# Activating Z Scores with EEGer 4.2

Support for Applied Neuroscience, Inc. (ANI) Z Score training is available in EEGer version 4.2. These instructions provide directions to set up and activate the Z Scores feature in EEGer.

For Z Scores to function in EEGer, the following items must be valid:

1. ANI biofeedback software must be installed.
2. A valid EEGer license for Z Scores must be installed.
3. A valid ANI passkey must be installed.
4. A valid birth date must be entered for the client prior to training (since the ANI software needs client age).
5. Valid site(s) and frequency ranges must be entered in the client's session plan prior to training.

## A. Install EEGer 4.2 software

EEGer version 4.2 and subsequent program updates are available on CD from EEG Spectrum Systems or can be downloaded from the EEGer website: www.eeger.com. Follow instructions provided with the CD or on the website to install.

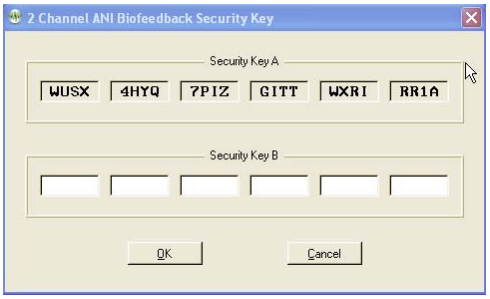
- Be sure to check the option to ***INSTALL THE ANI ZSCORE FILES*** on the ***Select Additional Tasks*** display during the installation process.

## B. Install the EEGer Keyblock File:

1. Insert the ***EEGer Keyblock File CD*** in your CD/DVD drive.
2. If the contents of the CD are displayed automatically, close the window. You must load the key using EEGer.
3. Start the EEGer program. From the **Files** menu, select **Read EEGer Keyblock Files.**
4. Select the CD/DVD drive for the ***Look In*** field.
5. The updated keyfile is displayed on the Open dialog. Click the filename to select/highlight and click **Open**.

## C. Obtain the Z Score Security Key from ANI

1. Start the EEGer program, if necessary.
2. From the **Files** menu, select **Create ANI Biofeedback Key.** Accept the License agreement and the key screen appears:




My Security Key A: _____ _____ _____ _____ _____ _____

My Security Key B: _____ _____ _____ _____ _____ _____

3. **Contact ANI**.
   a. Email **Security Code A** as it displays on your EEGer screen to **qeeg@appliedneuroscience.com and cc: rwthatcher@yahoo.com** (If you do not have access to email, please call EEGER for assistance at **818-789-3456**)
   b. Repeat steps 1 and 2 to enter the code they provide for **Security Key B**. Click **OK** to activate the new feature.

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NOTE: The ANI Z Score Security Key is computer specific. If you install EEGer on another computer or have to recover after hard drive failure, you must contact ANI to obtain a new Security Key.

# Using Z Scores in EEGer

## EEGer REWARD MODES FOR Z SCORES

In **Plan Session**, for the Z Score Setup stage, click the **Feedback** button to choose the desired mode. The mode can also be changed on the EEG training display by pressing **Shift+F3** to select a different reward mode.

- **ZAsymm** - reward is standard deviation of absolute asymmetry for designated frequency band (2 channels)
- **ZCohere** - reward is standard deviation of coherence for designated frequency band (2 channels)
- **ZPhase** - reward is standard deviation of absolute phase for designated frequency ban (2 channels)
- **ZAbsPwrA** - reward is standard deviation of absolute power from A site for designated frequency band
- **ZAbsPwrB** - reward is standard deviation of absolute power from B site for designated frequency band
- **ZRelPwrA** - reward is standard deviation of relative power from A site for designated frequency band
- **ZRelPwrB** - reward is standard deviation of relative power from B site for designated frequency band
- **ZPRatioA** - reward is standard deviation of power rations from A site for designated frequency band
- **ZPRatioB** - reward is standard deviation of power rations from B site for designated frequency band

NOTE: For Z Score training, enter a second training site (Input ChB) even if using a single-channel feedback mode. If only one site is entered, a "site error" may appear on the EEG training or replay screen. EEGer checks for a valid two-channel setup in case of a change to a two-channel mode while on the EEG training display.

EEGer automatically adjusts frequency bands when entering/exiting a Z Score feedback mode to match the closest standardized Z Score band.

| **Frequency bands** | Enter this Reward Frequency Range in EEGer Plan Session (Hz) |
|---|---|
| Delta | 1.0 - 4.0 |
| Theta | 4.0 - 8.0 |
| Alpha | 8.0 - 12.0 |
| Beta | 12.0 - 25.0 |
| High Beta | 25.0 - 30.0 |
| Beta 1 | 12.0 -15.0 |
| Beta 2 | 15.0 - 18.0 |
| Beta 3 | 18.0 - 25.0 |

| **Power Ratios** | Enter this Reward Frequency Range in EEGer Plan Session (Hz) |
|---|---|
| Delta / Theta | 1.0 - 4.0 |
| Delta / Alpha | 4.0 - 8.0 |
| Delta / Beta | 8.0 - 12.0 |
| Delta / High Beta | 12.0 - 25.0 |
| Theta / Alpha | 25.0 - 30.0 |
| Theta / Beta | 12.0 -15.0 |
| Theta / High Beta | 15.0 - 18.0 |
| Alpha / Beta | 18.0 - 25.0 |
| Alpha / High Beta | 35.0 - 37.0 |
| Beta / High Beta | 37.0 - 39.0 |

**Valid sites (all referenced to A1 or A2):**

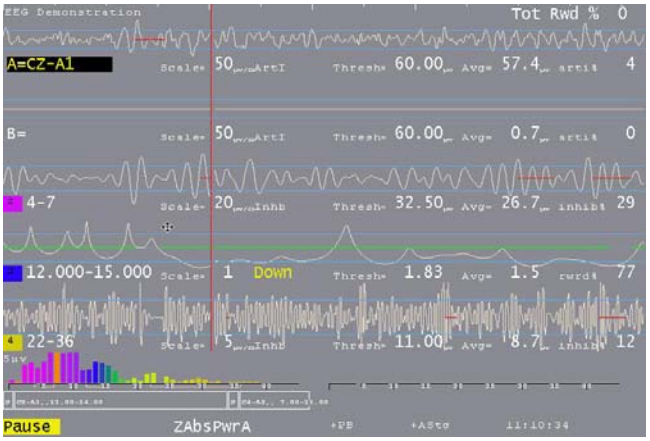
| | | | | |
|---|---|---|---|---|
| FP1 | F7 | C4 | O1 | T5 |
| FP2 | F8 | Cz | O2 | T6 |
| F3 | Fz | P3 | T3 | Pz |
| F4 | C3 | P4 | T4 | |

## Review Options:

- EEGer **Review** includes additional options for viewing data from sessions recorded using a Z Score reward mode.
- Files can be exported in EDF+ format for analysis in ANI's NeuroGuide or other software that can import EDF+ format.

# Z Score Training Display

**Layout**: The ***Reward Only*** layout may be used for Z Score training if you do not want to use inhibit bands.



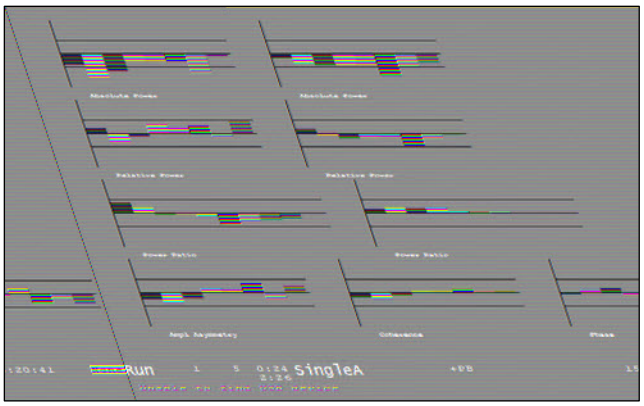

**Site and Frequency Settings**: When a Z Score feedback mode is selected for training, EEGer checks the selected site(s) and frequency against the available Z Score options. A message is displayed for invalid site(s). There must be two channels of EEG data for some of the options. For frequency, the Reward band is adjusted to the closest valid Z Score range.

**Feedback Mode**: To change the feedback mode, press **Shift+F3**. Use the arrow keys to move to the desired mode and press **+** to activate. EEGer must confirm the sites and frequency again if a Z Score mode is selected.

**Reward Mode**: Z Score training is performed with the down-training reward mode (Down). To change the reward mode, press **F2** to cycle through the options.

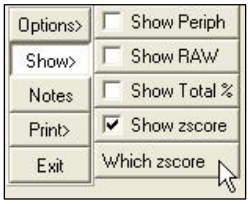
# Z Score Feedback Display

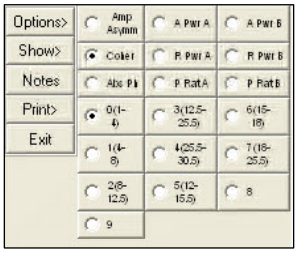
Press **F12** on the EEG training screen to cycle to the Z Score display (available only if Z Score is installed and working). This display shows the standard deviation values in real time for the various ANI outputs. Up values are positive deviations. The graph is limited to +/– 5 standard deviations. The horizontal lines represent two standard deviations from the mean. Channel A values are on the left, Channel B values on the right and the three bottom graphs display values for modes that combine Channel A & Channel B readings.




# Z Score Review Display

1. Click **Show>** and check the box labeled **Show zscore**. If there is Z Score data embedded in the data file, the additional button choices available after clicking on **Which Z Score** are displayed below. Choose the Z Score Feedback Mode and Frequency Range you wish to view.




2. Once you've selected the Z Score options, a red line appears at the bottom of the graph display. To view the Z Score deviation, adjust the **Scale** setting for the graph to "zoom in" on the Z Score line. For example, slide the Scale button to about 5 on the scale of 1 to 100. This gives an idea of how much the client's Z Score was over or under the norm.