



Innovative,
Scientific,
Targeting Strategies,
LZT works with
Atlantis I & II
Discovery 24

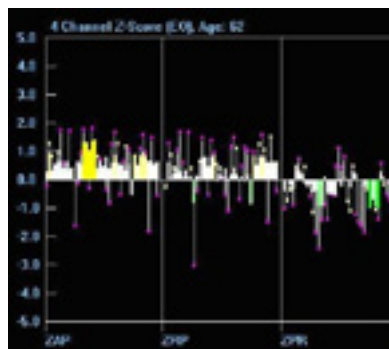
Original BrainMaster LZT Live Z-Score 4- to 19-Channel Training System

BRAINMASTER TECHNOLOGIES, INC. AND APPLIED NEUROSCIENCE, INC (ANI) are pleased to announce the availability of a new tool for use in EEG neurofeedback training, assessment, and related work. The original LZT Z-Score DLL* MultiVariate Proportional (MVP) training system provides realtime neurofeedback training, using state-of-the-art signal processing, the NeuroGuide normative database analysis, and new computational methods.

The Z-Score DLL* provides, in real time, a total of 72 realtime values for 2 channels and 248 realtime values for 4 channels, and 5700 realtime values for 19 channels computed on a continuous basis, by the ANI Z DLL software. These calculations are performed more than 30 times per second, and provide data useful for training, as well as for assessing the current condition of the trainee via their normative EEG scores on any of the components. These consist of Z-Scores for the following estimators:

- Absolute Power (2, 4, or 19 channels, 10 bands)
- Relative Power (2, 4, or 19 channels, 10 bands)
- Power Ratios (2, 4, or 19 channels, 10 ratios)
- Amplitude Asymmetry (2, 4, or 19 channels, 10 bands)
- Coherence (2, 4, or 19 channels, 10 bands)
- Phase Difference (2, 4, or 19 channels, 10 bands).

Z-Scores provide an instantaneous measure of how the trainee's EEG compares with a normal population. Scores are based upon the EEG signal, the sensor locations, the age of the trainee, and whether eyes are open or closed. With this information, the LZT Z-Score system is able to provide values of 0.0 (normal), positive (above normal) and negative (below normal) scores. A Z-Score of -1.0, for example, means the trainee is 1 *standard deviation* below normal for their population. So when a trainee sees an alpha level of 8.5, for example, and asks "What does it mean?" it is now possible to express this measurement in terms of comparison to the normative population. This makes it possible to construct protocols that are "aware" of how the trainee fits in, and how their EEG values compare with normative. This is of considerable value in amplitude and power measurements, but is even more essential for coherence, phase, and asymmetry scores.



Z-Bars (available with Z Plus™)

These Z-Scores provide, in real time, similar (and consistent) data as provided in a QEEG when a QEEG is used for normative statistics. The difference is that now these Z-Scores are available in real time, and are used in tandem with existing clinical neurofeedback software. It thus becomes possible to perform a mini-assessment of selected variables, during the training. Z-Scores can also be used to create feedback events such as sounds, games, BrainMaster's Flash games, set inhibits or

artifact detection, or control other interfaces, events, or devices. Z-Scores can be processed and used in an unlimited array of possible protocols. Once a Z-Score training protocol is set up for one trainee, it is automatically adapted to other trainees, by entering their age, eyes open/closed condition, and the sensor locations.

Using these Z-Scores, it is possible to design training and assessment protocols using the BrainMaster Event Wizard and Math Wizard interfaces. These tools allow users to design protocols using a very flexible user interface that includes access to more than 100 built-in BrainMaster training variables (Amplitude, Frequency, Percent Energy, Percent time over threshold, Coherence, Similarity, Phase, Variability, etc.), and now the additional 72 Z-Scores with 2 channels of EEG, 248 Z-Scores with 4 channels of EEG, and 5700 Z-Scores with 19 channels of EEG. The Event Wizard allows users to design up to 16 complex events, each of which is a protocol on its own. This provides the user with access to literally thousands of possible protocols, at the click of a mouse.

Thus, by training to Z-Scores instead of (or in addition to) raw scores, it is possible to normalize EEG values in real time, without the need for repeated QEEG recordings. For example, instead of training simply to a coherence metric, one could train to the Z-Scores, and can train within a set of limits, rather than simply a threshold. It is also possible to combine Z-Scores with any other variables during training, to provide protocols that are complex in design, yet simple to use.

The **Math Wizard** further extends the BrainMaster 3.0 Series and BrainAvatar™ 4.0 software training capabilities by allowing the use of hundreds of expressions and variables in simple equations, providing training flexibility and power. Ratios, logarithms, combinations of variables, yes/no decisions, and so on, are all available via the Math Wizard. Even Z-Scores can be used in mathematical expressions, creating new training variables whose scope and power are virtually unlimited.

BrainMaster 3.0 Series and BrainAvatar™ 4.0 Software can be used to provide all the existing EEG metrics (amplitude, frequency, percent energy, percent time over threshold, autothreshold values, coherence, similarity, phase, ect) while the Z-Scores are being used. You can even create complex metrics which combine build in EEG values with Z-Scores. Imagine, for example, a protocol which specifically rewards EEG amplitude criteria but only when all coherence values are within normal ranges.

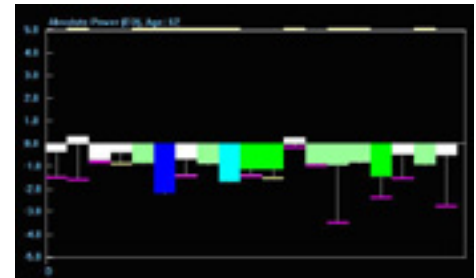
System Requirements: BrainMaster EEG systems Atlantis I and Atlantis II with 3.0 Series or BrainAvatar™ 4.0 Software, or Discovery 24 with Discovery 1.0 Series or BrainAvatar™ 4.0 Software.

OVER THE PAST 5 YEARS, BrainMaster has led the industry in developing and innovating software to use normative or reference databases to provide Live Z-Score Training (LZT) methods for neurofeedback. Documented by a series of publications and clinical reports, BrainMaster's systems have produced positive results for hundreds of clinicians. Based upon this experience, we are introducing the next generation of LZT training in the form of the "Z-Plus" software package. This package is optional, and extends the existing LZT training software with new, innovative metrics and displays. These further empower the clinician and the client to identify and train relevant EEG parameters and their changes. Z-Plus is available for Atlantis or Discovery, and is built into the BrainMaster series of software.

Starting with the "Percent Z OK" training method, BrainMaster has

developed a family of training variables that intuitively incorporate any or all of the Z-Scores, and turn them into a single proportional variable. With these variables, any combination of channels, parameters (absolute power, relative power, power ratios, coherence, phase, asymmetry), or frequency components (e.g. delta, theta, etc) can be trained. Regardless of the number of channels or parameters chosen, this variable always has the same meaning. It is the "percent of Z-Scores that are within the target limits." It has a maximum value of 100 (100% normal), that continuously varies in time, and is useful both for training and for assessing the overall condition of the client. This method has been proven in over 3 years of field experience, and has been published in a variety of peer-reviewed journals, books, and industry publications.

The Z-Plus approach does away with the traditional notion of using fixed thresholds for training. It also circumvents the issues of which Z-Scores to train, which Z-Scores to ignore, and how to adjust the system.



Z-Bars (available with Z Plus™)

Z-Motive is based upon new algorithm that computes a comprehensive system metric that is based upon the positions, weights, and trajectories of multiple Z-Scores, so as to provide a measure of not only the state of the brain, but also its tendency for change. Any or all Z-Scores can be included in the Z-Motive calculation, which provides an instantaneous comprehensive indication of brain state and brain change, when used for neurofeedback training.

Z-Motive combines the concepts of self-regulation, dynamic training, and adaptive targeting. Unlike methods that require the clinician to predefine precisely which Z-Scores to train and within which ranges, Z-Optimal presents the brain with a comprehensive metric that reflects all EEG parameters in a single, proportional value. This value provides a consistent target that reflects all training parameters on a continuous basis, and does not depend on particular targets being "hit" or "missed." Rather, all targets contribute to the total state, so that the brain receives global information.

Z-Plus also provides Z-Maps (19 channels only). These are live maps of the Z-Scores that can be used for training or for following training progress. We provide two types of maps. "Instantaneous" maps show the moment-to-moment changes, and can change rapidly. We also offer "damped" maps, which show the damped Z-Score, which is what is also used in the text display. This provides a more stable map for viewing and biofeedback. Both types of maps are useful, depending on the priority. It is possible to display either or both types of maps at the same time. Damped Z-Scores are what are shown in the text, and in the colored Z-Bars. Instantaneous Z-Scores are what are shown by the dynamic lines and dots on the Z-Bars display.

BrainMaster/ANI Original LZT Z-Score DLL 2-channel	(533-700)	\$895.00
BrainMaster/ANI Original LZT Z-Score DLL 4-channel	(533-740)	\$995.00
BrainMaster/ANI Original LZT Z-Score DLL 19-channel	(533-414)	\$1895.00
Z Plus Software option (must own BrainMaster LZT)		
Z Plus for Atlantis (must own LZT Z-Score)	(533-418-4)	\$300
Z Plus for Discovery (must own LZT Z-Score)	(533-418-19)	\$500
BrainAvatar™ 4.0 Training Upgrade for Atlantis	(533-141)	\$695 (\$495)
BrainAvatar™ 4.0 Training Upgrade for Discovery	(533-613)	\$995 (\$300)
BrainAvatar™ 4.0 533-613 (Requires Discovery ADA)	(533-145)	\$895 (\$695)



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