Guidelines for doing real-time Z-Score training using the Applied Neuroscience Z DLL

First install the latest BrainMaster BMT (Basic Modules for Training) software, version 2.5SE April 1, 2006 or later.

You may set up a new folder for a trainee, or you may use an existing trainee folder. There is a built-in settings file "Z Score Training I using Applied Neurosciences DLL" that you can use to start with.

When creating a new folder, choose the settings shown below:

New Folder - Select a Settings File	
[walkorga] [Wideinh] [Wideinh1] [Z Score Coherence Demo] [Z Score Coherence Range Training] [Z Score Demo Four Coherences Normal] [Z Score Phase Training Demo] [Z Score Theta Beta Ratio Training Demo] [Z Score Training Five Coherences Normal] [Z Score Training Five Coherences Normal] [Z Score Training I using Applied Neurosciences DLL] [Z Score Training with Flash Games Enabled] [Z-Heg] [Z-Miniq]	Z Score Training I using Applied Neurosciences DLL OK

Using your new folder, or an existing folder, you can then select "View or Change Settings" to see the following control:

etup Options					
Read/Write Settings File	Current Trainee/Study: Standard Test Study				
Data Channels	NCHANS: 2 SRATE: 256 FILTER: 3 ARTIFACT: 240 uV COM: 4 - SUMCHANS:OFF - SAVEEEG:OFF - P-P:ON SITES: 01 - A1 - 02 - A2 - 02				
Frequency Bands	Theta:4.0-7.0 Alpha:8.0-12.0				
Training Protocol	GO: 1:Theta(3.0) 1:Alpha(2.0) 2:Theta(3.0) 2:Alpha(2.0) STOP: (none) AUTO:ON:50/20/10 AUTOUPDATE BEFORE EACH RUN				
Display Options	Display: wave, filt. wave, therm,				
Feedback Control	Sound: Event Sound ON				
Session Control	40 SESSIONS -NO BASELINES-40 RUNS OF LENGTH: 1.0 MIN-NO PAUSE BETWEEN RUNS-SESSION TYPE: Simulation				
CLOSE	PRINT SETTINGS	Event Wizard	USE THESE SETTINGS		

If you used an existing folder, to load in the starting settings, press "Read/Write a Settings File and select the Z Score training:

Read or Write Settings File	
Settings File Name:	Note: Use this screen to manage your
[piano and violin alpha training two modes with high violin] [psmr] [ptheta] [Relax alpha training with Flash Games via. Event Wizard]	Settings File library. You can always change settings within any traince/study folder, without using this screen.
Relax [S-DEC-1F] [Sharp single component squash with Flash Games ∨ia. Event Wizard]	Create a New Settings File
[Sharp] [test event wizard] [testeven] [theta beta ratio training]	Save Settings To This File
[tom new band definitions] [UIHYZXX5 multiple threshold downtraining with multiple (chord) sounds] [UIHYZXX5]	Settings Description: Z Score Training I using Applied
[walkalph] [walkorga] [Wideinh] [Wideinh1]	Neurosciences DLL Directory:
[Yiterinii] [Z Score Coherence Demo] [Z Score Coherence Range Training] [Z Score Demo Four Coherences Normal]	/brainm.20/settings/Z Score Training I using Applied Neurosciences DLL
[Z Score Phase Training Demo] [Z Score Theta Beta Ratio Training Demo] [Z Score Training Five Coherences Norma]] [Z Score Training 1 using Applied Neurosciences DLL]	Read In Settings From This File
[Z Score Training with Flash Games Enabled] [z-Heg] [z-Miniq]	Cancel OK

Once your folder is started, you can press Data Channels to get the following control panel:

Data Channels			6	×
Channels O One O Two O AUX	Filter Order • 3 (faster response, less selective) • 6 (slower response, more selective)			
Sum-Channel I O ON O		Amplitude Scale		
	Save EEG to Disk: Artifact Threshold: O ON • OFF 240 microvolts			
Input Notch Filters GO Hz Notch Filter				
EEG Data Sampling Rate © 120 sps © 256 sps				
COM Port Select Enter COM Port Number (1, 2, 3,, 32) 4				
Search this PC for Available COM Ports				
Cancel	Cancel Electrodes & Trainee Info OK			

Then press "Electrodes & Trainee Info to see the following control panel:

Electrode and Trainee Information
Active 1Reference 1GROUNDReference 2Active 201Image: Aligned and a state of the st
🗖 Use MINI-Q Headbox (ignore above selections)
FP1 FP2 F7 F3 Fz F4 F8 T3 C3 Cz C4 T4 A1 T5 P3 Pz P4 T6 A2 O1 Oz $O2$
Age: (optional - must be nonzero to use Z-Score Training) 39
Cancel Condition: (required for Z-Score Training OK OK

Inspect the Electrode and Trainee Information control panel, and ensure that all information is correct. Make changes as necessary for your trainee. Note: if you set the trainee age to 0, you will "turn off" the Z Score training. This is the recommended way of making the Z Score training software inactive when you do not wish to use it.

Theses changes will be saved and used when you press "OK" and "Use These Settings" on the appropriate screens. Then when the software is started, the entered values will be used.

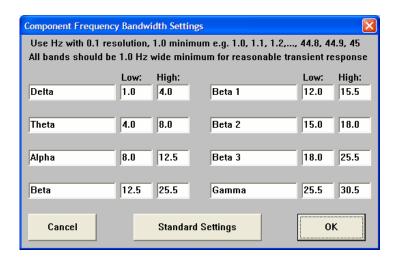
Note that it is not necessary to exit the training screen to make changes to this (or any) controls. You can simply stop the training screen, return to this control panel, make changes, and then restart the training screen (by pressing "GO"). This will allow you to change from eyes open to eyes closed, for example, without having to exit the training screen and start a new session.

You may return to this control panel at any time during the training by clicking on the title bar of the "Setup/Home Screen", and you may make changes to this screen. Then, use "OK" and "Use These Settings" to save the settings. The next time you press "GO" on the training screen, the new settings will be used.

Z Scores will automatically be computed for all possible values, and results can be displayed and trained using the BrainMaster Event Wizard. The Z Score variable names and usage are described in the "Data Dictionary for the Event Wizard" in the BrainMaster 2.5SE documentation. The following event shows a simple way to use the Z Scores:

If you wish, you can reprogram the BrainMaster built-in digital filters (and FFT bins) to match those in the Z Dll. This will make interpretation and use of the Z information

simpler and more consistent. The bands are set this way in the Demo settings files provided:



When you press GO, if Z Scores are enabled and the age is not set to "0", you should see a dialog like the following:

master2	.5 🛛 🕅
1	Initializing Z Score Training: Age: 54 Eyes: open Sites: O1: (BMr 25 -> NG 8) O2: (BMr 27 -> NG 9) Sampling Rate: 256 (to NeuroGuide = 128) Do you wish to use these parameters for Z-Score training? <u>Yes</u> <u>No</u>

If you wish to continue with EEG training without Z Scores, or if you need to change some of the parameters, simply press "No" now. If you press "Yes", one of two things will happen:

You may see a licensing control panel for the Applied Neurosciences software. If so, you will need to get your "A" key and then contact the manufacturer for a "B" key:

Œ	ANI Biofeedback Security Key	×
	Security Key A	-1
	MFRB 04RB EA47 IKIV 49WT IODM	
	Security Key B	-1
	<u>QK</u>	

Communicate this number to Applied Neurosciences, Inc. or to BrainMaster Technologies, Inc., and you will be able to purchase a B key to use the software. Once you have licensed the ANI Biofeedback software, you will not see this screen again. You will see the following dialog after licensing the software, and in the future, you will see the following dialog immediately after pressing "GO":

master2	25 🔀
⚠	Z Score training initialized. Z Scores will be computed.
	OK

Press "OK", and the system will go through its normal starting process, and then prompt you to press "OK" when the signal is OK:



After your press "OK" and the training screen starts, you should see a screen like the following:

Z Score Training with BrainMaster 2.5SE

🕅 Training/Control Screen - Bra	inMaster 2.5SE	
Data Display Freq.Bands Color Sou	und	
GO STOP Window Cl	lock: 38:	30 Points: 000 Close
System is Idling		Check Signal
EEG CHANNEL 1 MANNA MANNA MAN MANNA MANNA MAN	14mmin particulation	MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
EEG CHANNEL 2 MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM	m.Manampana	MMMMMMMMMMMMMMMMMMMM 4.0 sec.
Component /	Ampl(u¥) _ %	Full Scale: 12.8
Delta (1.0-4.0):	Energy 6.3 6 3.4 12	* 10.0 –
Theta (4.0-8.0): Alpha (8.0-12.5): Beta (12.5-25.5): Beta (12.0-15.5):	3.4 12 2.9 11 7.3 38 1.2 4	$5.0 - \frac{1}{4}$
Beta 2 (15.0-18.0): Beta 3 (18.0-25.5):	4.3 10 5.0 22	Event: 1, x=5 + ZAP1T;
Gamma (25.5-30.5):	2.3 10	10.0 -
EVENT CONDITIONS: 1 if EQN: GT 5.0 do tone :	VALUE % Time 4.9 67	5.0 - $\sqrt{4}$
2 if EQN: LT 5.0 do tone : 3 if EQN: GT 5.0 do nothing :	5.1 51 4.4 83	Event: 2, x=5 + ZAP1A;
		10.0 -
		$5.0 - \frac{2}{2} \frac{1}{2} \frac{1}{2$
		Event: 3, x=5 + ZAP1B;

The Z Scores are shown in the graphs at lower right, and can be used for training. For convenience, we add the value 5.0 to each Z score, to make a positive number. Thus, when a Z score is 0, the graph is at 5.0.

Note: When the Z Score training is running, your PC will use more of the processor. You should expect a small (3-5%) increase when this is being used. On a typical 1GHZ processor, the BrainMaster software with Z Scores uses between 3% and 10% of the CPU, compared to 0% - 2% typically with the BrainMaster 2.5SE software alone.

You can use any training methods with Z Scores through the Event Wizard. You can also use any screen configuration(s) you like. The Z Scores used in the Event Wizard will show up on the Text Stats panel, and on the Event Trends panel. Note that the Event Wizard automatically computes the percent time meeting criterion for any events. Thus, in the example below, the Text Stats displays the current value, as well as the percent time that each Z Score is above (or below) the "normal" value, based upon how each event is defined:

🔯 Training/Contro			2.5SE	
<u>D</u> ata D <u>i</u> splay <u>F</u> req.B	ands <u>C</u> olor <u>S</u> ou	nd		
GO STOP	Window Cl	ock:	39:1	9 Points: 000 Close
System is Idling			С	heck Signal
Component	A	.mpl(u¥)	% Energy	Full Scale: 10.7 10.0 -
Delta	(1.0-4.0):	5.7	6	
Theta	(4.0-8.0):	4.5	11	5.0 - 44444/4/4/4/4/4/4/4/4/4/4/
Alpha	(8.0-12.5):	5.4	9	
Beta	(12.5-25.5):	9.6	33	
Beta 1	(12.0-15.5):	5.9	5	
Beta 2	(15.0-18.0):	7.1	8	Event: 1, x=5 + ZAP1T;
Beta 3	(18.0-25.5):		19	10.0 -
Gamma	(25.5-30.5):	4.6	12	10.0
EVENT CONDITION		VALUE	Time	5.0 - $\mu^{\mu}\mu^{\mu}\mu^{\mu}\mu^{\mu}\mu^{\mu}\mu^{\mu}\mu^{\mu}\mu^{\mu$
1 if EQN: GT 5.0		4.2	73	
2 if EQN: LT 5.0		5.0	48	
3 if EQN: GT 5.0	do nothing :	6.9	77	Event: 2, x=5 + ZAP1A;
				10.0
				5.0 - Wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
				Event: 3, x=5 + ZAP1B;

Note that you can use the "damping factors" in the Event Wizard to create time-averages of any variable, including the z scores. The following example shows the effect of a damping factor of 10:

🕅 Training/Contr	ol Screen - Brai	nMaster	2.5SE	
<u>D</u> ata D <u>i</u> splay <u>F</u> req.	Bands <u>C</u> olor <u>S</u> ou	nd		
GO STOP	Window Cla	ock:	39:2	5 Points: 000 Close
System is Idling	g		C	Check Signal
Component	А	.mpl(uV)	%	Full Scale: 10.7
		• • • •	Energy	10.0 -
Delta	(1.0-4.0):	4.1	6	
Theta	(4.0-8.0):	6.4	11	
Alpha	(8.0-12.5):	3.7	10	5.0 5.0
Beta	(12.5-25.5):		29	
Beta 1	(12.0-15.5):		5	
Beta 2	(15.0-18.0):		7	Event: 1, x=5 + ZAP1T;
Beta 3	(18.0-25.5):		15	10.0 -
Gamma	(25.5-30.5):	5.0	10	10.0
EVENT CONDIT	IONS:	VALUE	% Time	5.0 5.0
1 if EQN: GT 5.	0 do tone :	5.6	97	
2 if EQN: LT 5.0		4.9	68	
3 if EQN: GT 5.	0 do nothing :	5.6	98	Event: 2, x=5 + ZAP1A;
				10.0
				5.0 5.0
				Event: 3, x=5 + ZAP1B;

In the following example, the BrainMaster component amplitudes are plotted along with the Z Scores as trend plots. The concordance between the raw amplitude scores and the Z sores can be seen in the signals.

🔯 Training/Control Screen - BrainMaster	2.5SE
Data Display Freq.Bands Color Sound	
GO STOP Window Clock:	00:41 Points: 038 Close
In Playback Mode	View Playback
Full Scale: 26.6 microvolts	Full Scale: 26.6
20.0 -	20.0 -
10.0 - Mr. MMMM	10.0 - Aman Mark 5.0
Theta	Event: 1, x=5 + ZAP1T;
	20.0 -
	2.0 10.0 MMmmMM 5.0
Alpha	Event: 2, x=5 + ZAP1A;
20.0 - ht	20.0 -
$10.0 - M_{M}M_{M}M_{M}M_{M}M_{M}M_{M}M_{M}M_{M$	10.0
Beta	Event: 3, x=5 + ZAP1B;

The following screen shows the live "Z Score Panel" that is available on the training screen whenever Z Scores are used. This panel shows all 76 available Z Scores. The Z Scores are damped, to provide a slower time course than the standard, faster moving training variables. The Z Scores are color coded, to show when they exceed the normal limits. High Z Scores are colored yellow (+1 SD to +1.5 SE), orange (+1.5 SD to +2.0 SR) and red (+2 SD and above), and low Z Scores are colored Green (-1.0 SD to -1.5 SD), blue-green (cyan) (-1.5 SD to 2.0 SD) and blue (-2 SD and below). This provides a real-time "report" of the Z Scores, as the training or monitoring session progresses.

💆 Training/Control Screen - BrainMaster 2.5SE							
Data Display Ereq.Bands Golor Sound							
GO STOP Window Clock: 39:42 Points: 000 Close							
System is Idling Check Signal							
EEG CHANNEL 1 บัญญาษณ์พายามหายามหายามหายามหายามหายามหายามหายาม	1 Am	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	rentined	And no the states	MMMM	www.vy	www.mmmmwy.mmymy.nl/ 8.8 sec.
EEG CHANNEL 2 Warhow May Warhow May Manager M Manager Manager	mm.Mullipeters	prod Northan	mynhwyan)	WWWWW	when	all mage has	Murana manager 8.8 sec.
		Abs	Rel	Rat/T	Rat/A	Rat/B	Rat∤G
5 60 (Delta	0.8	0.8	-0.2	-0.2	-0.2	-0.2
	Theta Alpha	1.0 0.2	1.0 0.1		0.4	0.4 1.8	0.4 1.8
45 \	Beta	-1.6	-2.1			1.0	-0.2
	Beta 1	1.0	0.8				
للحجي المسر	Beta 2	-0.0	-0.2				
30	Beta 3 Gamma	0.9 0.3	0.8 0.2				
30 5	Delta	-2.7	-3.2				-2.7
	Theta	0.9	1.0				-2.1
	Alpha	0.4	0.5			-1.9	-1.9
	Beta Beta 1	-0.0 1.8	-0.1 1.7				-3.2
	Beta 1 Beta 2	0.5	0.5				
	Beta 3	0.4	0.4				
	Gamma	0.7	0.7				
		Asyn	n	Coh		hase	
	Delta Theta	2.3			-	0.2	
	Alpha	-0.4		0.2		0.8	
	Beta	-1.7				2.1	
	Beta 1	-1.0		-0.8		0.8	
	Beta 2	-0.8		0.3		0.2	
	Beta 3 Gamma	0.8 -0.4				2.9 0.1	
	ciainina	0.4					

Playing back files:

If you have the Z Score Training enabled, and you select files for playback, the system will automatically detect the sensor locations and eyes (open or closed), if these were set when the data were acquired.

Select Input File			×			
Filename: e010)0201.e02					
Len: 60 sec (2 chans), 120 sps, 2E F3-LE-GND-LE-F4 ASSESSMENT						
	e0100101.e02	<u> </u>				
	e0100201.e02 e0100301.e02					
	e0100401.e02					
	e0100501.e02 e0100601.e02					
Cancel	e0200101.e02					
	e0200201.e02 e0200301.e02					
ОК	e0200401.e02	▼				
Path: c:\brainm.20\studies\horvajo1\						

When you select a playback file and hit "OK", then if the age of tehr trainee is other than "0", the system will attempt to set up the Z Score mechanism for playback. You should see a dialog like the following:

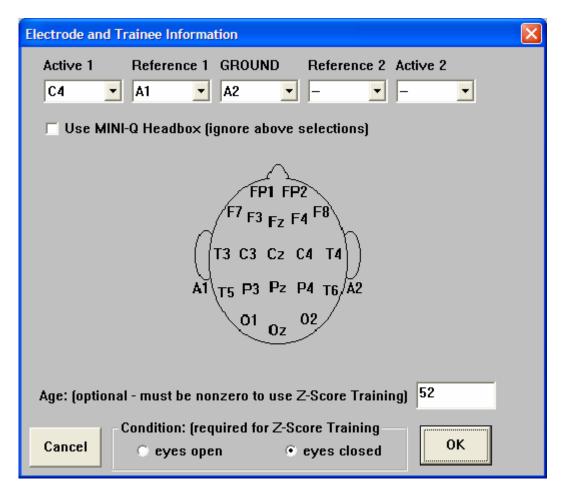
	master2	25 🛛 🕅
	1	Initializing Z Score Training: Age: 52 Eyes: closed Sites: F3: (BMr 6 -> NG 2) F4: (BMr 8 -> NG 3) Sampling Rate: 120 (to NeuroGuide = 120) Do you wish to use these parameters for Z-Score training?
x		<u>Y</u> es <u>N</u> o

When you hit "OK" the system will initialize the Z Score system. If it is successful, you will see a dialog like the following:



Hit "OK" to proceed, and the playback will begin.

Note: For records made with software before the March 2006 software, the data keys will not contain the age or the eyes condition. When playing back such records, you should go to the following screen (the button for this control is is found on the "View or Change Settings/Data Channels" control panel)



and make changes as necessary, so that your playback contains the correct information.

Built-in Settings Files.

The following Settings files are provided in the 2.5SE April 1, 2006 release, for initial use:

- Z Score Training I Using Applied Neuroscience DLL Z Score Coherence Demo Z Score Coherence Range Training: Z Score Phase Training Demo
- Z Score Theta Beta Ratio Training Demo
- Z Score Demo Four Coherences Normal
- Z Score PercentZOK

To use these settings files, either create a new folder, or select the "test" folder, or select another folder to work in. Then press "View or Change Settings / Read/Write a Settings File". Then select the name from the choices, press "Read Settings from this File" and "OK". Then you will have the settings loaded, into the current folder, to work with.

These settings files provide starting points to design further protocols. For example, sounds can be added to the Event Wizard settings, to provide training based upon the Z Scores. Some of the files already demonstrate this.

Any panels can also be added. The raw and filtered waveforms, BrainMirror displays, or other panels can be used, as required in any of these designs.

The files marked "Demo" are set up as simulations. To use them for training, use the "Session Control" panel, and change them from "simulation" to "training".

These files are described in the following descriptions.

Z Score Training with BrainMaster 2.5SE

Z Score Coherence Range Training:

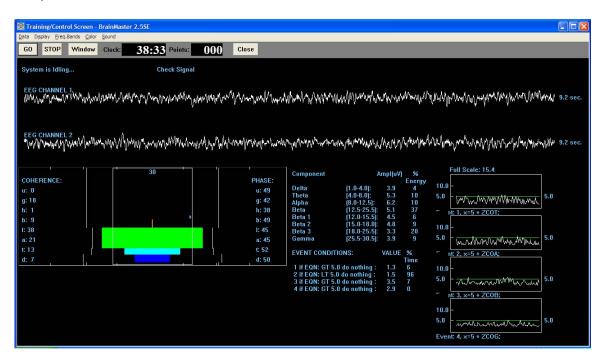
This is an example of a protocol in which the Z score of the alpha coherence is trained within a range, being rewarded when it is within 1 standard deviation of normal:

Training/Contro			2.5SE				
GO STOP	Window Cla	ock:	38:0	0 Points:	145	Close	
System is Idling			С	heck Sign	al		
EEG CHANNEL	Wywr4WW WYL440	normani Innana	nd Valensen Waren 1410	wMuh WMum	warden warden Nachward	₩₩₩₩ 4.0 s	
Component	A	l′′′ mpl(u¥)	% Energy	Ful	l Scale: 8.9	, 11	
Delta Theta Alpha	(1.0-4.0): (4.0-8.0): (8.0-12.0):	3.4 6.8 4.8	4 8 9				
Beta Beta 1	(12.0-25.5): (12.0-15.5):	9.0 5.2	35 9				
Beta 2 Beta 3 Gamma	(15.0-18.0): (18.0-25.5): (25.5-30.5):	3.0 10.6 3.2	10 16 9				
EVENT CONDITI 1 if EQN: GT 4.0 2 if EQN: GT 6.0	DNS: do tone :	VALUE 2.5 2.5	% Time 24 0				6.0
				2.0 -			
				Events	1-2: x=5 + ZCO	A;	

Z Score Coherence Demo

This file runs the BrainMaster coherence alongside the Z Score coherence:

Sounds can be produced by either the built in "coherence" sounds, by the event sounds, or by a combination of both.



Z Score Phase Training Demo

This file demonstrates training the phase difference between two signals, using the Z phase metric.

🔯 Training/Contr	ol Screen - Brai	nMaster	2.5SE				
<u>D</u> ata D <u>i</u> splay <u>F</u> req.	Bands <u>C</u> olor <u>S</u> ou	nd					
GO STOP	Window Clo	ock:	39:31	Points:	000	Close	
System is Idling]		Ch	eck Signal			
EEG CHANNEL	.1 WAWWWWWWWW	NM MAN	NUMUN	14MMM	www.	MUMM ¹ 4.1) sec.
EEG CHANNEL //w/whyth///////////	2/19. ANNINAN	Nuntura	mp. Mar			MMM 4.1) sec.
Component	A	mpl(u¥)	_ %	Full Sc	ale: 12.8		
Delta Theta Alpha Beta Beta 1 Beta 2 Beta 3 Gamma	(1.0-4.0); (4.0-8.0); (8.0-12.5); (12.5-25.5); (12.0-15.5); (15.0-18.0); (18.0-25.5); (25.5-30.5);	6.1 8.0 6.5 9.8 1.5 3.9 8.9 3.6	Energy 7 12 9 32 8 8 8 15 13	10.0 -			
EVENT CONDIT 1 if EQN: GT 5.		VALUE 6.4	Time 71	5.0 -			5.0
				Event: 1, x=	=5 + ZPHG;		

Z Score Theta Beta Ratio Training Demo:

This demonstrates using the Z Score for the Theta/Beta ratio as a training variable. At the same time, the theta and beta amplitudes are monitored using the thermometers, and the Trend Text panel.

Training/Control Scre		E				
Data Display Freq.Bands		9:23 Points:	000 ci	ose		
System is Idling		Check Signal				
EEG CHANNEL 1	White And		NyMannah	Mirara	NMN/MMM	WWWWWWWWWWWWWWWWWWW 7.0 sec.
95 0.00,0 Theta	95 0.00.0 Beta	Component Delta Theta Alpha Beta Beta 1 Beta 2 Beta 3 Gamma EVENT CONDITI 1 if EQN: LT 5.0	(1.0-4.0): (4.0-8.0): (8.0-12.5): (12.5-25.5): (15.0-18.0): (18.0-25.5): (25.5-30.5): ONS:	4mpl(uV) 3.5 9.0 3.5 16.2 3.6 4.8 7.6 5.2 VALUE 5.4	Energy 3 13 12 33 4 11 17 15	Full Scale: 12.8
						5.0

Z Score Demo Four Coherences Normal: This protocol provides reward tones when four selected coherences are within 2 standard deviations of normal:

🔯 Training/Control Screen - BrainMaster 2.5SE			FX
Data Display Ereq.Bands Color Sound			
GO STOP Window Clock: 37	22 Points: 000	Close	
System is Idling	Check Signal		
EEG CHANNEL 1	X		
the trend of a the old which we have a	las MA, Mae Alfred Las I As	1. We there are a phene with the present of the phene of	
L to when the AMA AMA AMA to The Proceeding	NALINA AN ANALANA ANA	AMANAA JAA WALAAMAADD MAANA A MADAADDAADAADAADAADAADAADAADAADAADAADAAD	sec.
	chin s u set		
EEG CHANNEL 2	. ú.	a a second of the second se	
has a subject to a sheet of the stress of a subject of the subject	e e a me den e dans dalaha d	why New New New New York Why A part New York when the Area and A Martin Martin Martin Contraction of the Martin Contraction of the Contraction of	
MAAMULINA ARE ALL MAANA ALL MAANA ALL	al Maaa Maada ka kaa kaa kaada	KAN DARIARANAN ANT ALANTAN DALAMAN ANDALANAN ANDARIS. MANDALAN DARAMAN MANDALANAN ANDALANAN ANDALAN DALAMAN AN	sec.
a which we have		line of the state	
Abs Rel	Rat/T Rat/A Rat/B		
Delta (1.0-4.0) -0.3 -0.4 Theta (4.0-8.0) 0.2 0.1	-0.3 -0.3 -0.3 -0.1 -0.1	-0.3 -0.1	
Alpha (8.0-12.5) -0.1 -0.2	-0.1 -0.1	-0.5	
Beta (12.5-25.5) 0.4 0.5		-0.9	
Beta 1 (12.0-15.5) 0.9 0.9 Beta 2 (15.0-18.0) 0.3 0.3			
Beta 3 (18.0-25.5) 0.5 0.5			
Gamma (25.5-30.5) 0.5 0.5			
Delta (1.0-4.0) -0.3 0.0 Theta (4.0-8.0) 0.3 0.0	0.0 0.0 0.0 0.0 0.0		
Alpha (8.0-12.5) -0.0 0.0	0.0 0.0	0.0 5.0	
Beta (12.5-25.5) 0.7 0.0		0.0	
Beta 1 (12.0-15.5) 0.9 0.0 Beta 2 (15.0-18.0) 0.5 0.0			
Beta 3 (18.0-25.5) 0.6 0.0			
Gamma (25.5-30.5) 0.7 0.0			
Asymmetry C Delta (1.0-4.0) -0.0	Coherence Phase Differe	erence 2.0 - VIII 1 Junior VIIII 1 Junior VIII 1 Junior VIII 1 Junior VIII 1 Junior VI	
Theta (4.0-8.0) -0.1	-1.9 1.5		
Alpha (8.0-12.5) -0.1	-1.4 1.3		
Beta (12.5-25.5) -0.2 Beta 1 (12.0-15.5) 0.1	-2.1 0.9 -1.4 0.9		
Beta 2 (15.0-18.0) -0.2	-1.2 1.1	Event: 1,	
Beta 3 (18.0-25.5) -0.1	-1.0 0.8		
Gamma (25.5-30.5) -0.1	-1.6 1.1		

The following is the setup for the event. It uses the built-in "Range" function to define a derived training variable that has the value 4 when all four coherences are within 2 standard deviations of zero (normal).

💑 Event Wizard Designer for BrainMaster			
Event Number:		This Event Is:	C Disabled
Event Condition: IF: Use Equation: Delta Amplitude 0		√isibility: ● Visible	C Hidden
Constant: Scale Factor: 100 Offset: 0.0 Color: Check Equation x=Rng/ZCOD.2.0)+Rng/ZCOT.2.0)+Rng/ZCOD.2.0)+Rng/ZCOD.2.0); x=Rng/ZCOD.2.0)+Rng/ZCOD.2.0); x=Rng/ZCOD.2.0); x=Rng/Z			
RULE: IS GREATER THAN:		49 A (880.0) 16 Organ 1	 ▼ 1 to 88 ▼ 128 choices
Use Entered Value: Alpha Offset: 0.0 Color: Color: Color:	Playing Style: Modulation:	Sustained	Percus. or Sust. Ampl. or Pitch
Check Equation x=APHASE+2; Note: You must press "Check Equation" to check and save any changes made to equations	Starting Loudness: Loudness Change Rate:	10	0 to 128 0 to 20
Event Result: THEN: Play MIDI Sound	Note Change Rate: Musical Scale (Mode): Musical Key:	Major (Ionian)	0 to 20 15 choices C to B Flat
Obey Inhibits ("staps") Control MMP Player	Play Note or Chord:		✓ 1 to 8 Notes
Event Summary: Summary or Event 1: IF: EQN: x=Rng[2C0D,2,0]+Rng[2C0T,2,0]+Rng[2C0A,2,0]+Rng[2C0B,2,0]; IS GREATER THAN Value: 3.0 THEN: Play MIDI Sound MDDE: 2 NOTE: 49 INSTR: 16 0rgan 1 STYLE: Sustained MDDDLAITION: Amplitude LOUDINESS: Level: 80	Enable All Events	Disable All Events	Data Dictionary Print All Events
LOUDNESS CHANGE RATE: 10 PITCH CHANGE RATE: 2 KEY: A MODE: Major (Ionian) CHORD: 1 Note	<u>H</u> elp	Cancel	<u> </u>

The following example shows a sinewave sweep into the system, with the BrainMaster digital filter amplitudes trended for three components on the lower left, and the Z scores for the same components trended on the lower right.

This uses the built-in settings file:

Z Score Training I Using Applied Neurosciences DLL



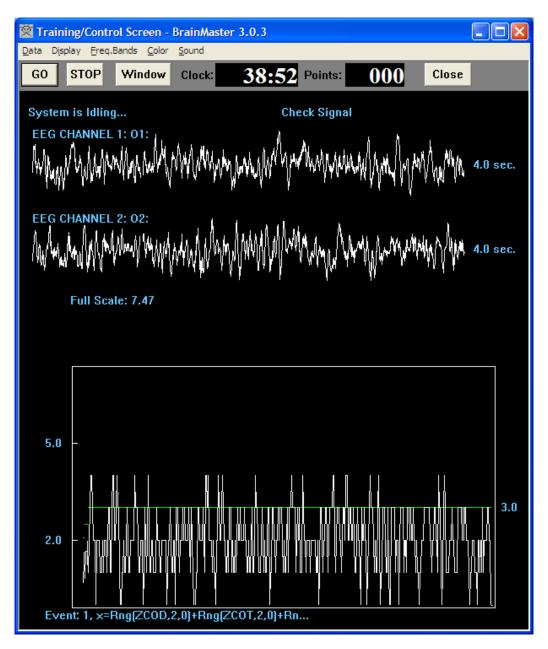
It shows the expected behavior. The concordance between the raw amplitudes and the Z scores is seen, as they rise and fall in a similar fashion. It is visibly evident how the Z score variable provides a metric that will occupy a range around the green line ("normal"). Z score training automatically provides this ability to train to any particular Z score, and have the details of the signals managed by the ANI Z DLL, to always provide a normalized metric.

Z Score Demo Four Coherences Normal

This design uses the "Rng" function to determine if Z scores are within a range. Four bands are used, being delta, theta, alpha, and beta. If a band is within range, its Rng function equals 1. Otherwise, it equals 0. So by training to the new variable that ranges from 0 to 4, we can provide feedback when all 4 coherences are in the normal range. This protocol also uses the animations, DVD player, and Flash Player.

The equation used for training is:

x=Rng(ZCOD,2,0)+Rng(ZCOT,2,0)+Rng(ZCOA,2,0)+Rng(ZCOB,2,0);



Four-channel Z Scores: When four channels are used, a total of

The resulting layout of the Z Score display panel is shown below:

🔯 Training/Control Screen - BrainM	aster 3.0.3						
Data Display Freq.Bands Color Sound				0			
GO STOP Window Clock	38:49	Points: 06	Close				
60-second Training Run No: 2	Ple	ase perform task!					
EEG CHANNEL 1							
Murbur Jones Man March March 100	M. M. WWW.	humber	www.wmp	na wany may any manager	Manual market and	Man MM M	WMWMWM 8.0 sec.
EEG CHANNEL 2							
MIMMMM MMANA	ANT WAR AND	Whitewalther	han when the	young have all the approximation of the	m. MANNAMM	WMMM WMM	MMMM 8.0 sec.
	<u>- 144 - 1</u> 44 - 14				· W TL · ·	1 4 14	
EEG CHANNEL 3							
and nandon the particulation of the second states o	A. And M. WALL	WWWWWWWWW	home of the second second	+www.WMMnwhyNnamhry	MMMMMMMMMMMMMM	Manyara Cam.	₩₩₩ [₩] ₩₩ 8.0 sec.
EEG CHANNEL 4							
LEG CHANNEL 4	A JUNA MANANA	WWWWWWWW	La hanna a	AA IL AL AL AL ALLAND I I	ika and and an an an	A we walk that is	<
Aman A An A Ma Million A. A. Million at a	I YAYAN YAN YA WA KU	k aha i kanAMk.A u	haller ann Janes P	Nex & MANAR, And March AN MARCH	all An Ito Atali and Allena a	A Market Market	1440 MANA 8.0 sec.
SITES: F3 F4 (EC) Abs	Rel Rat/I			SITES: P3 P4 (EC)	Abs Rel	Rat/T Rat/	
Delta (1.0-4.0) 2.0 Theta (4.0-8.0) 2.7	-0.9 -0.6 0.0	-0.6 -0.6 -0.3 -0.3	-0.6 -0.3	Delta (1.0-4.0) Theta (4.0-8.0)	2.0 -0.8 2.4 -0.3	-0.3 -0.3 -0.4	-0.3 -0.3 -0.4 -0.4
Alpha (8.0-12.5) 2.0 Beta (12.5-25.5) 3.2	-0.3 0.7	-1.0	-1.0 -1.5	Alpha (8.0-12.5) Beta (12.5-25.5)	2.2 -0.1 3.5 0.9		-1.1 -1.1 -1.3
Beta 1 (12.0-15.5) 3.7 Beta 2 (15.0-18.0) 3.1	1.3 0.5			Beta 1 (12.0-15.5) Beta 2 (15.0-18.0)	3.6 1.1 3.2 0.6		
Beta 2 (15.0-18.0) 3.1 Beta 3 (18.0-25.5) 3.3 Gamma (25.5-30.5) 3.3	0.9 0.7			Beta 3 (18.0-25.5) Gamma (25.5-30.5)	3.2 0.6 3.7 1.0 3.5 0.9		
Delta (1.0-4.0) 2.0 Theta (4.0-8.0) 2.6	-0.9 -0.5 -0.0	-0.5 -0.5 -0.4 -0.4	-0.5 -0.4	Delta (1.0-4.0) Theta (4.0-8.0)	2.2 -0.2 2.5 0.2	-0.3 -0.3 0.3	-0.3 -0.3 0.3 0.3
Theta (4.0-8.0) 2.6 Alpha (8.0-12.5) 2.1 Beta (12.5-25.5) 3.2	-0.2 0.8	-1.0	-1.0 -1.3	Alpha (8.0-12.5) Beta (12.5-25.5)	1.3 -0.8 3.0 0.8		-0.7 -0.7 -1.4
Beta 1 (12.0-15.5) 3.4 Beta 2 (15.0-18.0) 3.0	<mark>1.1</mark> 0.6			Beta Ì (12.0-15.5) Beta 2 (15.0-18.0)	4.0 1.5 2.8 0.6		
Beta 3 (18.0-25.5) 3.2 Gamma (25.5-30.5) 3.3	0.8 0.9			Beta 3 (18.0-25.5) Gamma (25.5-30.5)	3.1 0.9 3.0 0.9		
F3-F4: A	C P F3-P		F3-P4: A	C P F4-P3: A	C P F4-P4: /		P3-P4: A C P -0.1 -0.3 0.4
Theta (4.0-8.0) 0.1 -	1.7 1.5	0.1 - <mark>2.0</mark> 2.0	-0.1 0.1	-1.1 0.9 0.0 -	-1.5 1.3 0	.0 -0.8 0.5	-0.1 -0.3 0.6
Beta (12.5-25.5) 0.0 -	2.0 1.9 1.9 1.2	-0.4 -2.6 2.0 -0.2 -2.1 1.2	0.6 0.2	-0.6 0.6 -0.2 -	-1.7 1.0 0	.6 -1.0 0.2 .2 -0.3 0.4	0.7 -0.4 0.2 0.3 -0.4 0.2
Beta 2 (15.0-18.0) -0.0 -	1.0 0.8 1.5 1.2	0.1 -1.1 0.9 -0.2 -1.7 1.4	-0.0 0.1	-0.3 0.5 -0.2 -		.2 -0.2 0.1	-0.1 -0.0 0.5 0.3 -0.0 0.1
	0.9 1.5 1.5 1.0	-0.2 -1.0 1.6 -0.3 -1.4 1.0	0.2 0.1		-1.1 1.3 0 -1.2 1.0 0	.1 0.1 0.5 .2 -0.5 0.5	0.4 -0.4 0.2 0.4 -0.3 0.2

Training using the PercentZOK function:

Event Wizard Designer for BrainMaster 3.0.3			
Event Number. 중1		This Event Is:	C Disabled
Event Condition: Damping Factor: Damping Factor:		Visibility: Visible	C Hidden
Constant Scale Factor: 100 Offset: 0.0 Color:			
Check Equation x=PercentZOK(UTHR); RULE: S GREATER THAN:	MIDI Sound Properties:		
Use Equation:	Starting Note	37 A (440.0)	▼ 1 to 88
	Instrument	102 Echo Drops	▼ 128 choices
Constant: Scale Factor: 100 Offset 0.0 Color:	Playing Style		Percus. or Su
Check Equation x=CT;		Ampl. and Pitch	Ampl. or Pitcl
Note: You must press "Check Equation" to check and save any changes made to equations	Starting Loudness	Level: 80	▼ 0 to 128
	Loudness Change Rate		▼ 0 to 20
Event Result: THEN: Play MIDI Sound	Note Change Rate		▼ 0 to 20
	Musical Scale (Mode)		▼ 15 choices
	Musical Key	-	▼ C to B Flat
Obey Inhibits ("stops") Control MMP Player	Play Note or Chord	1 Note	✓ 1 to 8 Notes
Event Summary: Summary for Event 1: EVENT 1 IS CURRENTLY: ENABLED	Enable All Events	Disable All Events	Data Dictionary
IF: EQN: x=PercenZOR(IUTHR): IS GREATER THANEQN: x=CT;THEN: Play MIDI Sound MODE: 2 NOTE: 37 INSTR: 102 Echo Drops STYLE: Sustained MODULATION: Ampl. and Pitch LOUDNESS: Level: 80	Clear All Events	Show All Events	Print All Events
LOUDNESS CHANGE RATE: 3 PITCH CHANGE RATE: 1 KEY: A MODE: Major (Ionian) CHORD: 1 Note	Help	Copy Event	Paste Event
	Cancel	Use Now	OK

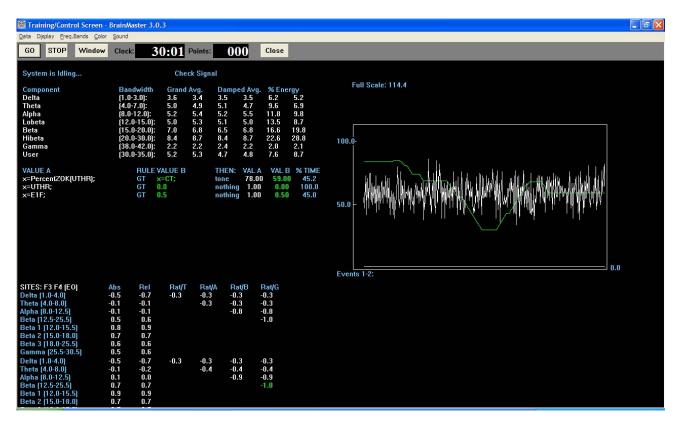
Effect of changes in window from 2 sigma to 1 sigma and back: ("u" and "U")

Training/Control Screen		
Data Display Ereq.Bands Colo		
GO STOP Window	Clock: 34:01 Points: 000 Close	
System is Idling	Check Signal	
Component Delta Theta Alpha Lobeta Beta Hibeta Gamma User VALUE A ×=PercentZOK[UTHR]; ×=UTHR; ×=E1F;	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Full Scale: 114.4
SITES: F3 F4 (E0) Delta (1.0-4.0) Theta (4.0-8.0) Alpha (8.0-12.5) Beta 1 (12.5-25.5) Beta 2 (15.0-18.0) Beta 3 (18.0-25.5) Gamma (25.5-30.5) Delta (1.0-4.0) Theta (4.0-8.0) Alpha (8.0-12.5) Beta 1 (12.0-15.5) Beta 1 (12.0-15.5)	Abs Ref Rat/T Rat/A Rat/B Rat/G -0.5 -0.7 -0.3 -0.3 -0.3 -0.3 -0.1 -0.1 -0.4 -0.4 -0.4 0.1 0.0 -0.8 -0.8 -0.8 0.5 0.6 -1.0 -0.4 -0.4 0.9 0.9 -1.0 -0.4 -0.4 0.7 0.7 0.7 -1.0 -0.4 0.5 0.5 - - - -0.6 0.4 -0.4 -0.4 -0.4 0.5 0.5 - - - -0.6 -0.8 -0.4 -0.4 -0.4 -0.1 -0.2 -0.4 -0.4 -0.4 -0.1 -0.2 -0.4 -0.4 -0.4 -0.1 -0.2 -0.4 -0.4 -0.4 -0.8 0.8 - - -0.3 0.8 0.8 - - -	Events 1-2:

Х

Z Score Training with BrainMaster 2.5SE

Changes in threshold ("c" and "C")



Adding an event to monitor and possibly target the percent time that the conditions are actually met:

🕅 Training/Control Screen	- BrainMaster 3.0.3		
Data Display Freq.Bands Col	or <u>S</u> ound		
GO STOP Window	Clock: 22:01 Points:	Close	
System is Idling	Check Sign	nal	
Component Delta Theta Alpha Lobeta Beta Hibeta Gamma User VALUE A x=Percent2OK[UTHR]; x=UTHR; x=CIP; x=EIF;	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	Damped Avg. % Energy 3.7 3.9 5.3 5.6 4.8 5.0 11.2 8.4 5.7 5.7 10.7 7.3 5.1 5.4 7.6 8.5 5.9 6.6 15.0 11.3 8.8 8.8 2.7 7.53 2.2 2.3 1.8 2.8 5.1 4.8 5.7 7.53 2.2 2.3 1.8 2.8 5.1 4.8 8.5 7.3 THEN: VAL A VAL B %TIME tone 64.00 59.00 54.8 nothing 0.80 0.00 100.0 nothing 0.00 0.50 54.8	Full Scale: 114.4
SITES: F3 F4 (E0) Deta (1.0-4.0) Theta (4.0-8.0) Alpha (8.0-12.5) Beta (12.5-25.5) Beta (12.0-15.5) Beta (12.0-15.5) Gamma (25.5-30.5) Deta (1.0-4.0) Theta (4.0-8.0) Alpha (8.0-12.5) Beta (12.5-25.5) Beta (12.5-25.5) Beta (12.0-15.0)	Abs Rcl Rat/T Rat -0.5 -0.8 -0.4 -0.4 -0.1 -0.2 -0.3 0.7 0.8 0.4 0.8 0.8 0.6 0.7 0.7 0.7 0.7 0.7 -0.7 0.6 0.6 -0.4 0.7 0.7 -0.3 -0.5 -0.7 -0.3 -0.1 -0.2 -0.4 0.7 0.7 -0.7 -0.5 -0.7 -0.3 -0.1 -0.2 -0.4 0.7 0.7 -0.7 0.7 0.7 -0.7	á −0.á −0.á 5 −0.5 −0.5 −0.9 −0.9 −1.0 3 −0.3 −0.3	Events 1-3:

Z Score Training with BrainMaster 2.5SE

🔯 Training/Control Screen - BrainMaster 3.0.3					
Data Display Ereq.Bands Color Sound					
GO STOP Win	low Clock:	5:04 Points:	000 ^{Cla}	se	
System is Idling		Check Signa	í,		
Component Delta Theta Alpha Lobeta Beta Hibeta Gamma User	Bandwidth (1.0-3.0): (4.0-7.0): (12.0-12.0): (12.0-15.0): (15.0-20.0): (20.0-30.0): (38.0-42.0): (30.0-35.0):	3.6 3.5 5.0 5.0 5.4 5.5 5.1 5.3 6.8 6.6	Damped Avg. % 3.2 3.5 3. 5.0 5.5 9. 5.7 5.5 13 5.6 5.5 12 6.9 7.1 17 8.6 8.6 27 2.3 2.3 2. 4.9 4.9 4.	4 5.5 5 6.4 5 10.3 4 9.7 6 16.7 5 26.8 4 2.9	Full Scale: 114.4
VALUE A x=PercentZOK(UTHR) x=UTHR; x=E1P; x=E1F;	RULEV. GT × GT 0. GT 0. GT 0.	=CT; .0 .0	tone 47.00 ! nothing 0.80 nothing 17.08	AL B % TIME 9.00 17.1 0.00 100.0 0.00 100.0 0.50 17.1	
SITES: F3 F4 (E0) Delta (1.0-4.0) Theta (4.0-8.0) Alpha (8.0-12.5) Beta 1 (12.5-25.5) Beta 1 (12.0-15.5) Beta 2 (15.0-18.0) Beta 3 (18.0-25.5) Gamma (25.5-30.5)	Abs Rel -0.5 -0.7 -0.0 -0.1 0.1 0.1 0.6 0.7 0.8 0.8 0.6 0.5	Rat√T Rat∦ -0.4 -0.4 -0.4	A Rat/B Rat/ -0.4 -0.4 -0.4 -0.4 -0.8 -0.8 -1.0		Events 1-3:
Galima (23.5-30.5) Delta (1.0-4.0) Theta (4.0-8.0) Alpha (8.0-12.5) Beta (12.5-25.5) Beta 1 (12.0-15.5) Beta 2 (15.0-18.0)	0.3 0.5 -0.8 -1.0 -0.1 -0.1 0.1 0.1 0.6 0.7 0.8 0.9 0.7 0.7	-0.5 -0.5 -0.6	-0.5 -0.5 -0.6 -0.6 -1.0 -1.0 -1.1		

Example with a high threshold and low percent time: window 0.8 threshold 59

Example with wider window and higher percent time: window 1.3 threshold 59

🔯 Training/Control Screen	- BrainMaster 3.0.3			
Data Dipplay Ereq.Bands Golor Sound				
GO STOP Window	Clock: 07:03 Poin	nts: 000 Close		
System is Idling	Check Si		Full Scale: 114.4	
Component Detta Theta Alpha Lobeta Beta Hibeta Gamma User VALUE A x=PercentZOK(UTHR); x=UTHR; x=ETP;	Bandwidth Grand Avg. [1.0-3.0]: 3.6 3.6 [4.0-7.0]: 4.9 4.9 [8.0-12.0]: 5.5 5.5 [12.0-15.0]: 5.1 5.3 [15.0-20.0]: 8.5 8.8 [38.0-42.0]: 2.2 2.2 [30.0-35.0]: 4.9 5.0 RULE VALUE B GT x=CT; GT 0.0	6 3.4 3.2 5.1 4.4 9 4.9 7.3 9.3 5.3 5 5.7 5.2 12.3 11.6 3 5.0 5.5 9.6 10.5 6 6.8 6.5 18.0 14.3 8 9.0 8.1 30.2 26.4 2 2.1 2.2 1.4 1.7 0 4.8 4.9 6.2 8.4 THEN: VAL A VAL B % TIME tone 64.00 59.00 86.3 nothing 1.30 0.00 100.0		
x=E1F;	GT 0.5	nothing 1.00 0.50 86.3	50.0 - 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
SITES: F3 F4 (E0) Delta (1.0-4.0) Theta (4.0-8.0) Alpha (8.0-12.5) Beta (12.5-25.5) Beta 1 (2.0-15.5) Beta 2 (15.0-18.0) Beta 3 (18.0-25.5) Gamma (25.5-30.5)	-0.6 -0.8 -0.4 - -0.0 -0.1 - 0.1 0.1 0.7 0.7 0.8 0.8 0.7 0.7 0.6 0.6 0.5 0.5	Rat/A Rat/B Rat/G -0.4 -0.4 -0.4 -0.5 -0.5 -0.9 -0.9 -1.0		
Deita (1.0-4.0) Theta (4.0-8.0) Alpha (8.0-12.5) Beta (12.5-25.5) Beta 1 (12.0-15.5) Beta 2 (15.0-18.0)	-0.7 -1.0 -0.5 -	-0.5 -0.5 -0.5 -0.6 -0.6 -1.0 -1.0 -1.1		

© Training/Control Screen - BrainMaster 3.0.3 Data Daplay Freq.Bands Color Sound			
GO STOP Window	Clock: 00:01 Points: 000 Close		
System is Idling	Check Signal		
Component Detta Theta Alpha Lobeta Beta Hibeta Gamma User	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Full Scale: 114.4	
VALUE A x=PerceniZOK(UTHR); x=UTHR; x=ETP; x=ETP;	RULE VALUE B THEN: VAL A VAL B % TIME GT x=01; tone 59.00 79.00 36.5 GT 0.0 nothing 1.30 0.00 100.0 GT 0.0 nothing 36.57 0.00 100.0 GT 0.5 nothing 0.60 0.50 36.7	50.0-	
SITES: F3 F4 (E0) Detta (1.0-4.0) Theta (4.0-8.0) Alpha (8.0-12.5) Beta (12.6-25.5) Beta 1 (12.0-15.5) Beta 2 (15.0-18.0) Beta 3 (18.0-25.5) Gamma (25.5-30.5)	Abs Ref Rat/T Rat/A Rat/B Rat/G -0.4 -0.6 -0.3 -0.3 -0.3 -0.3 0.0 -0.1 -0.4 -0.4 -0.4 -0.4 0.1 0.0 -0.3 -0.3 -0.3 0.6 0.4 -0.4 -0.4 -0.4 0.1 0.0 -0.1 -0.3 -0.3 0.5 0.6 -0.8 -0.8 -0.4 0.8 0.7 -0.8 -1.0 -0.4 -0.4 -0.4 0.8 0.7 -0.8 -1.0 -0.7 -0.8 -0.7 -0.8 -0.7 -0.8 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5 -0.7 -0.7 -0.5 -0.5 -0.5 -0.5 -0.7 -0.7 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5 -0.7 -0.7	Events 1-3:	
Deita (1.0-4.0) Theta (4.0-8.0) Alpha (8.0-12.5) Beta (12.5-25.5) Beta 1 (12.0-15.5) Beta 2 (15.0-18.0)	-0.7 -0.9 -0.4 -0.4 -0.4 -0.4 -0.1 -0.3 -0.6 -0.6 -0.6 0.2 0.2 -1.1 -1.1 0.7 0.8 -1.1 0.9 0.9 -1.1 0.9 0.9		

Changes in percent time as the threshold is changed:

Data Descriptions for Event Wizard Z Score Training:

The following is excerpted from the Data Dictionary for the Event Wizard. It shows the variable names and interpretations for the values accessible using the ANI Z DLL with the BrainMaster Event Wizard:

ZAP1D, ZAP1T, ZAP1A, ZAP1B, ZAP11, ZAP12, ZAP13, ZAP1G, ZAP2D, ZAP2T, ZAP2A, ZAP2B, ZAP21, ZAP22, ZAP23, ZAP2G	delta, theta, alpha, beta, beta1, beta2, beta3, gamma Absolute Power 2 channels / 8 bands
ZRP1D, ZRP1T, ZRP1A, ZRP1B, ZRP11, ZRP12, ZRP13, ZRP1G, ZRP2D, ZRP2T, ZRP2A, ZRP2B, ZRP21, ZRP22, ZRP23, ZRP2G	delta, theta, alpha, beta, beta1, beta2, beta3, gamma Relative Power 2 channels / 8 bands
ZPR1DT, ZPR1DA, ZPR1DB, ZPR1DG, ZPR1TA, ZPR1TB, ZPR1AB, ZPR1AG, ZPR1BG, ZPR2DT, ZPR2DA	d/t, d/a, d/b, d/g, t/a, t/b, t/g, a/b, a/g, b/g Power Ratios 2 channels / 10 ratios
ZAAD, ZAAT, ZAAA, ZAAB, ZAA1, ZAA2, ZAA3, ZAAG ZCOT, ZCOA, ZCOB, ZCOG	delta, theta, alpha, beta, beta1, beta2, beta3, gamma Amplitude Asymmetry 8 bands theta, alpha, beta, gamma Coherence 4 bands
ZPHD, ZPHT, ZPHA, ZPHB, ZPH1, ZPH2, ZPH3, ZPHG	delta, theta, alpha, beta, beta1, beta2, beta3, gamma Phase Difference 8 bands

NeuroGuide bands are: D: Delta (1-4), T: Theta (4-8), A: Alpha (8-12.5), B: Beta (12.5-25.5) G: Gamma (25.5-30.5), 1: Beta 1 (12 – 15.5), 2: Beta 2 (15-18), 3: Beta 3 (18 – 25.5)

Examples of Z Score Training:

x=ZAP1A;	get the alpha amplitude z score
x=ZPHT;	get the phase difference z score for theta
x=ZCO1;	get the coherence z score for beta1
x=ZPR1BG	get power ratio z score number 10 (beta/gamma) for Channel 1
x=ZAAA;	get the alpha amplitude asymmetry
x=(ZAP1T + ZAP2T)/2;	get average of z scores for theta from channels 1 and 2

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