# Case Studies A

COLLECTED 2014

## Case Studies

- 1. cABR within normal limits
- 2. cABR: APD pattern
- 4. Teen-ager: APD
- 5. Adult: ? Dx

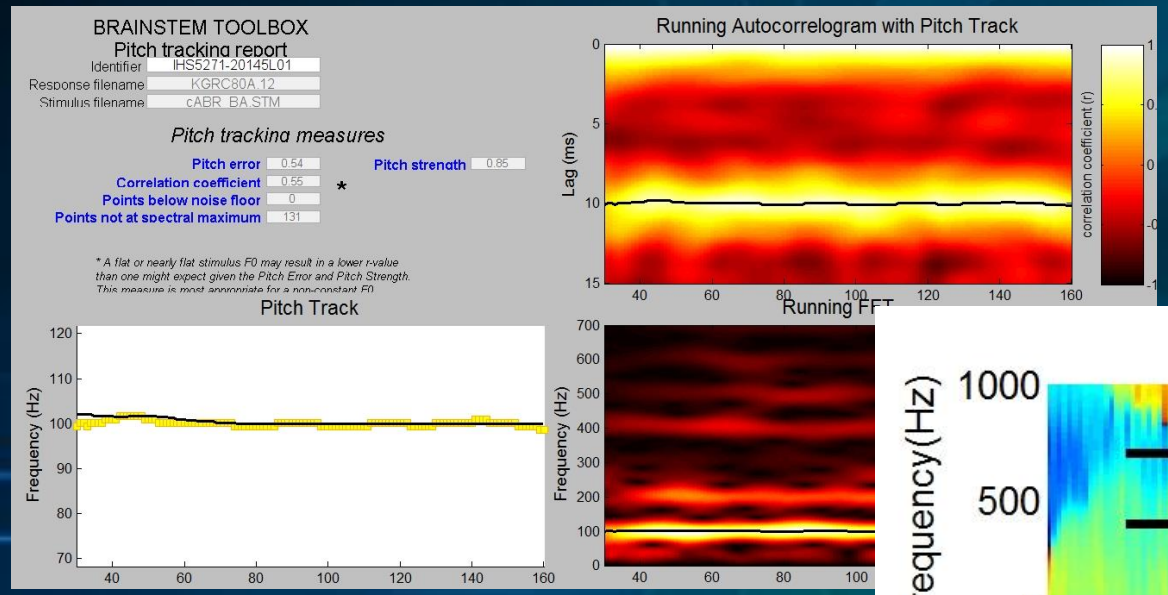
# KG: Case history

- Nine years of age
- No unusual medical history, no otitis media, no jaundice. Met expected speech and language milestones.
- No difficulty in noisy environments; holds conversations in restaurants.
- No problems learning to read or with phonics.
- No problems with multi-part directions.
- Sings song lyrics correctly.

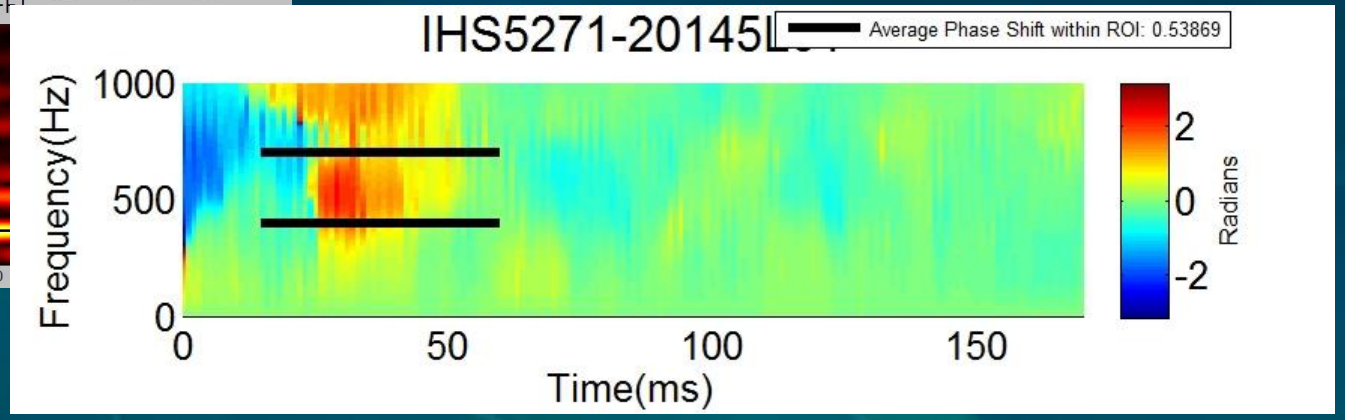
# KG: Test results

- Behavioral tests:
  - SSW: exactly 1 SD below mean (so, at the cut-off)
  - DD: 95%/90% (expected was 80%/75%)
  - CS: standard score of 11 (above the mean)
  - AFG 0 dB: standard score of 10 (at the mean).
- Electrophysiological tests:
  - DA latencies good; excellent cross-correlations, borderline on slope.
  - GA/BA: all WNL

# KG: Pitch Tracking, Cross-phaseogram




Actually borderline



# EJ: APD

- 7 years of age.
  - Adopted at age 3 yrs. Hx of drug/alcohol exposure, details unknown. Hx of otitis media.
  - Speech/Language: When addressed, simply stares. In Speech Tx. Garbles message when carrying out directions.
    - "Take a shower, and wash from head to toe": tries to put her head on her toes.
  - In noisy environment: fidgets, "tunes out", distracted. Poor with rapid speakers. Poor auditory memory.
  - Reading:  Slow learning to read. Receives special reading tutoring.

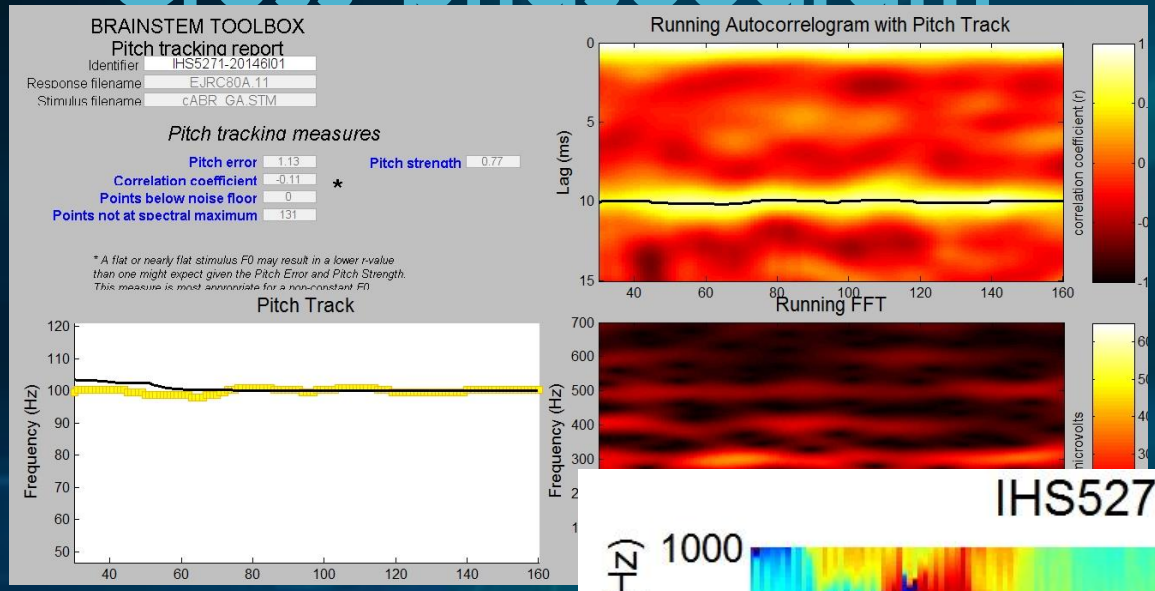
# EJ: Test results

- Behavioral tests:
  - SSW: 48 errors (expected = 22). This is – 5.3 SD. + Reversals.
  - DD: WNL (but she is young, so expected performance = 55%)
  - CS: standard score of 7 (16$^{th}$ percentile)
  - AFG +8 dB: standard score of 9 (37$^{th}$ percentile)
  - AFG 0 dB: standard score of 3 (1$^{st}$ percentile)
- Electrophysiological:
  - DA: late Wave A, late Wave O, poor slope
  - GA/BA: OK. PitchTracking OK, Cross-phaseogram OK.

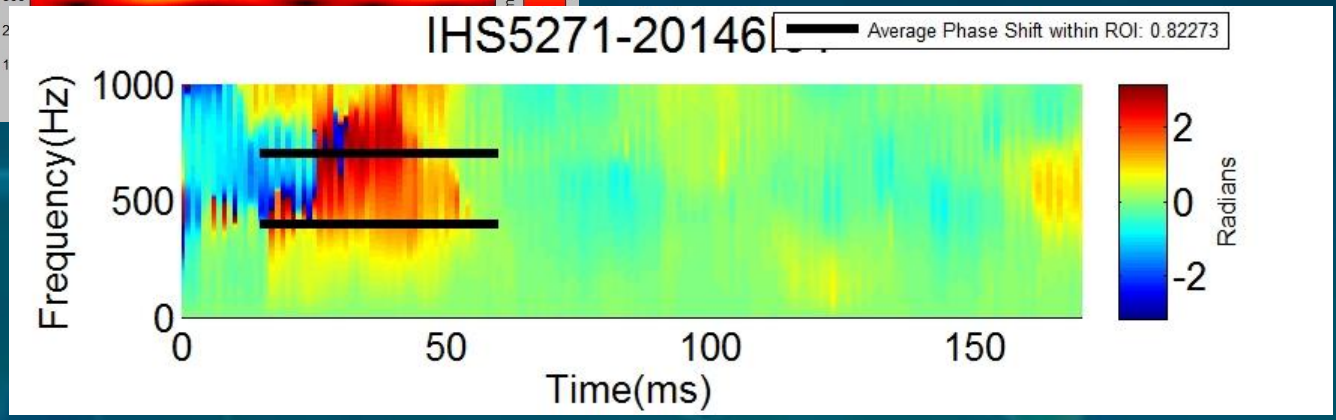
# EJ: DA Latencies

| *Norms: 8-11 years* | *Wave V* | *Wave A* | *Wave D* | *Wave E* | *Wave F* | *Wave O* |
|---|---|---|---|---|---|---|
| Expected<br>No greater than: | *6.77* | *7.81* | *22.58* | *31.50* | *39.64* | *48.35* |
| ***Right Ear*** | *6.35* | ***7.90*** | ***22.68*** | *30.90* | *39.25* | ***48.45*** |
| ***Left Ear*** | *6.40* | *7.58* | *22.13* | *30.48* | *38.93* | *47.98* |
| | | | | | | |

# EJ: Pitch Tracking and Cross-phaseogram




normal



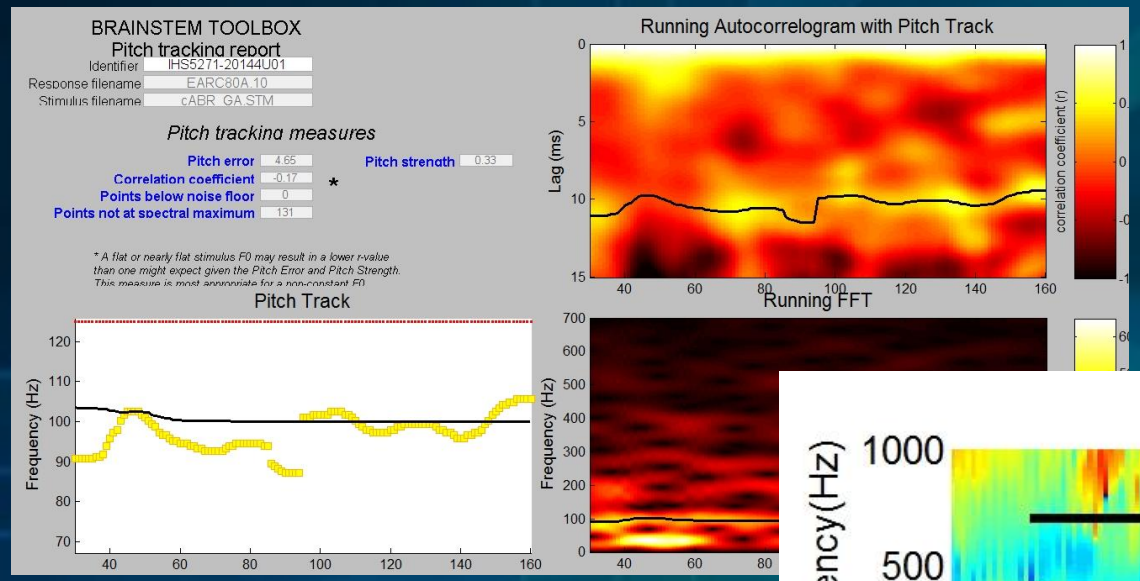
# EA: cABR not normal

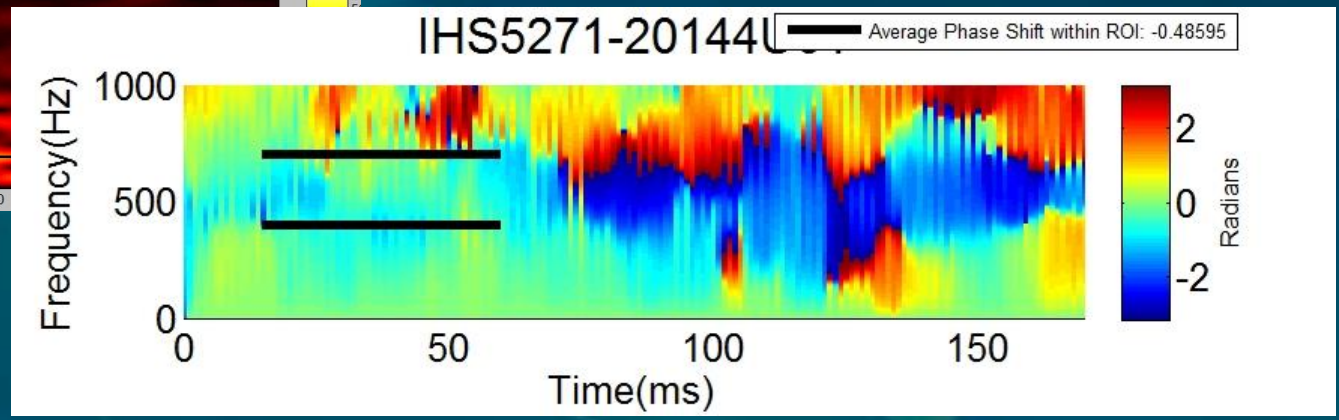
- 18 years old
  - Born with severe jaundice, medically treated. History of otitis media. OK start with sp/lang, but regression at 18 mo. Speech Tx 3-6 yrs. Unintelligible even to parents.
  - Difficulty learning to read. Presently in online high school to avoid noisy environments (classroom)
  - Difficulty understanding in any auditory competition. Difficulty talking on telephone. Poor auditory memory. Poor at multi-part directions.
  - Non-singer. Muddles song lyrics.

# EA: Test results

- Behavioral results:
  - SSW: 17 errors (under 6 is normal) (This is -7 SD)
  - DD: 82%/67% (where expected is 90%/90%)
  - Quick SIN: 4 dB/4 dB
- Electrophysiological results:
  - Clicks: Wave V at 7.40 (cut-off is 6.30)
  - DA: All latencies delayed. Poor slope. Poor correlations.
  - GA/BA: Poor S-R. Poor Pitch Tracking. Poor cross-phaseogram.

# EA: Pitch-tracking and Cross-phaseogram



# RJ: Noise Exclusion Deficit

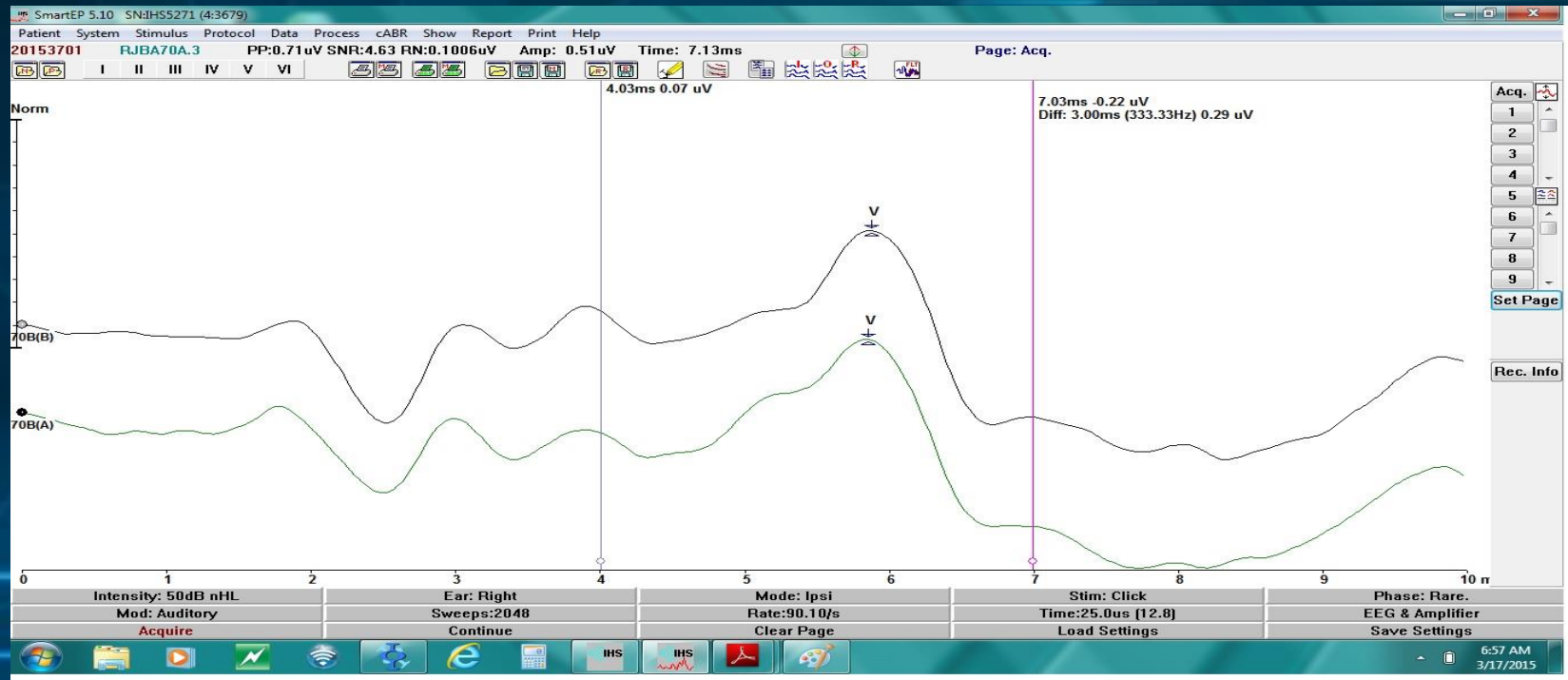
- Complaint: difficulty hearing in noise
  - Can't hear in classroom
  - Misses instructions from dance coach
- Previously diagnosed with APD 3 years ago
- Hx of reading difficulty, other siblings with APD (and Asperger's), poor at rapid/degraded speech, poor auditory memory

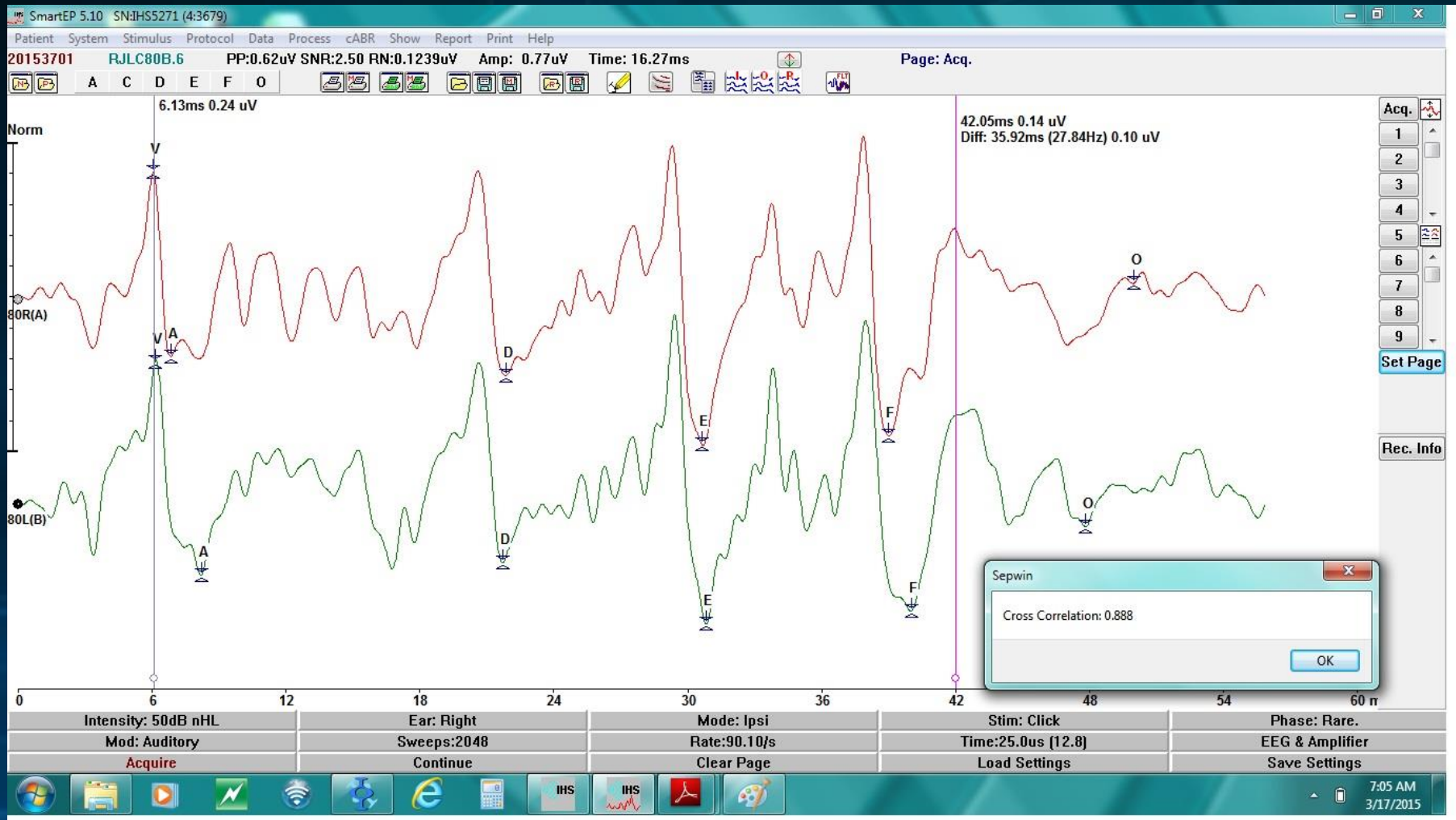
# RJ: Behavioral

- SSW: exactly -2 SD
- DD: OK
- QuickSIN: exactly -2 SD (3 dB SNR both ears)
- LISN-S: Spatial deficit (-3.9 SD); borderline for Talker deficit (-1.9 SD)
- Pitch Patterns: passed (but has music/dance experience)

# RJ: Electrophysiological

- Clicks: WNL
- 40 msec DA: delayed Wave A and O


SmartEP 5.10 SN:IHS5271 (4:3679)
Patient System Stimulus Protocol Data Process cABR Show Report Print Help
20153701 RJBA70A.3 PP:0.71uV SNR:4.63 RN:0.1006uV Amp: 0.51uV Time: 7.13ms
Page: Acq.
I II III IV V VI
Norm
4.03ms 0.07 uV
7.03ms -0.22 uV
Diff: 3.00ms (333.33Hz) 0.29 uV
V
V
70B(B)
70B(A)
Acq.
1 2 3 4 5 6 7 8 9
Set Page
Rec. Info
0 1 2 3 4 5 6 7 8 9 10 m
Intensity: 50dB nHL
Ear: Right
Mode: Ipsi
Stim: Click
Phase: Rare.
Mod: Auditory
Sweeps:2048
Rate:90.10/s
Time:25.0us (12.8)
EEG & Amplifier
Acquire
Continue
Clear Page
Load Settings
Save Settings
6:57 AM
3/17/2015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Patient System Stimulus Protocol Data Process cABR Show Report Print Help
20153701 RJLC80B.6 PP:0.62uV SNR:2.50 RN:0.1239uV Amp: 0.77uV Time: 16.27ms
Page: Acq.
A C D E F O
6.13ms 0.24 uV
42.05ms 0.14 uV
Diff: 35.92ms (27.84Hz) 0.10 uV
Norm
80R(A)
80L(B)
V
A
D
E
F
O
Acq.
1
2
3
4
5
6
7
8
9
Set Page
Rec. Info
Sepwin
Cross Correlation: 0.888
OK
0
6
12
18
24
30
36
42
48
54
Intensity: 50dB nHL
Ear: Right
Mode: Ipsi
Stim: Click
Phase: Rare.
Mod: Auditory
Sweeps:2048
Rate:90.10/s
Time:25.0us (12.8)
EEG & Amplifier
Acquire
Continue
Clear Page
Load Settings
Save Settings
7:05 AM
3/17/2015

# BRAINSTEM TOOLBOX

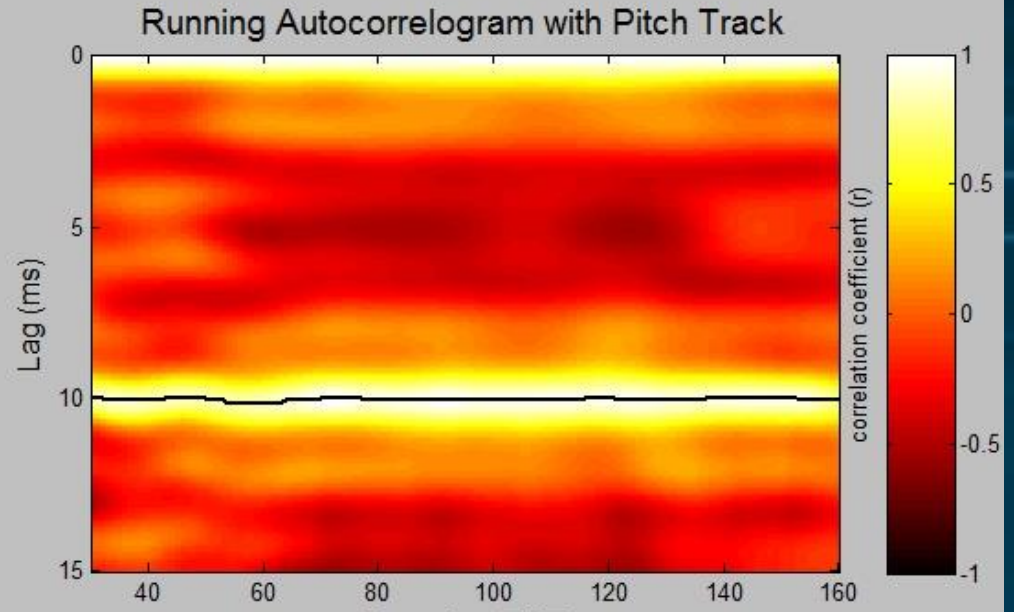
## Pitch tracking report

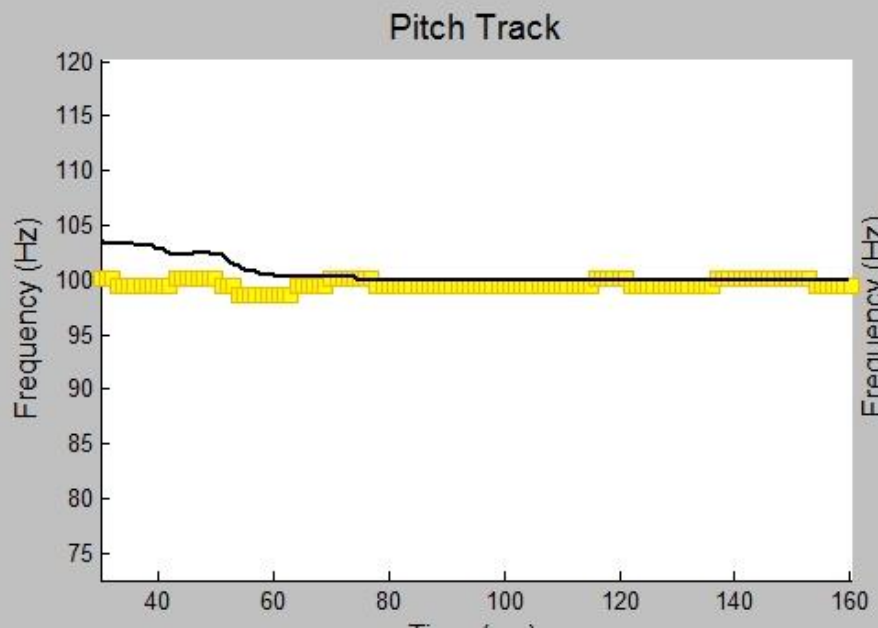
| | |
|---|---|
| Identifier | IHS5271-20153701 |
| Response filename | RJRC80A.12 |
| Stimulus filename | cABR_GA.STM |

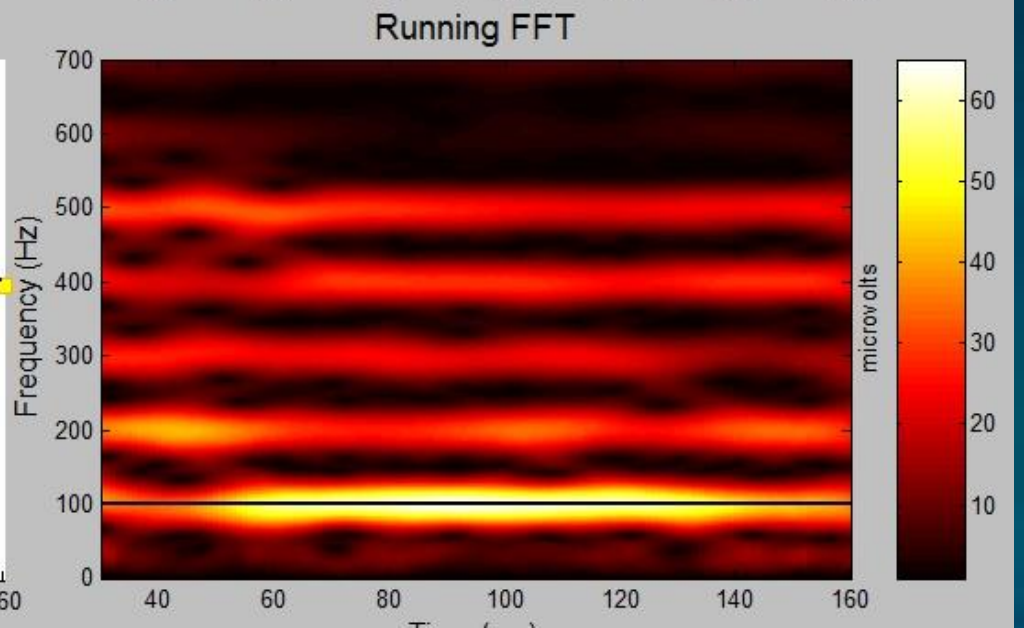
### *Pitch tracking measures*

| | | | |
|---|---|---|---|
| **Pitch error** | 1.02 | **Pitch strength** | 0.96 |
| **Correlation coefficient** | 0.08 * | | |
| **Points below noise floor** | 0 | | |
| **Points not at spectral maximum** | 131 | | |

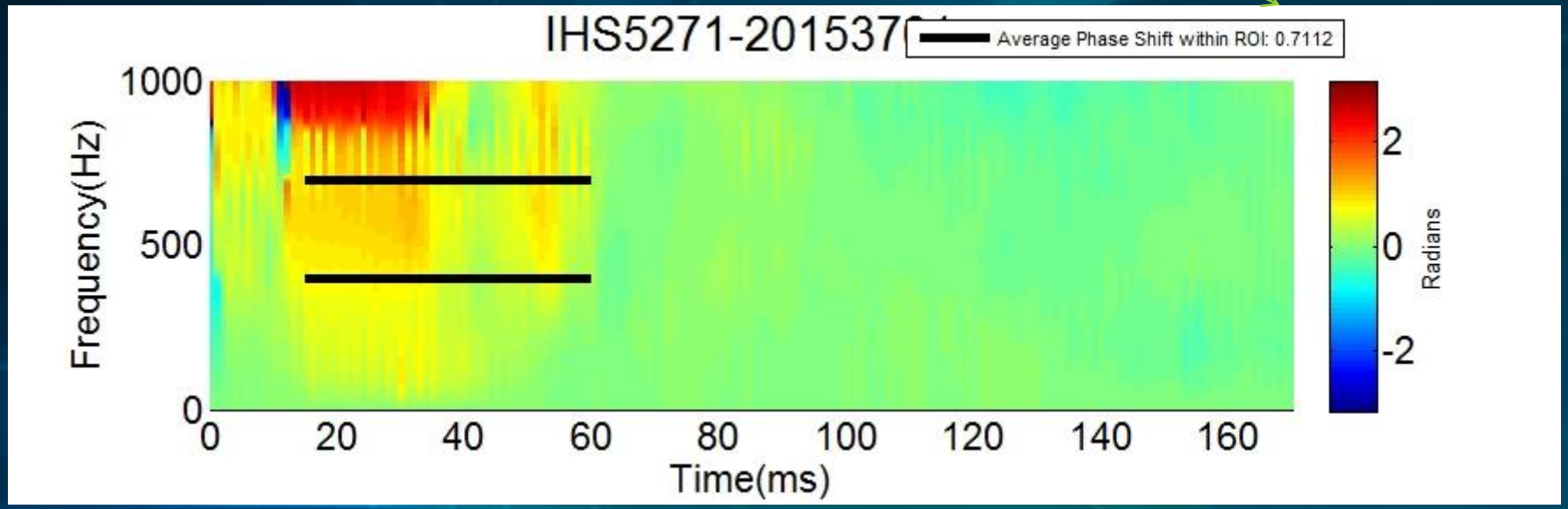
** A flat or nearly flat stimulus F0 may result in a lower r-value than one might expect given the Pitch Error and Pitch Strength. This measure is most appropriate for a non-constant F0.*



normal


IHS5271-201537
Average Phase Shift within ROI: 0.7112
1000
500
0
Frequency(Hz)
0
20
40
60
80
100
120
140
160
Time(ms)
2
0
-2
Radians

# RJ Slope Measurements

| *Slope of Wave V/A Complex* | Amplitude in uV | Duration in msec | Slope |
|---|---|---|---|
| ***Cutoff:*** | Greater than 0.30 | Less than 1.40 | Greater than 0.30 |
| ***Right Ear*** | 0.45 | 0.80 | 0.56 |
| ***Left Ear*** | 0.43 | **2.05** | **0.20** |

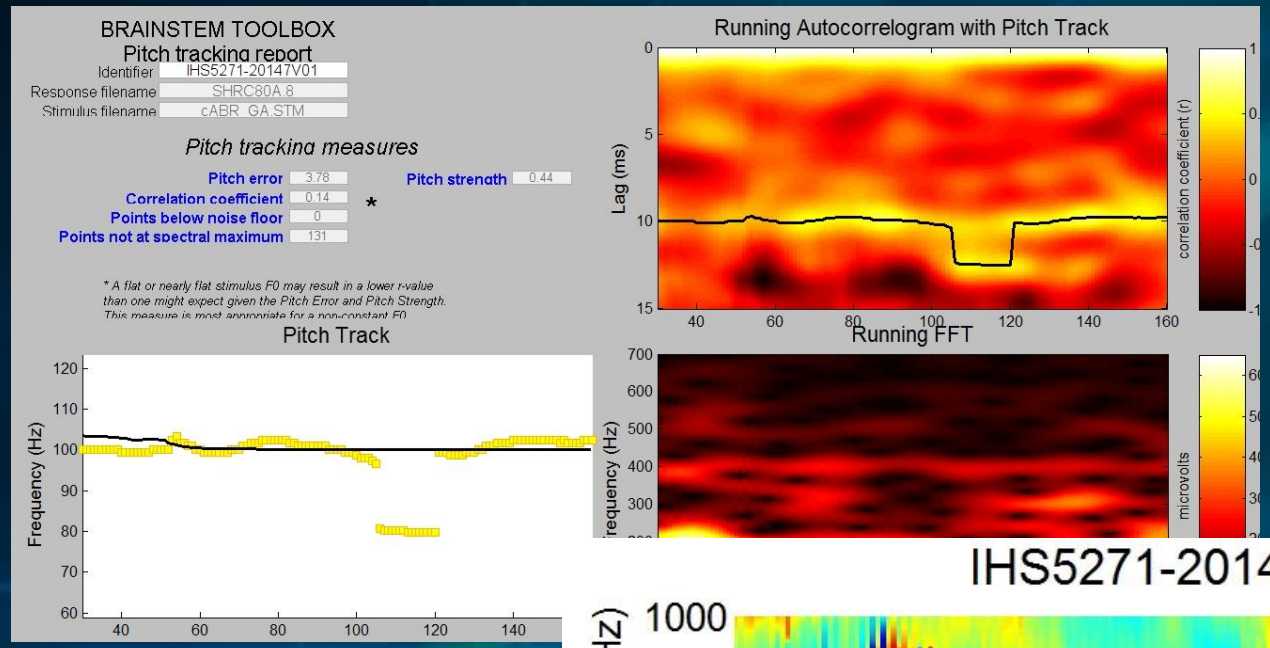
Outside of normal limits

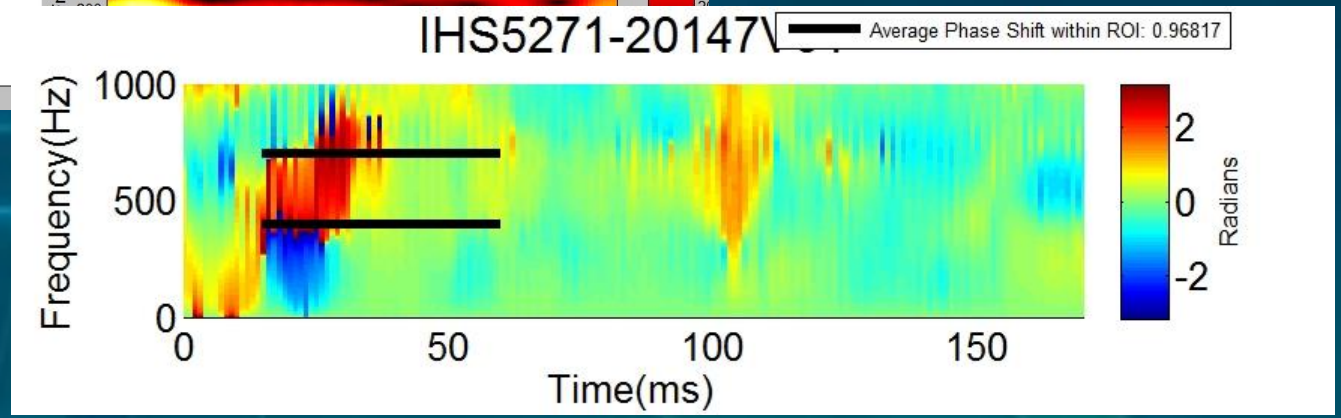
# SKH: atypical APD

- 52 Years of age.
  - Reported no Auditory Processing difficulties in last 5 years. Previously heard well in noise, on telephone, good at multi-tasking.
  - Now: cannot understand in any auditory competition. Cannot go to restaurant. Cannot go to movies (watches movies on computer to use closed captions). Poor auditory memory. Forgets how to say a word. Cannot understand song lyrics.
  - Increasingly photophobic.

# SKH

- Behavioral tests:
  - SSW: WNL
  - DD: WNL
  - Quick SIN: WNL
- Electrophysiological tests:
  - Clicks: Wave V at 7.0 (very late). Poor correlations.
  - DA: R ear generally OK. L: multiple late waves. Poor slope.
  - GA/BA: poor S-R correlations. Poor Pitch Tracking.


BRAINSTEM TOOLBOX
Pitch tracking report
Identifier IHS5271-20147V01
Response filename SHRC80A.8
Stimulus filename cABR_GA.STM
Pitch tracking measures
Pitch error 3.78
Pitch strength 0.44
Correlation coefficient 0.14
Points below noise floor 0
Points not at spectral maximum 131
* A flat or nearly flat stimulus F0 may result in a lower r-value than one might expect given the Pitch Error and Pitch Strength.
Running Autocorrelogram with Pitch Track
Lag (ms)
correlation coefficient (r)
Pitch Track
Frequency (Hz)
Running FFT
microvolts


IHS5271-20147V
Average Phase Shift within ROI: 0.96817
Frequency(Hz)
Time(ms)
Radians

# Conclusions

- 1. cABR provides objective measure
- 2. free from confounds
- 3. that can be used in clinic.
- 4. information to build a clinical protocol is available.