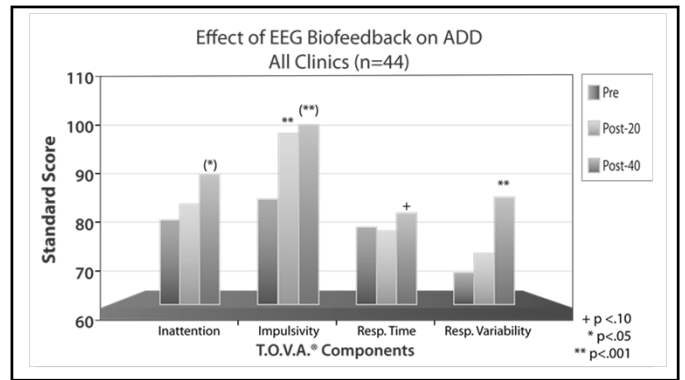
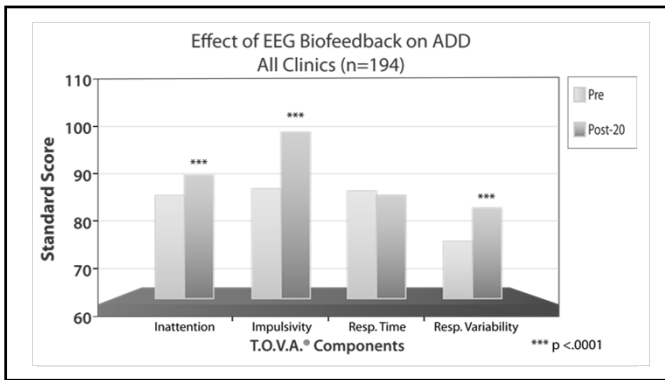


Standard Statistical Analysis of Historical CPT Data

Siegfried Othmer, Ph.D - Chief Scientist EEG Institute
© 2013 EEG Info

Early Statistical CPT Data

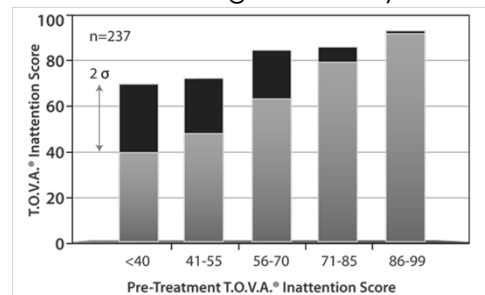
- The following charts show summary data for CPT standard scores that were taken in the mid-nineties
- These data document the status of protocol-based neurofeedback in that timeframe
- Used Standard "SMR-beta" training:
 - Reward nominally 12-15 Hz or 15-18 Hz
 - Inhibit 4-7 Hz and 22-30 Hz
 - Placement typically C3-T3



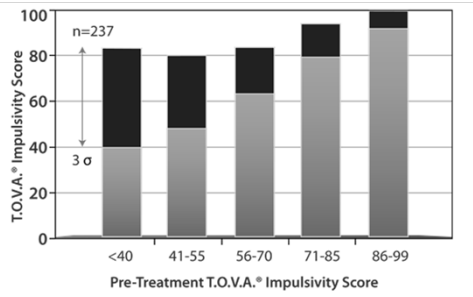
An Issue of Gaussian Statistics...

- In all of the following statistical analyses, the assumption was made that standard scores of less than 40 (i.e., at least four standard deviations below norms) were not particularly meaningful.
- i.e, the curve is not Gaussian more than four standard deviations out
- Hence all standard scores of less than 40 were arbitrarily reset to 40 for purposes of graphing and calculation of changes

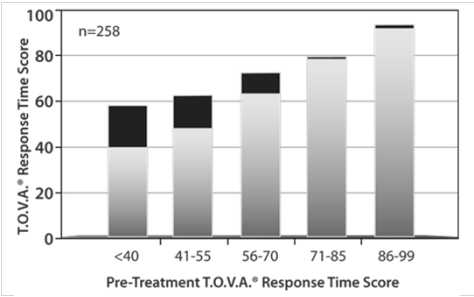
Inattention Score Segmented by Initial Deficit



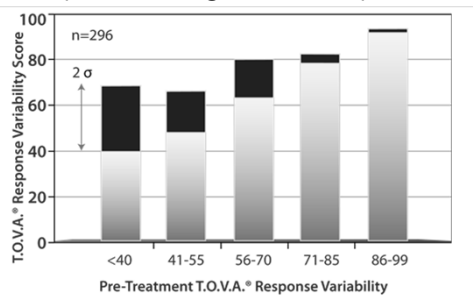
Impulsivity Score Segmented by Initial Deficit



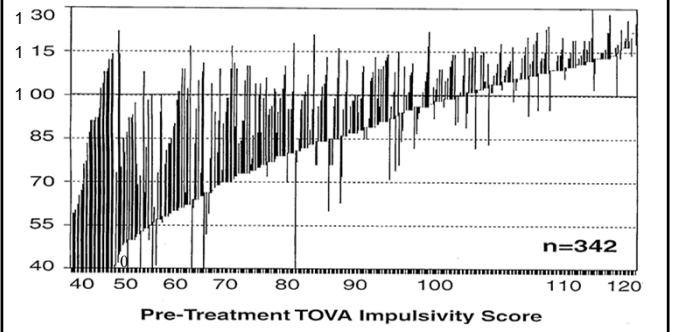
Reaction Time Score Segmented by Initial Deficit



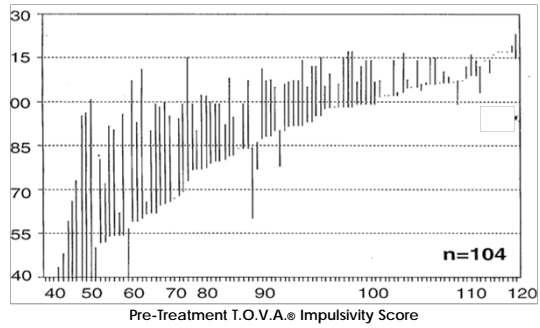
Variability Score Segmented by Initial Deficit



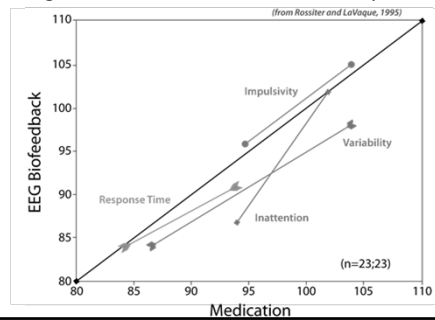
Effect of EEG Biofeedback on ADHD Kids

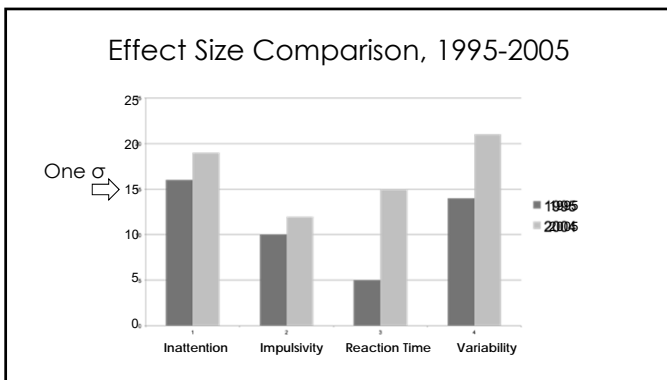
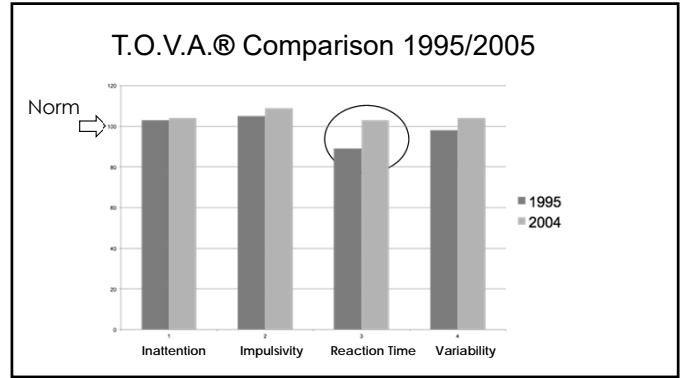
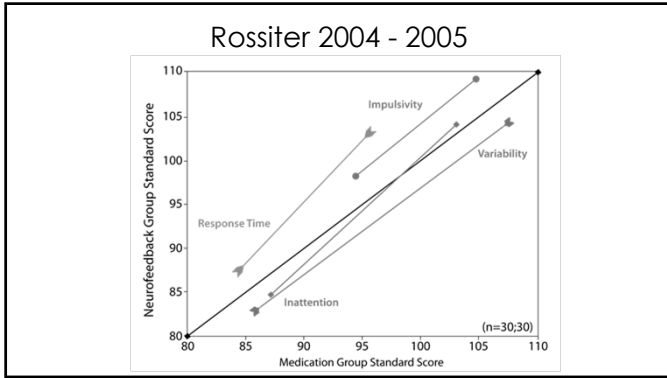


Effect of SMR-Beta on EEG Biofeedback



Comparison of ADHD Treatments Change in T.O.V.A.® Subtest Score (Post-Pre)



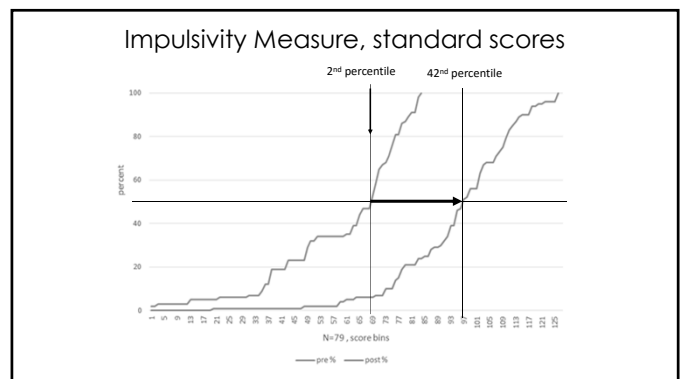


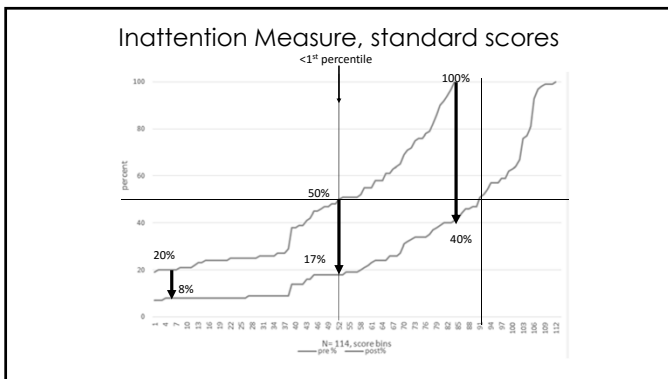
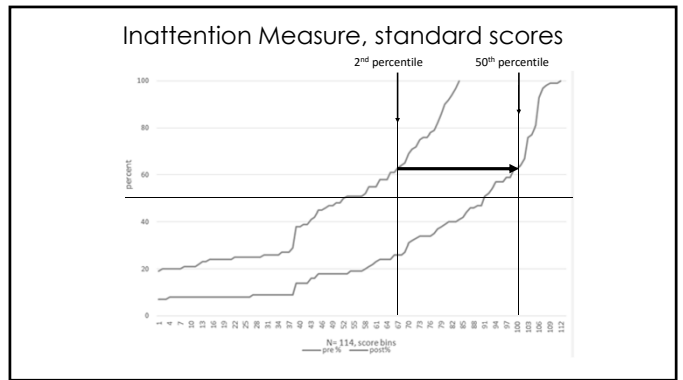
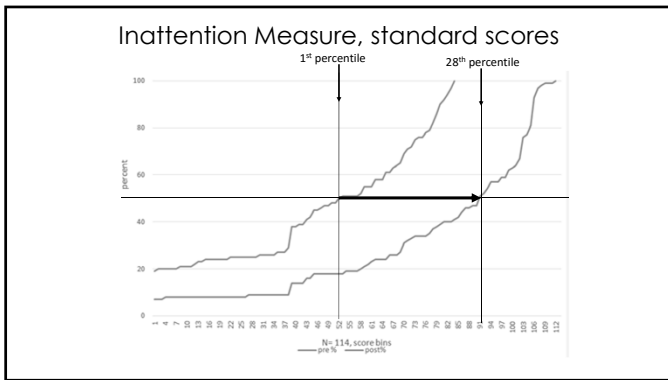
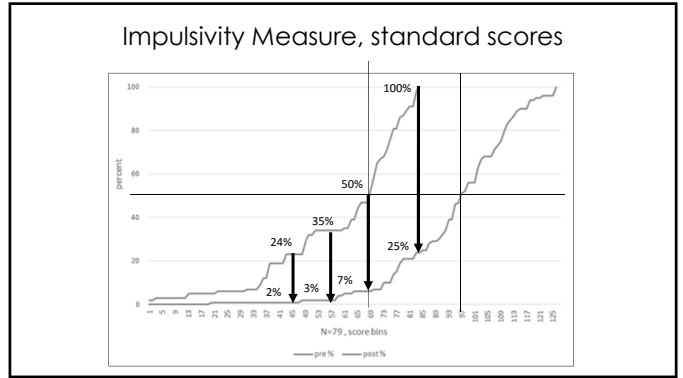
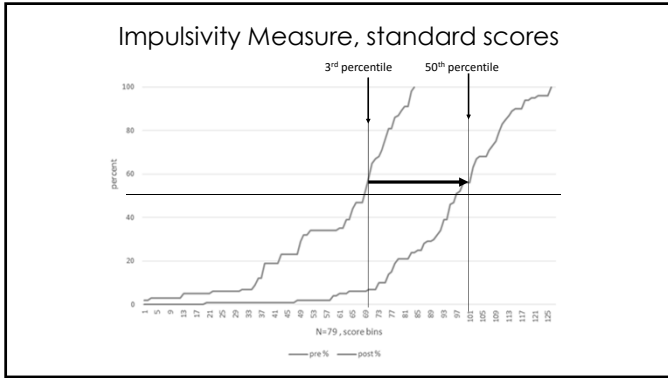
EEG Institute CPT Data Summary

Infra-Low Frequency Training
 2010-2013
 Data reduction by John Putman
 CPT data acquired with QIKtest
 Analysis used TOVA norms

Copyright, EEG Institute 2014

- ### Description of Data Set
- Database range was limited to pre-training values of less than 85 standard score, or 16th percentile
 - Data were from a total database of 350
 - 350 represents all pre-post data sets obtained at the EEG Institute in 2010-12 time frame, irrespective of age or diagnosis
 - Impulsivity measure: 23% of total population
 - Inattention measure: 33% of total population





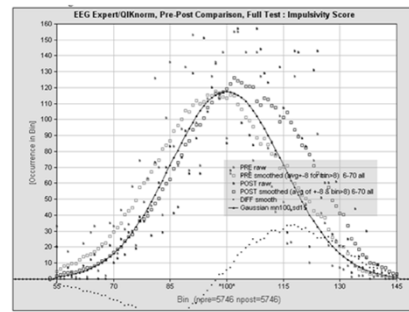
Where are we now, with QIK norms?

- The following is a summary of all data analyzed with the new QIKtest norms
- Two sets of data are shown:
 - Population in deficit
 - Total pool

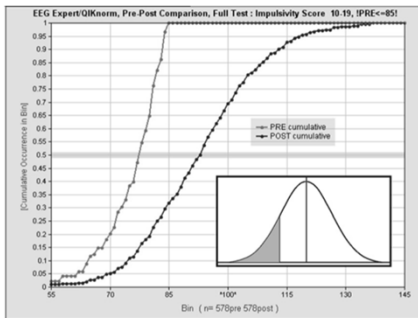
Cumulative Results for the Entire Database

- Impulsivity scale shown (the most representative)
- All results for cases in which pre-post data are available from all practitioners, covering the years 2006 to 2014.
- Covers a wide range of protocols, of software maturity, and of clinical skills
- Sample size exceeds 5700 cases

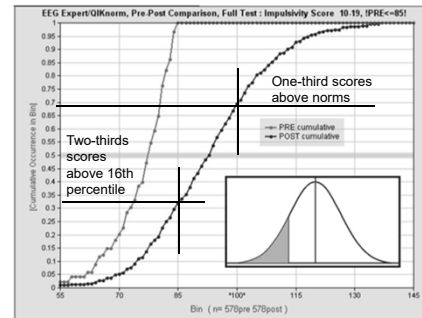
Impulsivity, standard scores



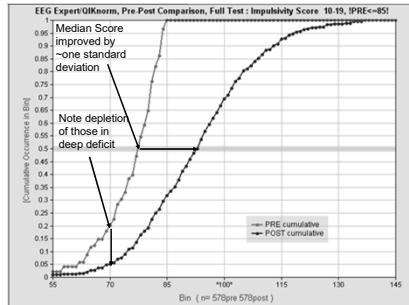
Impulsivity, standard scores



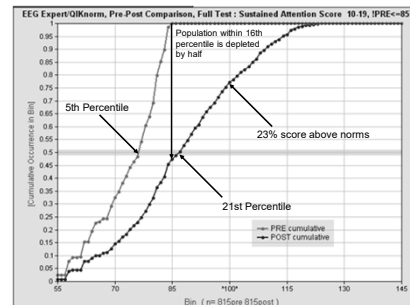
Impulsivity, standard scores



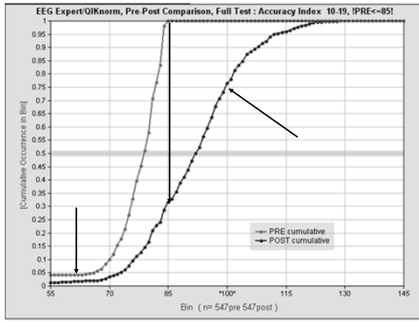
Impulsivity Measure, standard scores



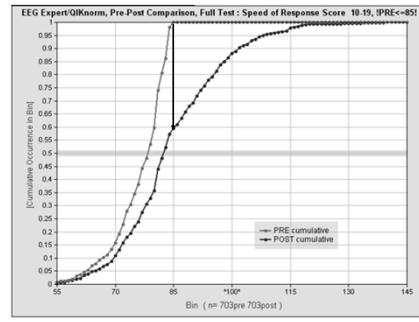
Inattention Measure, standard scores



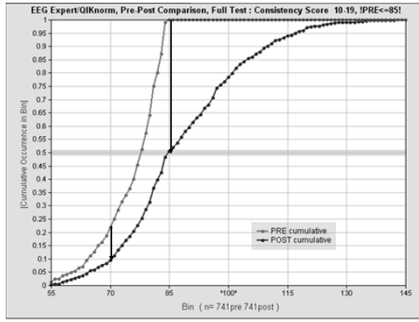
Accuracy Index, standard scores



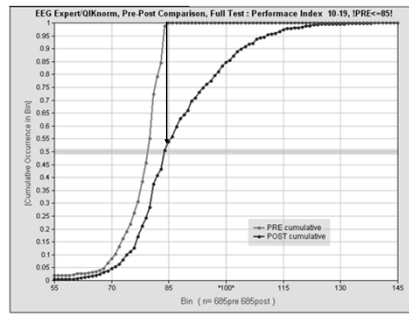
Speed of Response, standard scores



Consistency, standard scores



Performance Index, standard scores

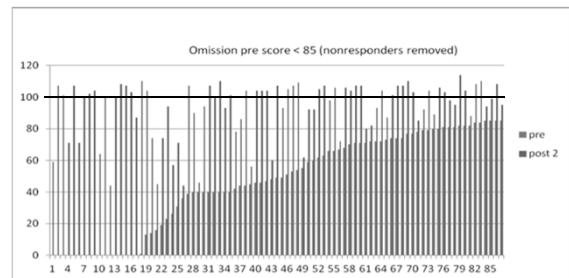


Individual data from the EEG Institute

- The following is a look at the deficated population at the EEG Institute
 - Look at data with non-responders removed to observe trends
 - Sample population: 350

Individual data for omission errors

Non-responders removed: 24% of sample

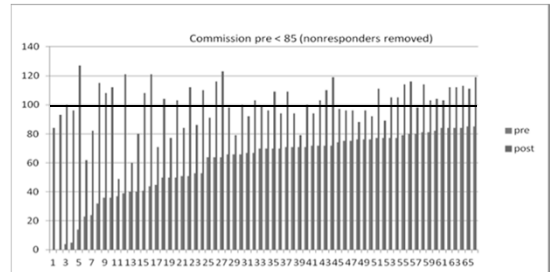


Individual data for omission errors

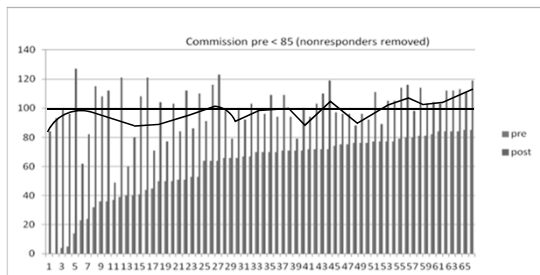
Observe that the likelihood of recovery of normal function is not sensitively dependent on the initial deficit. Sample population: 350

Individual results for commission errors

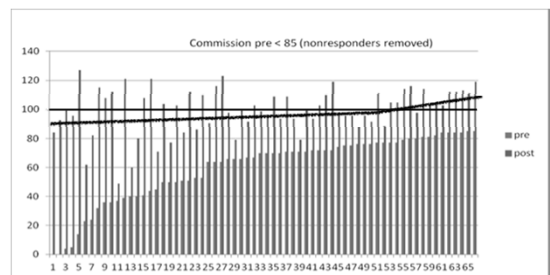
5% non-responders removed



Individual results for commission errors

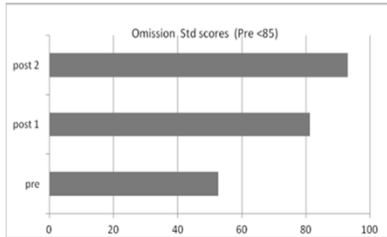


Individual results for commission errors



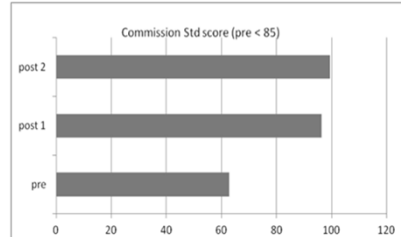
Standard scores for omission errors

- Pre-training score: 53
- Post-training score (all tests): 81
- Post-training score (no non-responders): 93



Standard scores for commission errors

- Pre-training score: 63
- Post-training score (all tests): 96
- Post-training score (no non-responders): 99.5!



Cumulative Results for the Entire Database

- All results for cases in which pre-post data are available from all practitioners, covering the years 2006 to 2014.
- Covers a wide range of protocols, of software maturity, and of clinical skills
- Sample size exceeds 5700 cases

Summary of CPT Data

- Substantial normalization of CPT scores is obtainable with either inter-hemispheric or lateralized bipolar training with individually optimized reward frequency.
- Results are superior to those obtained earlier with "SMR-Beta" training, particularly when account is taken of the changes in clinical population.

Changes in Clinical Population in Contemporary Data

- Wider range of clinical conditions being seen
- Lower initial functionality of many clients
- Greater completion rate
(more difficult clients are reaching the retest point)