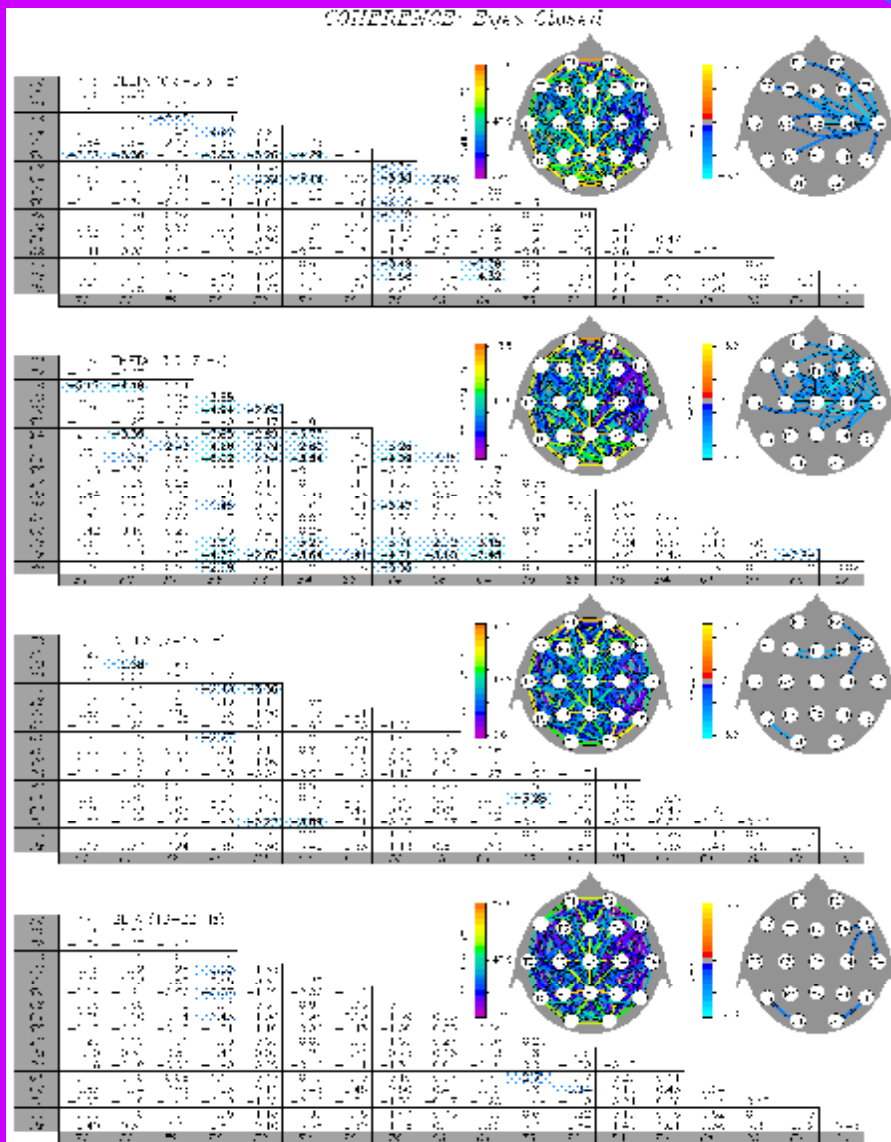
ATTENTION QUOTIENTS



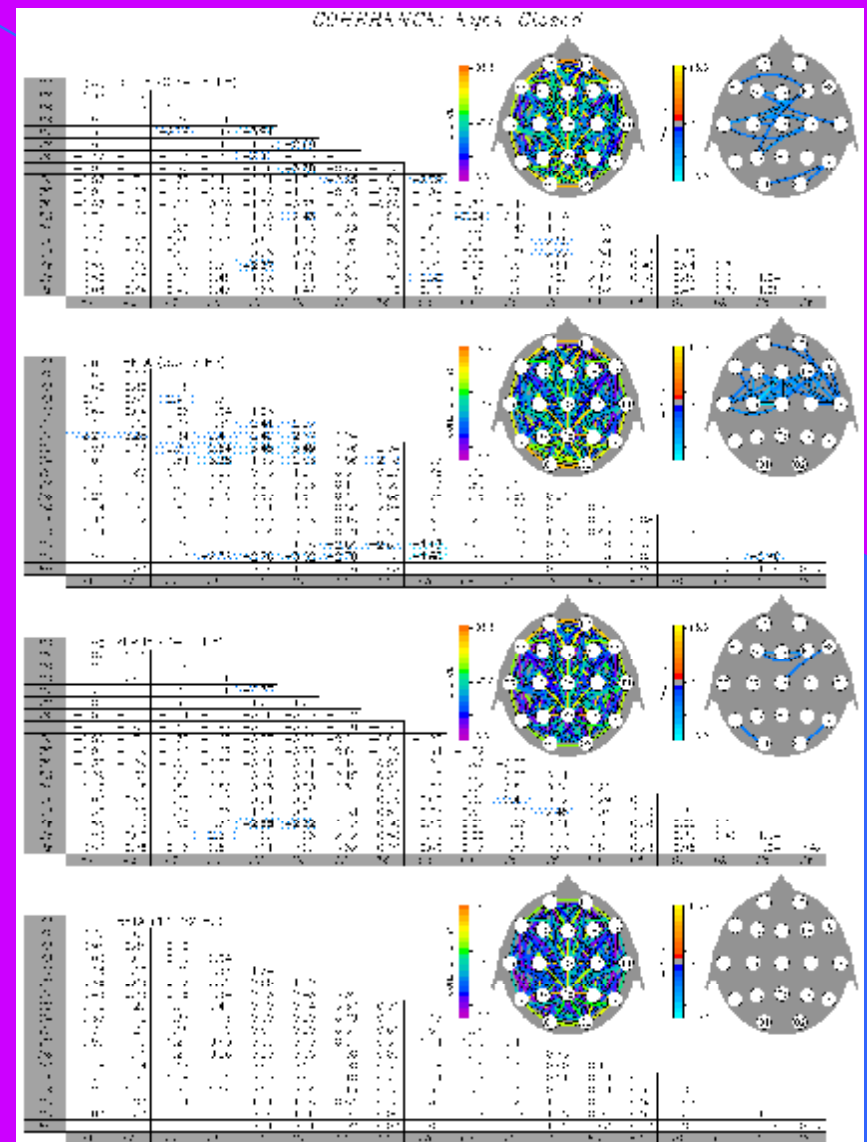
QEEG Results pre-training

- First QEEG revealed clear connectivity and excitability disturbances
- A fairly localized elevation in the low/high ratios (delta/beta, theta/alpha, theta/beta) over the vertex was suggestive of a localized inhibitory process
- Also a slight excess of beta over the left parieto-occipital region

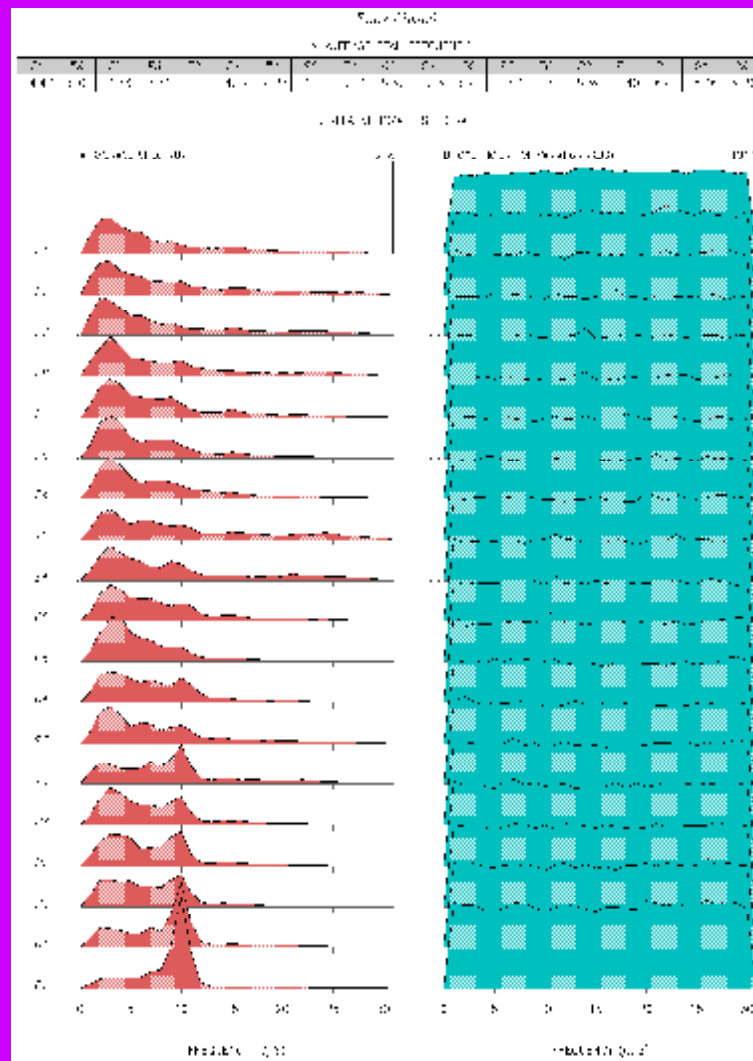
2001: D=18, T=37, A=7, B=5, Sum=67



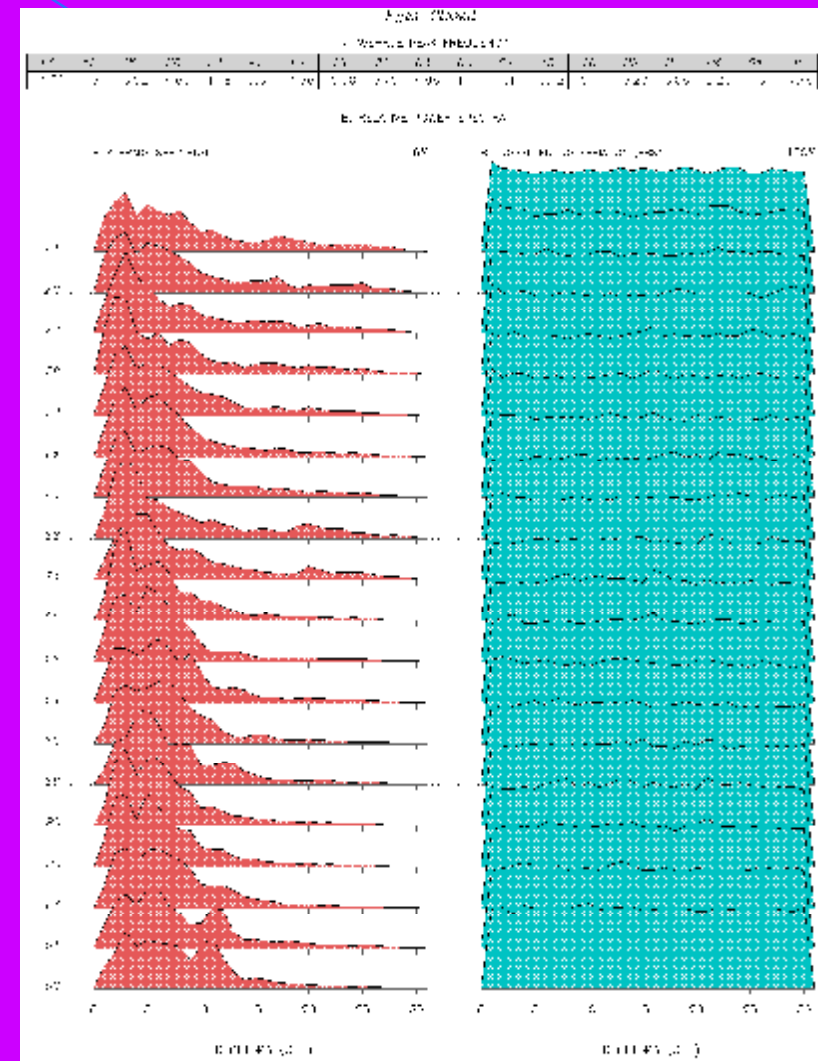
2002: D=13, T=24, A=6, B=0, Sum=43



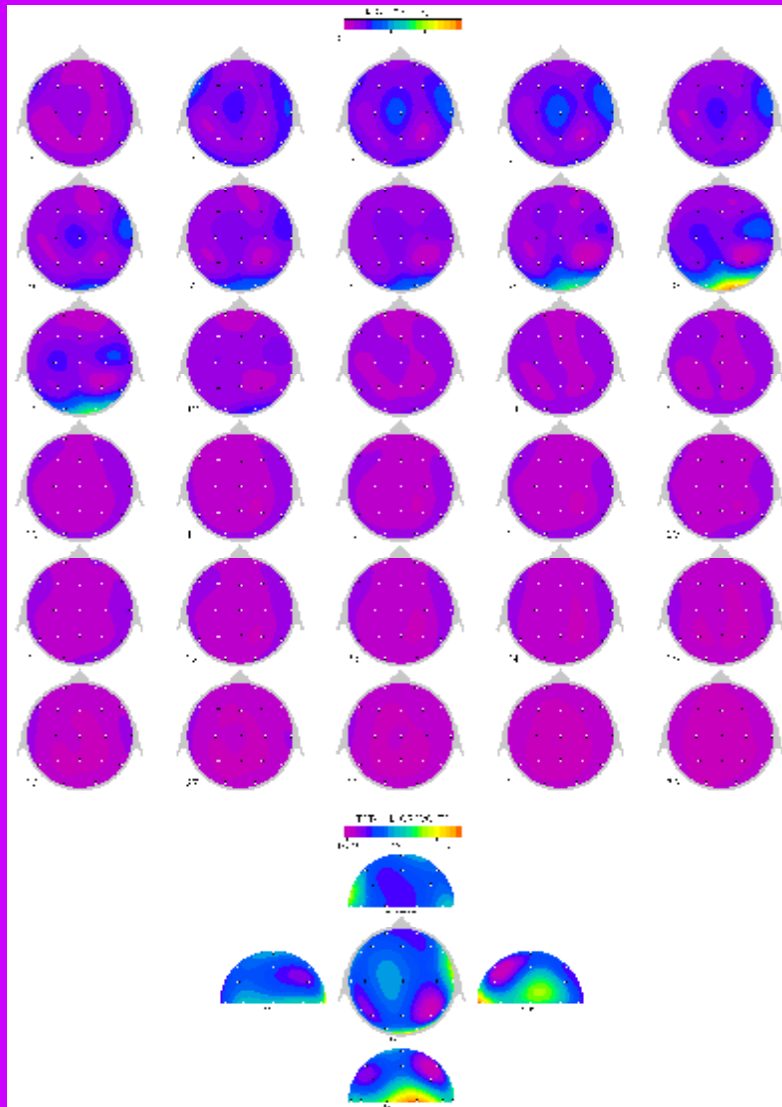
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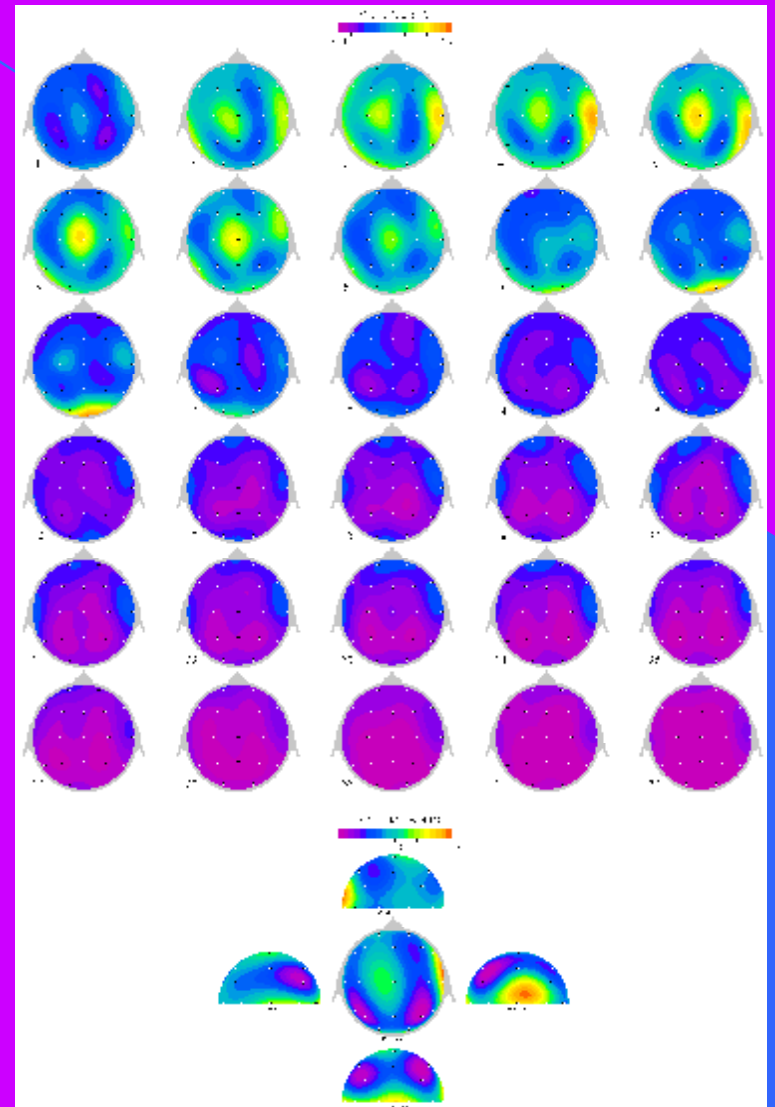
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2002



QEEG Results post 40 sessions NF training

- → Second QEEG indicated that the hypo-connectivities detected earlier were improving, with still further room for improvement (67↓43).
- The relative absence of a strong posterior alpha pointed to the need for an adjustment in training in the direction of enhancing this deficit, however continuing to down-train the low frequency (2-8Hz) over the vertex.

Training strategy

- | NF training was thus designed to *decrease the beta, increase the coherence over the fronto-central area and diminish the lower frequencies (delta, theta) over the vertex.*
- | Based upon the QEEG results, 40 NF sessions, 3 – 6 per week, were done before another QEEG was evaluated.
- | NF training was done on ROSHI with light first, that had to be discontinued due to his extreme light sensitivity, and replaced by electromagnetic closed loop-EEG, only.
- | Later in training light was added as well. Only low level of sound feedback was used.

Light stimulation

- | Excessive sensitivity for light made light stimulation obsolete for training with this patient until session 61 (usually made him aggressive).
- | Blue lights were introduced slowly from 5 min to 12-15 min duration.
- | After session 70, white lights were used with eyes open without problems.
- | This coincided with some stabilization of theta over vertex at lower 20 value of NEI and improved synchronization NEI 72-75.

Sound Stimulation

- | Audio was used at the very low volume and in addition, relaxing classical music was played or,
- | A special music entitled “Rhythm of the Sea” created by Robert Anthony Aviles, which integrates special sounds related to specific frequencies.

Protocols

Positions varied: F3/F4, C3/C4, F3/C3, C1/C2, P3/P4

Training

Sessions

Sync + TO[I] or B20[I] or BO[I]	18
S14 + TO[I] or A12 ↑	10
SMR + B20[I] or S14	3
TO[I] only	5
B20[I] or BO[I]	16
AO[E] only	8
TO[I] + AO[E]	37
BO[I]/TO[I] + S14 or S13	5

Session by Session

SESSION	DATE	NEI	PROTOCOLS	COMMENTS
1	4/01/02	48↑ 62	F3/F4 – Sync True White EO 7 min only	First evaluation - IVA and ROSHI evaluation plus a short session
2	4/2/02	58↑ 75	F3/F4 - Sync True White EO	Calmer after yesterday's 1st short ROSHI session Focused on reading
6	4/11/01	16↓ 12↓ 10	F3/F4 - B20[I] (Cz - TO[I] 2 min) White EO, plus EM	Better sleep after NF but did not hold Able to stay focused and quiet on B20[I]; agitated, noisy on first TO[I]
10	4/18/02	57↑81 5	F3/F4 - Sync C3/C4 – S14 EM EO	After 5 day break, eating better, sleeping better, dry
20	5/18/02	14↓ 11 -12↑-10	F3/F4 - B20[I] C3/C4 - SMR EM only	Sleeping better, anger decreased Putting more things in his mouth

SESSION	DATE	NEI	PROTOCOLS	COMMENTS
30	6/20/02	21 ↓ 12	Fz /Pz - BO[I] EM only	Experience with dolphins remarkable, no fear ; obsessing with lists Aggressive at end because father wouldn't let him make a list
40	7/9/02	18 ↓16 4	F3/F4 - B20[I], BO[I], S14 EM only	Sleeping well, only had to fall asleep. Good session with mom
51	8/8/02	22 ↓20	CZ/Fz - TO[I] EM only	Still not wetting the bed, good interaction with dolphins again last week
60	8/31/02	10↑12	P3/P4 - AO[E] EM only	Father reported a good night Less obsessed with lists
70	10/05/02	26↓18 14↑16	C1/C2 - TO[I], P3/P4 - AO[E] EM plus True White	Last night woke up 2 x but went back to sleep easily. Good evolution in general. During session read. At the end counted down from 100 with good enunciation and not rushed
71-78		20 ↓ 16 ↑20	C1/C2 - TO[I], P3/P4 - AO[E] EM plus True White	Better sleep last sessions. Better recall (25 words). He passed 3 reading comprehension tests in a week vs 4, between July and Sept. HW speed up 30min, from 1 hr /5 min TV

SESSION	DATE	NEI	PROTOCOLS	COMMENTS
81	11/2/02	19 ↑	F3/F4 - AO[E] True white, EO plus EM	A bit restless in beginning of session. Very mellow by end. Mother commented he was much more clam today.
91	12/12/02	23 20	C1/C2 - TO[I] P3/P4 - AO[E] True white, EO plus EM	Agitated more lately, grandpa passed away-funeral witnessed, tantrum then calmed down session went well
94	12/21/02	20 20	C1/C2 - TO[I], P3/P4 - AO[E] True white, EO plus EM	Father reports doing well in school and socially
97	01/08/03	20 20	C1/C2 - TO[I] P3/P4 - AO[E] True white EO plus EM	Grandma passed away, second funeral, followed by aunt Mother diagnosed with breast cancer, impending surgery
98	01/16/03	21 20	C1/C2 – TO[I] P3/P4 - AO[E] True white EO plus EM	At the end of TO[I], 1 min crying spell Calm himself down by making a short list with help from his father, then he switched attention to read animal books

Allergy tests

I Food hypersensitivity to specific proteins from:

– Milk

- IgG 3657 (N, 400-2000)

– Corn

- IgG 4040 (N, 400-2000)

– Soy

- IgM 3470 (N, 400-2000)

– Wheat

- IgG 2789 (N, 400-2000)
- IgM 3826 (N, 400-2000)

I Pancreatic enzymes:

– Secretin*

- IgG 14 (N, 0-10)
- IgM 11 (N, 0-10)

*Secretin, a GI hormone, regulates pancreatic enzymes, trypsin and amylase. Also has been shown to reduce specific behavior of autistic children: expressive and receptive language, eye contact and GI function.

More Allergy Tests

Neurotransmitters and other important proteins antibodies to:

– Serotonin*

- IgG, 22 (N, 0-10)
- IgM, 11 (N, 0-10)

– Glial Fibrillary Acidic Protein (GFAP**)

- IgM 60 (N, 0-50)
- IgA 21 (N, 0-20)

– Somatostatin***

- IgG 34 (N, 0-10),
- IgM 18 (N, 0-10)

– Robeola IgG 94 (N, 0-20)

*Serotonin is found in platelets and Ab against serotonin are found in patients with primary fibromyalgia and neuroimmune disorders

** GFAP expression in glial cells is associated to development, aging and CNS injury

***Somatostatin, like secretin, is present in GI tract, has an endocrine function in neurons

Results

- | The consequences of this guided training with this autistic child were as follows:
 - a complete resolution of his sleep disturbance/enuresis,
 - aggressive behavior lessened to almost none as the training continued,
 - his academic performance and verbal expression improved and continues to improve,
 - his obsessive behavior almost completely controlled
 - He is happier and it is easier for him to communicate (e.g., better eye contact)

Results

- | Another consequence of the NF training was the disappearance of the uncontrolled hand movements. They were in the form of “supination and splaying of his fingers, in flapping up and down motion”.
- | Those movements were indicating arousal, withdrawal and protective nature, as stated by his therapist, Tim Healey, M.S., RPT, in June 2002.

Conclusions I

- | QEEGs were instrumental in guiding the NF training and the corrections, of either the coherence or the amplitudes of the certain frequencies over the areas indicated by the QEEGs, were followed by changes in behavior, mental status, and well being of this autistic child.
- | Roshi instrument has confirmed the results indicated in the QEEG and with it we were able to monitor changes and modify NF training accordingly, as the training progressed.

Conclusion II

- | Training with ROSHI in Sync modality the high level of hypo-coherence had been significantly modified (from 67 to 43 hits) and that corrected his EEG from a simple EEG to a complex state, followed by changes in his academic and behavioral performance.
- | Training Theta down and Alpha up reduced the obsessive compulsive behavior of making lists. However, it seemed that making lists had a calming effect, as well as, it has been a way of “bringing temporary order” per Tim Healy, M.S., RPT, his therapist.

Parents comments

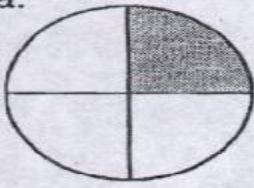
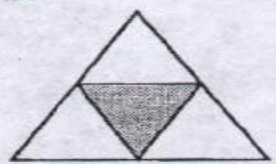

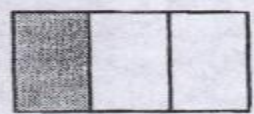


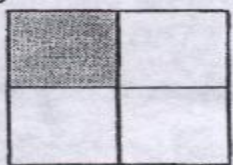
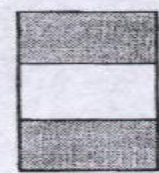
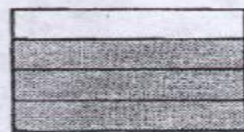
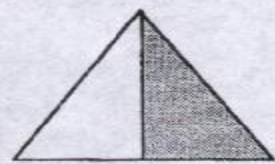
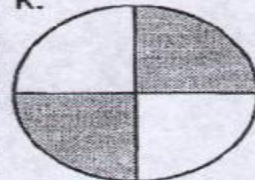
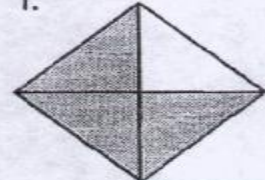
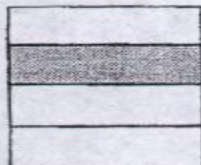
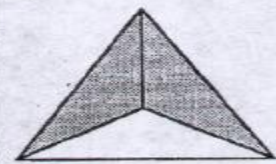
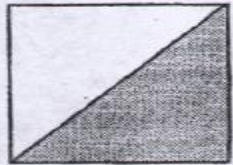
- | The changes observed in Colin's evolutions were remarkable:
 - Clarity of speech (80% intelligible from one syllable, 30% intelligible)
 - Prosody of speech enhanced (has incorporated emotional inflections, questioning, etc)
 - Multi-syllabic from monosyllabic 50%
 - Understanding of language
 - Gross motor improvements including motor planning
 - Attention in general improved
 - Aggression less frequent, or controlled immediately when prompted
 - Sleep improved,
 - **MATH has improved remarkably** (examples)

Therapists and Teacher's comments

- | “He is certainly progressing! Whatever you do, just continue!” PsychoTherapist
- | “The third EEG done in September 2002, showed the first time a **NORMAL EEG!**” ordered by Children Hospital of Orange County and analyzed by Dr. Trauner from UCSD.
- | School behavior (see “behavior log”) from 3-4’s with some 6-7-8’s, **now has several #1’s, in general 2’s!**

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Background continuation

- | Prior to investigating Neurofeedback, as a therapeutic modality, the patient was under the care Tim Healey, M.S. from Santa Ana, an Infant and Child Development Specialist, Gary Ordog, M.D., a neuro-immunologist/allergist, and was studying with a private tutor.
- | His school/ work was inconsistent and his behavior in the classroom was of a great concern.