BrainAvatar ™

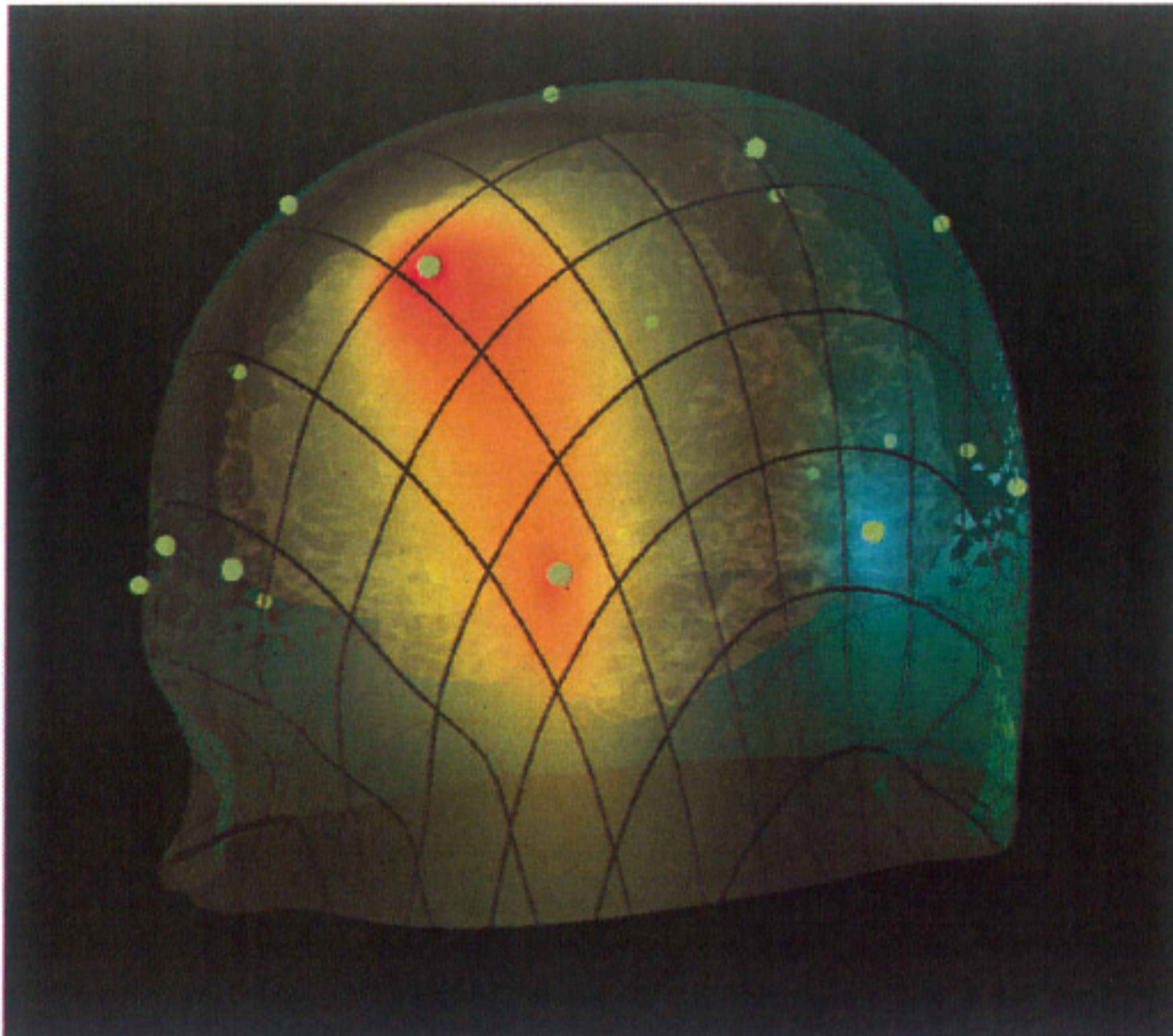## The next generation of Neurofeedback

by BrainMaster

Live Scalp (Laplacian) Display

BrainMaster introduces BrainAvatar™

A•va•tar' — A graphical representation of a concept or a quality. An icon.

The next generation of neurofeedback software

BRAINMASTER TECHNOLOGIES, INC is proud to introduce BrainAvatar™, the next generation of EEG and neurofeedback software, available on our Atlantis and Discovery EEG systems. It provides a new standard of excellence, and as with our previous offerings, will become the new standard for comparison for the future of the field. It combines all existing BrainMaster capabilities with new features incorporating EEG, peripheral modalities, and integrating assessment with training in a seamless system.

BrainAvatar™ introduces a new level of integration and ease of use. It allows you to work the way you want to work, making work more productive and less stressful for you and for your clients.

FLEXIBLE NEW DISPLAYS

BrainAvatar™ features an innovative new dual monitor display with independent controls, with up to 8 tabbed screens on each monitor. This allows you to select quickly between waveforms, graphs, training screens, live text, whole-head maps, and other displays. View what you want when you want it. All screens can be modified on-the-fly, allowing you to develop and evolve your training software as you work. Right-click pulldown menus simplify tailoring each display panel to suit your needs. All settings are automatically used in real time, and are saved for your client folder or as standard setups.

With BrainAvatar™, you can run any design from a desktop shortcut and then select the client folder or create new folders as you work. Folders can be changed on-the-fly allowing you to arrange your work flow as you prefer. Trainee data as well as settings files can be stored in subfolders and selected using BrainAvatar™'s built-in file browser. Access raw data, summaries, images, or other saved data using the intuitive and simple user interface.

BrainAvatar™ screens feature programmable look or theme, plus adjustable color, gain, scale, and other settings. Choose blackboard, paper white, or other themes to suit your environment. Panels can be set up with unique views of EEG channels, filtered and FFT data, and spectra, allowing you to set up displays with unprecedented flexibility.
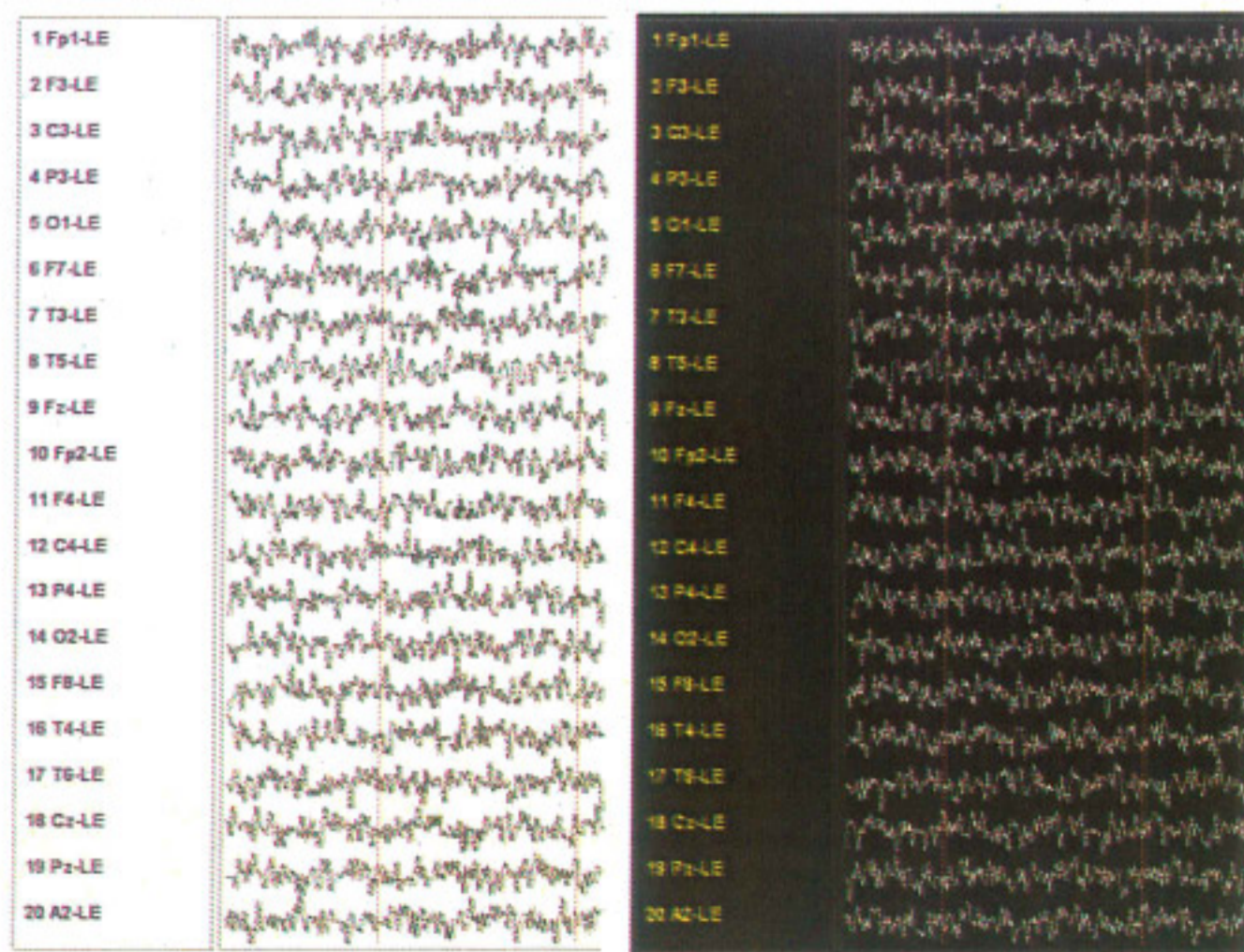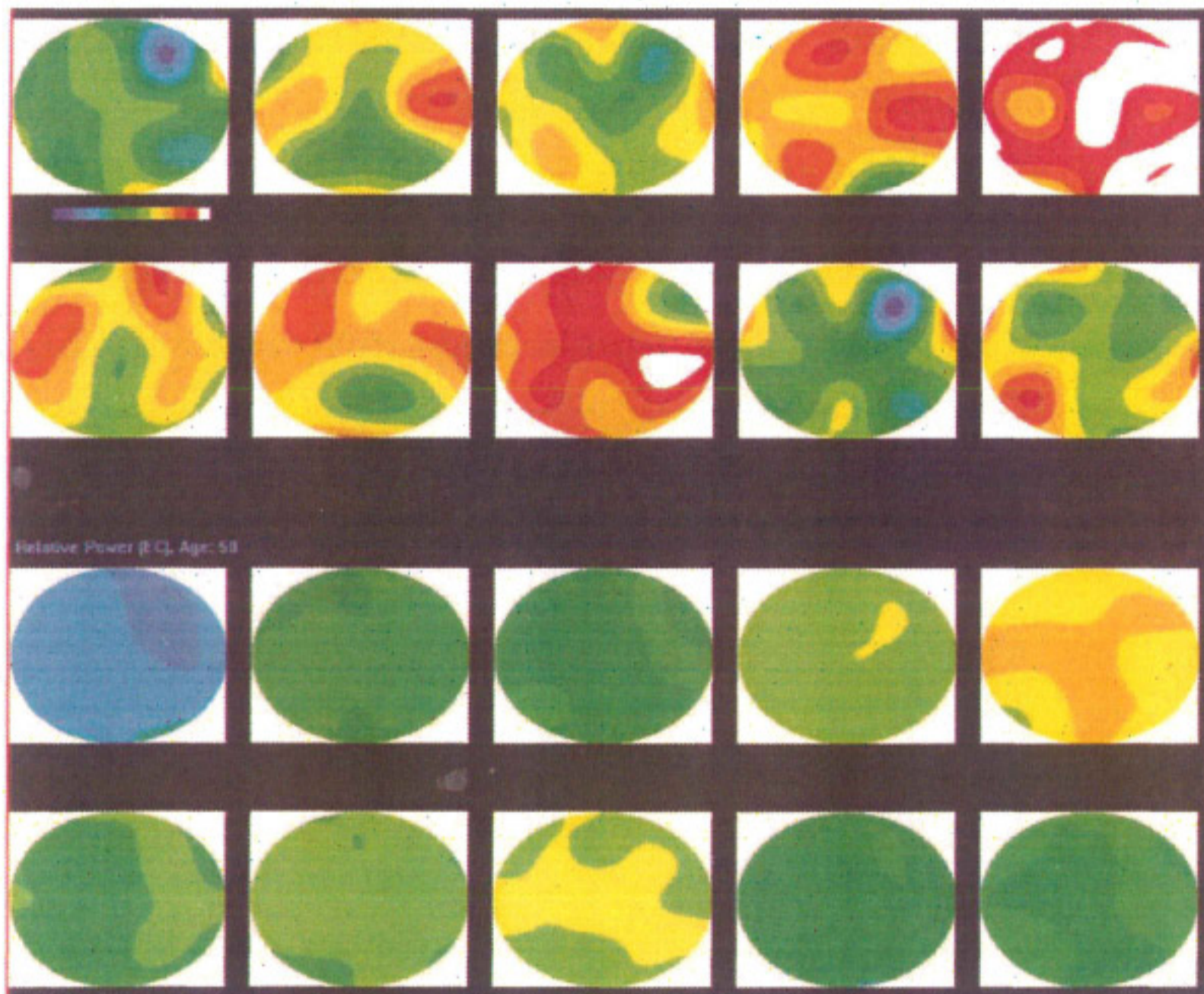

Customizable Display Themes
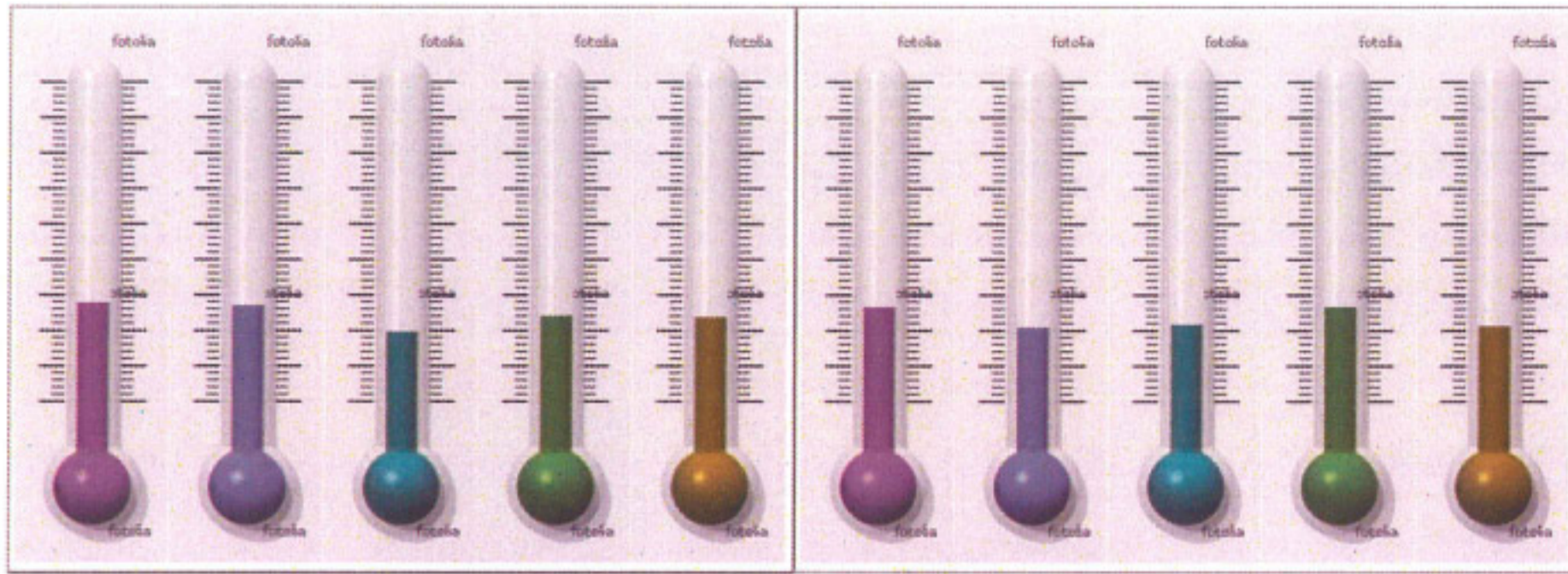
Thermometers (with training option)

True 3-D displays using advanced graphics techniques provide fast and visually appealing professional-quality 3-D images and animations.

Using the latest software graphics technology, BrainAvatar™ includes displays including new Live-Q maps and 3-D renderings providing live parameters, Z-Scores, and maps.

BrainAvatar™ adds a new set of 3-D screens, providing vivid and rapid indicators of EEG parameters and training variables. New 3-D Look panels include thermometers, spectra, and other graphical displays.
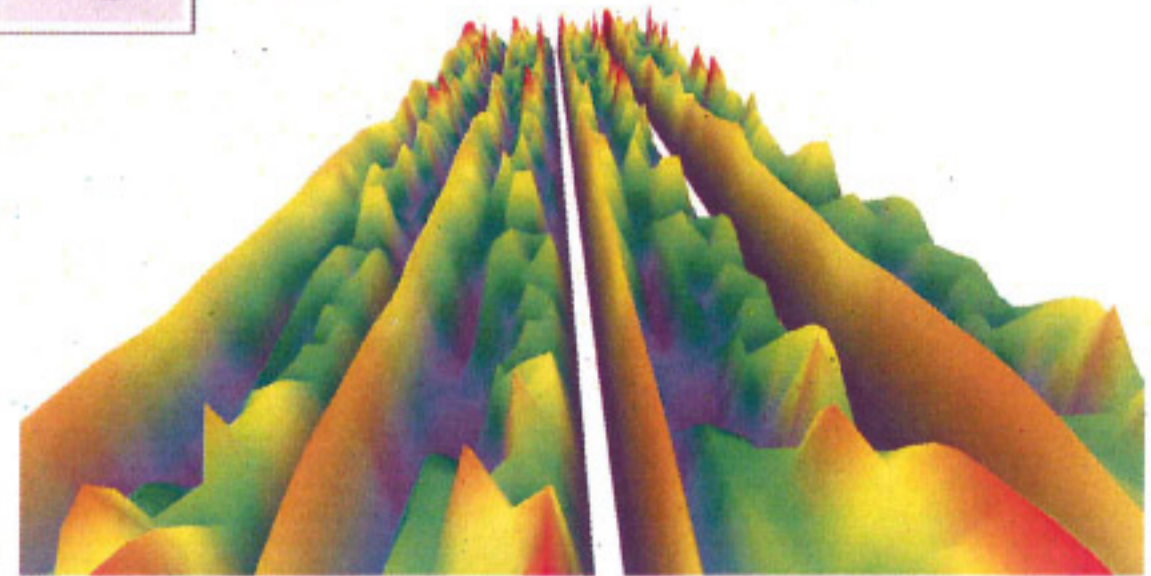

Waterfall (with training option)

Live-Q displays reflect the brain's dynamics in real time, with unprecedented detail and speed. This leads to faster, more accurate assessments, and targeted neurofeedback training using the latest Live Z-Score training including BrainMaster's exclusive PZOK and ZPLUS training capabilities.

These live maps show brain activity in real time, showing brain activity as raw data, or as referenced to a normative database.

Live Maps (with Z-Scores and Z-Plus options)

"We have chosen to manifest the brain, and its dynamic properties, in an embodiment that is at once scientifically valid, and clinically relevant.

With this system, we open the door to an unprecedented level of visualization, processing, and EEG biofeedback, suited to the needs of the 21st century."

— *Thomas Collura, PhD*
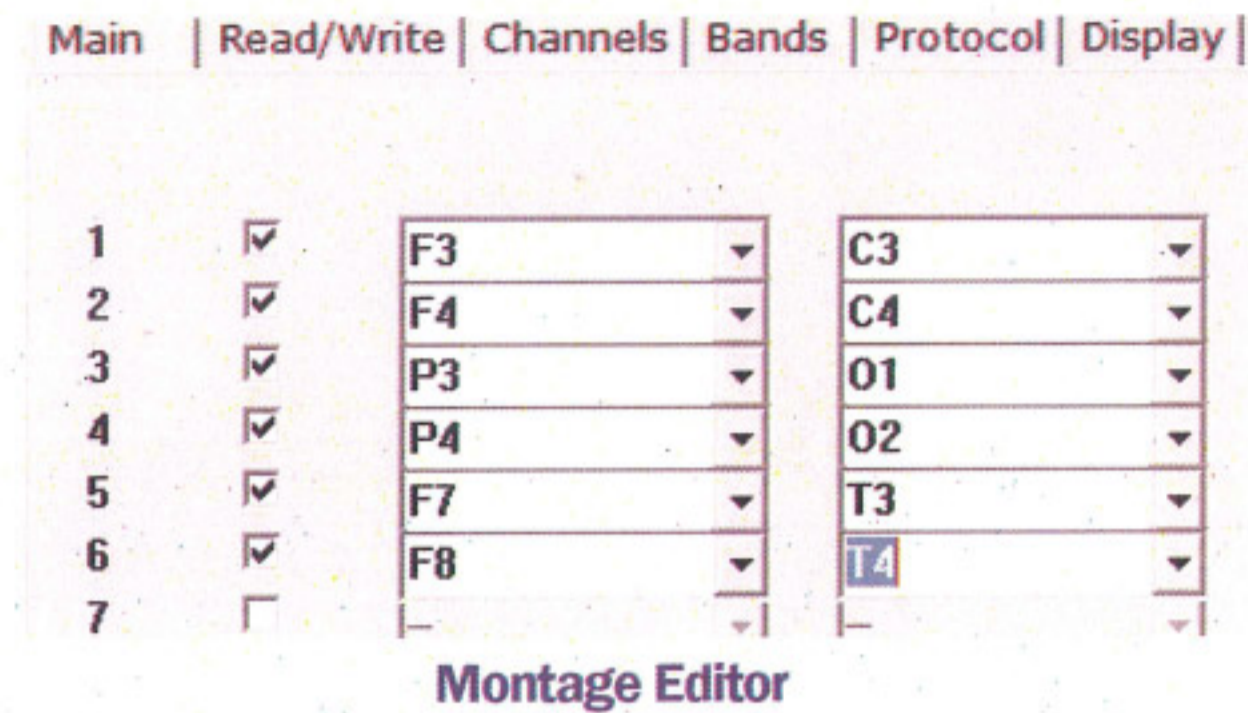*BrainMaster Technologies, Inc.*
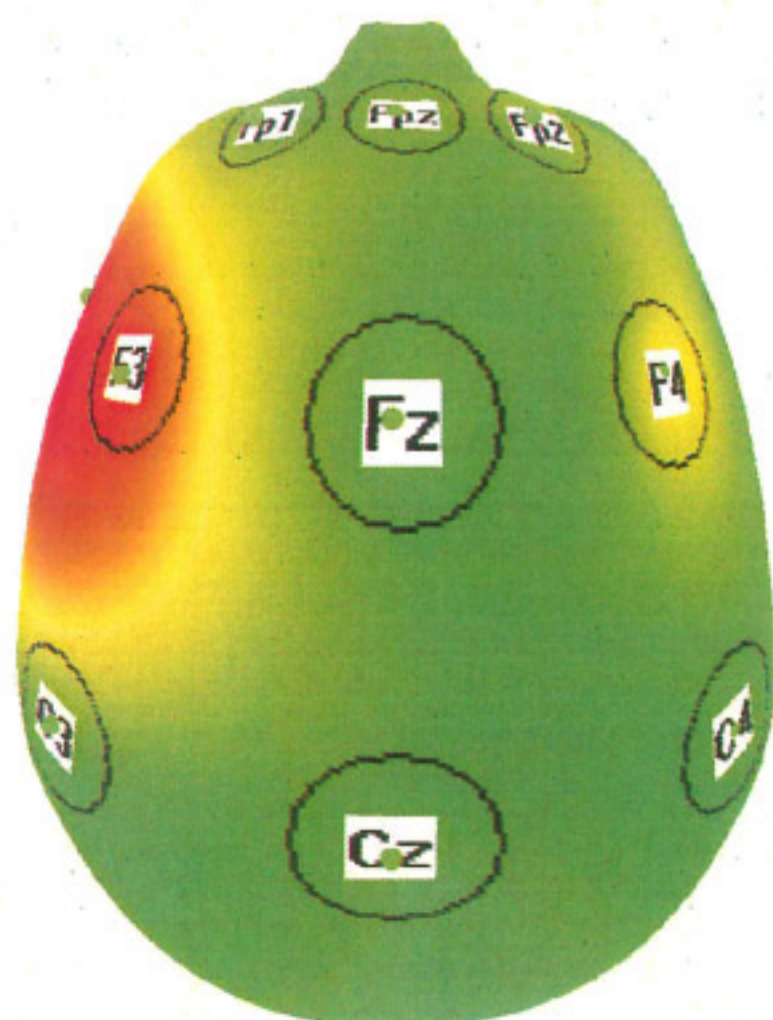
The opaque scalp view shows EEG surface distribution in realistic coordinates. All views can be easily rotated and sized to suit your needs.

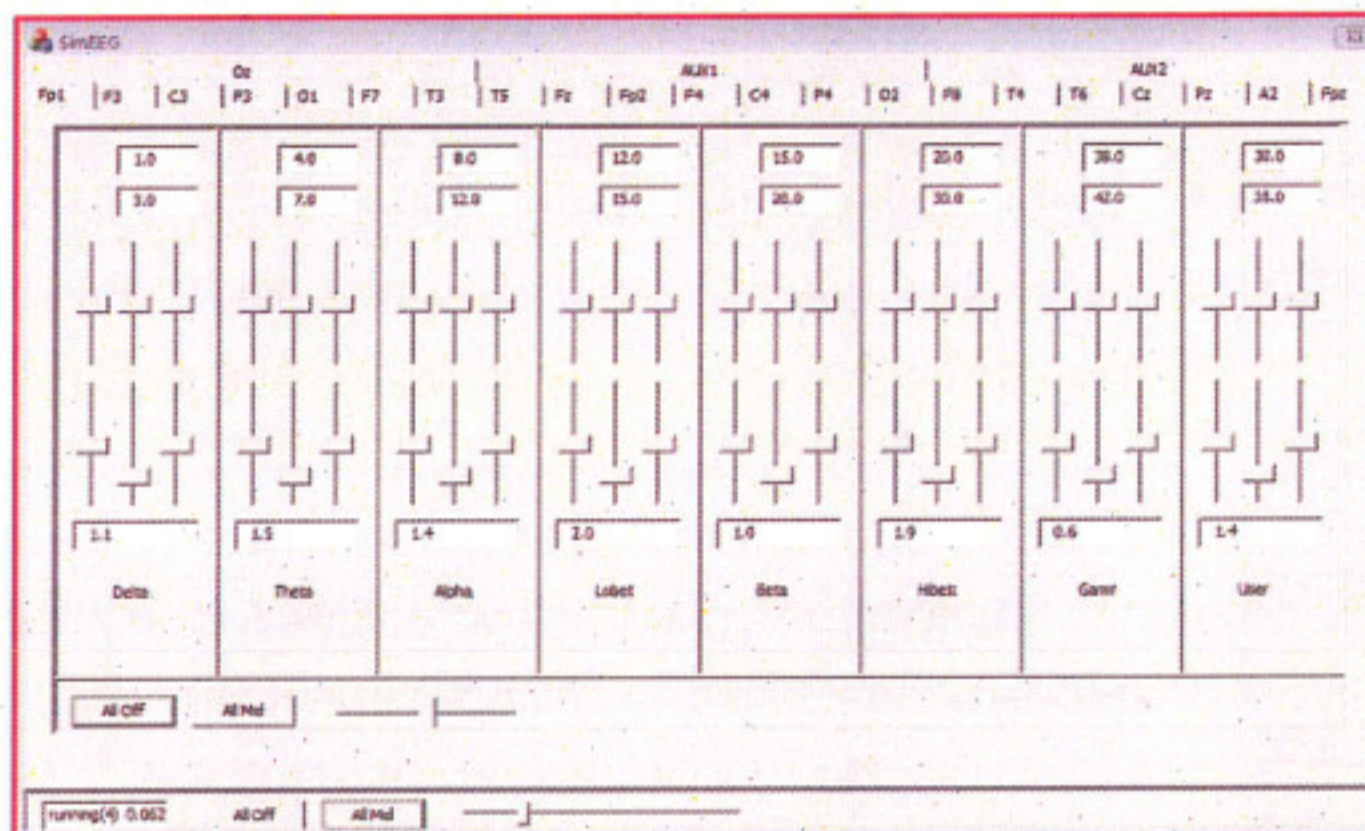**The transparent scalp view** shows underlying brain structures in accurate LORETA coordinates.

Control Maps (with training option, Z-Scores options)

3.

Montage reformatting, editing, artifacting

BrainAvatar™ also includes simple, flexible tools to reformat, edit, mark, and artifact EEG recordings. A montage editor allows you to create and use the montages you need, and quickly switch to different montages on-the-fly, or during file review.
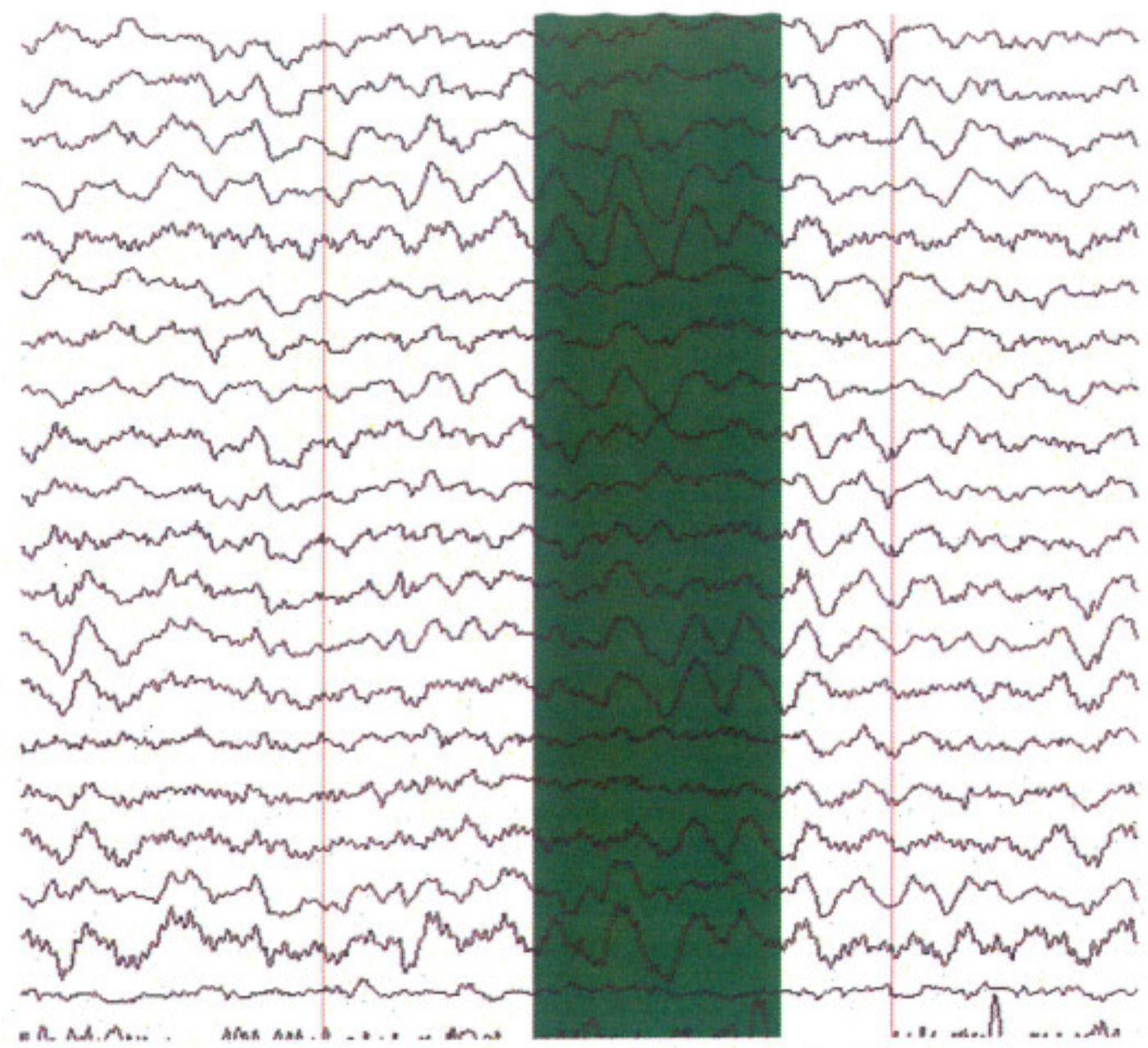

Montage Editor

EEG Simulator (included with BrainAvatar™ Basic)

EEG Selection and Marking

BrainAvatar™ includes a built-in EEG simulator that can be used for teaching, testing, validation, or sham (mock) biofeedback applications. It features 8 bands of independently controlled nonlinear coupled oscillators, with programmable amplitude, range, and variability. Along with live EEG, simulated data can be rendered to graphics, 2-D and 3-D displays, and summary files for statistical processing and Z-Score computations.

New screens allow practitioners to assess and visualize brain dynamics in space and time, showing realistic and meaningful representations of dynamic properties such as attraction, repulsion, global size, and tendency for self-organization. You can now visualize the change, motivation, and resultant self-efficacy evident in EEG parameters including Z-Scores, in real time and during your other clinical interventions. Direct your client's energy in the most useful directions, using state-of-the-art tools for visualizing and comprehending the brain's activity.

With BrainAvatar™, you can alternate and combine EEG with 2-D and 3-D views, contour maps, and brain source images.

View from any angle, change background, use transparent or opaque images, to view the brain and scalp EEG individually or together. Any component including Z-Scores, monopolar, or sequential data can be viewed. References include linked ears, individual ears, average, Laplacian, and LORETA localization data. Selectable rendering and smoothing parameters let you tailor maps and images to your needs based on your preference of quantization, color scheme, and model.

With a new screen saver feature, you can print or save BrainAvatar™ screens to disk, at any time at the press of a button. Screens can also be instantly printed. for rapid availabil-

ity, even during the session. Screen images are automatically numbered and can be labeled, printed, or imported into documents, spreadsheets, or reports.

Our new displays carry forward to home, school, office, and other remote environments. Clinicians can select the amount of control to give remote users and set limits by number of sessions, by training time, or by calendar. By locking down the settings, providers can ensure that clients have a uniform experience and comply with time and session requirements. Improved ease of use for remote supervision includes faster access to on-screen controls when a clinician is supervising a live client over the internet.
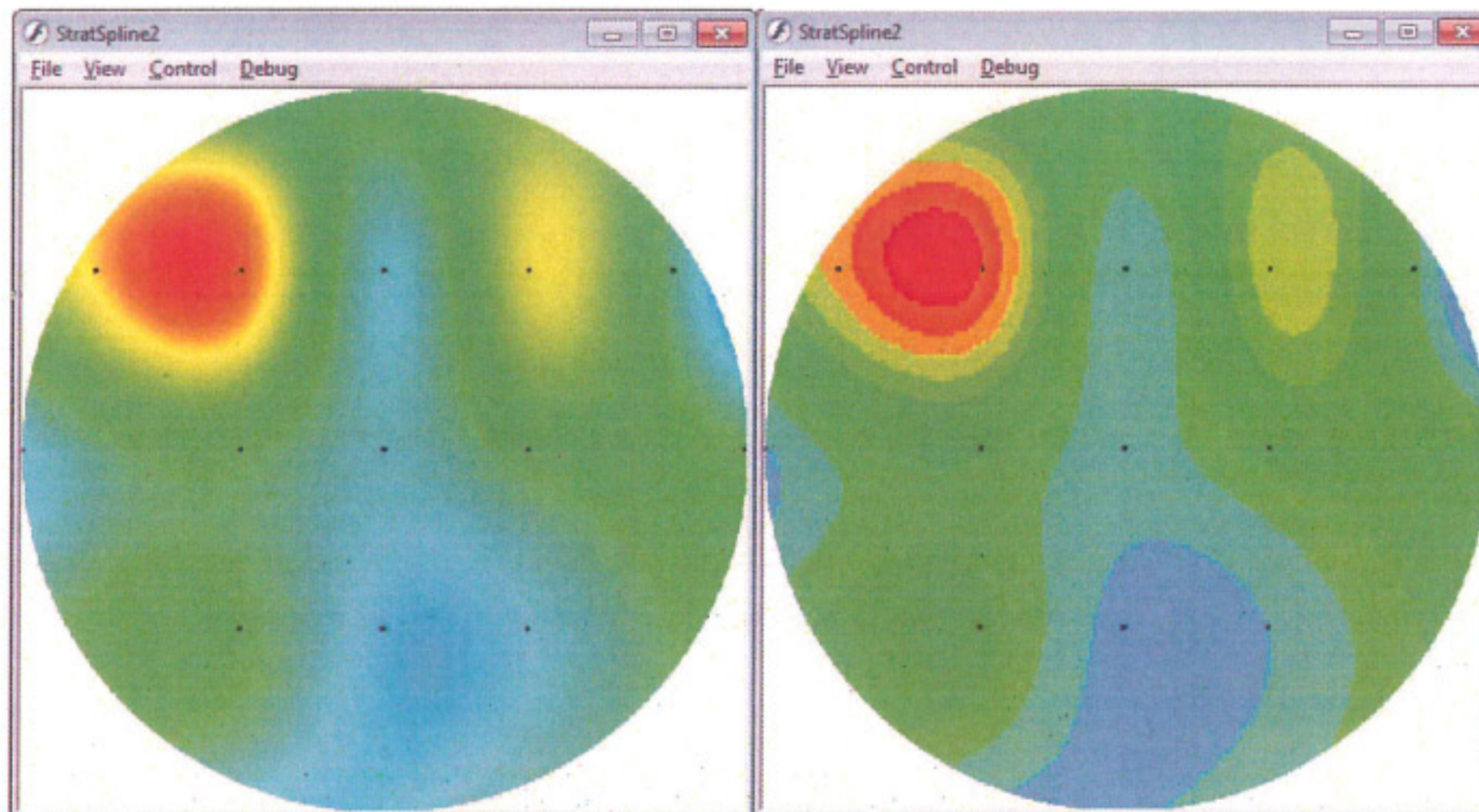
Flexible Live Topographic Mapping

SEAMLESS INTEGRATION – EEG, NEUROFEEDBACK, REPORTS

By seamlessly blending EEG and neurofeedback, BrainAvatar™ provides a single, state-of-the-art platform for applications ranging from 1 to 24- channel EEG, Live Z-Score Training (LZT), MINI-Q, whole-head EEG, mapping, and all types of neurofeedback. No more *getting in and out* of different programs to achieve different tasks. Now, the entire process can be conducted with one system that supports scientific, industry, and regulatory standards.
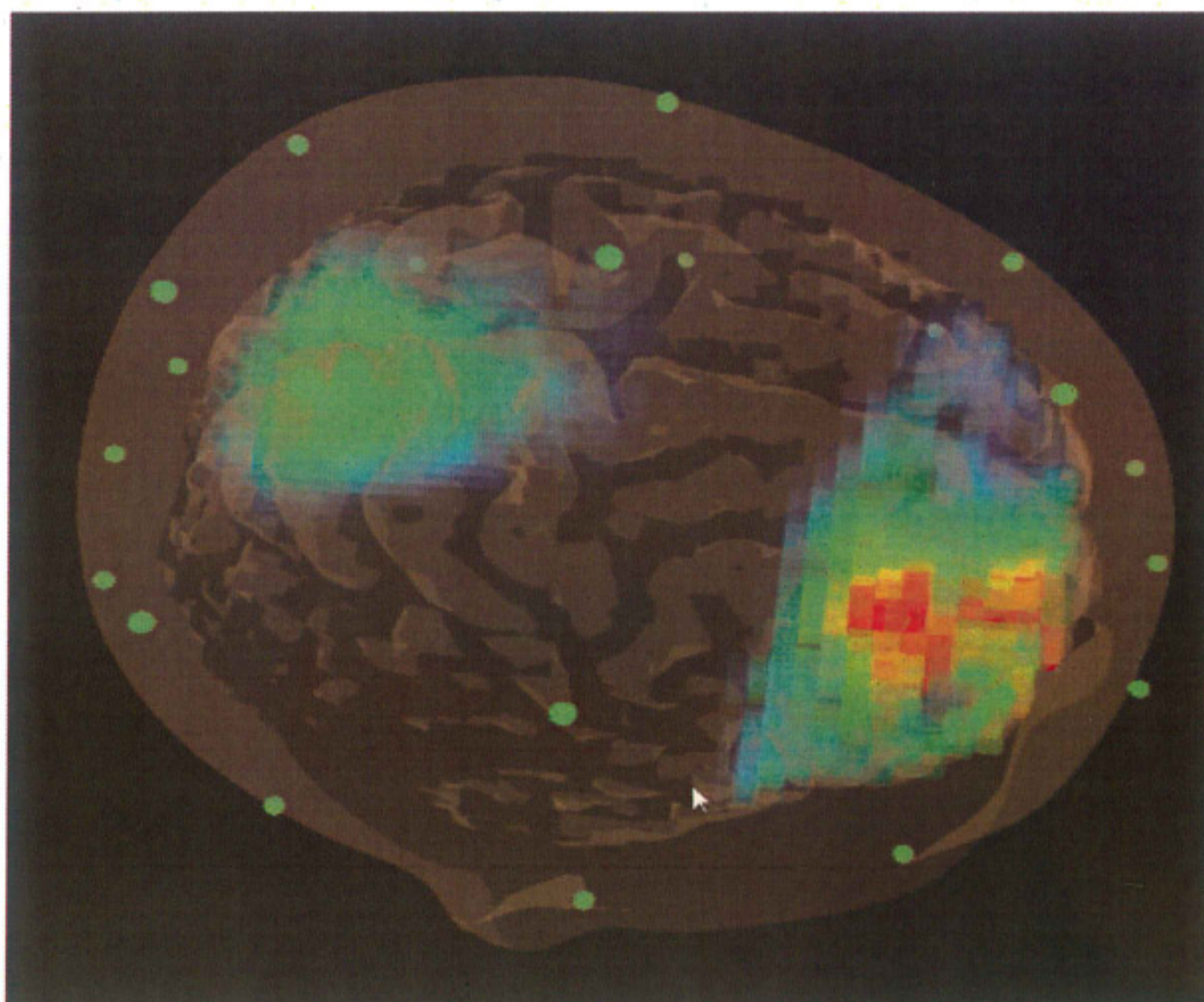
EEG AND NEUROFEEDBACK IN ONE SYSTEM

With BrainAvatar™, you can cap up your client, begin acquiring whole-head EEG, normative Z-Scores, and do neurofeedback training in one continuous process. BrainAvatar™ supports from 1 to 24 channels, so you can choose any number of sensor sites, including monopolar or bipolar connections, and assess, train, and report in a single, integrated, coordinated process.

BrainAvatar™ provides a solution for evaluation, assessment, and training in an integrated system that supports the industry standards. Files can be written in formats including binary, European Data Format (EDF), Lexicor, ASCII decimal, ASCII hex, or comma-separated variables (CSV), and imported into most EEG and data analysis programs.
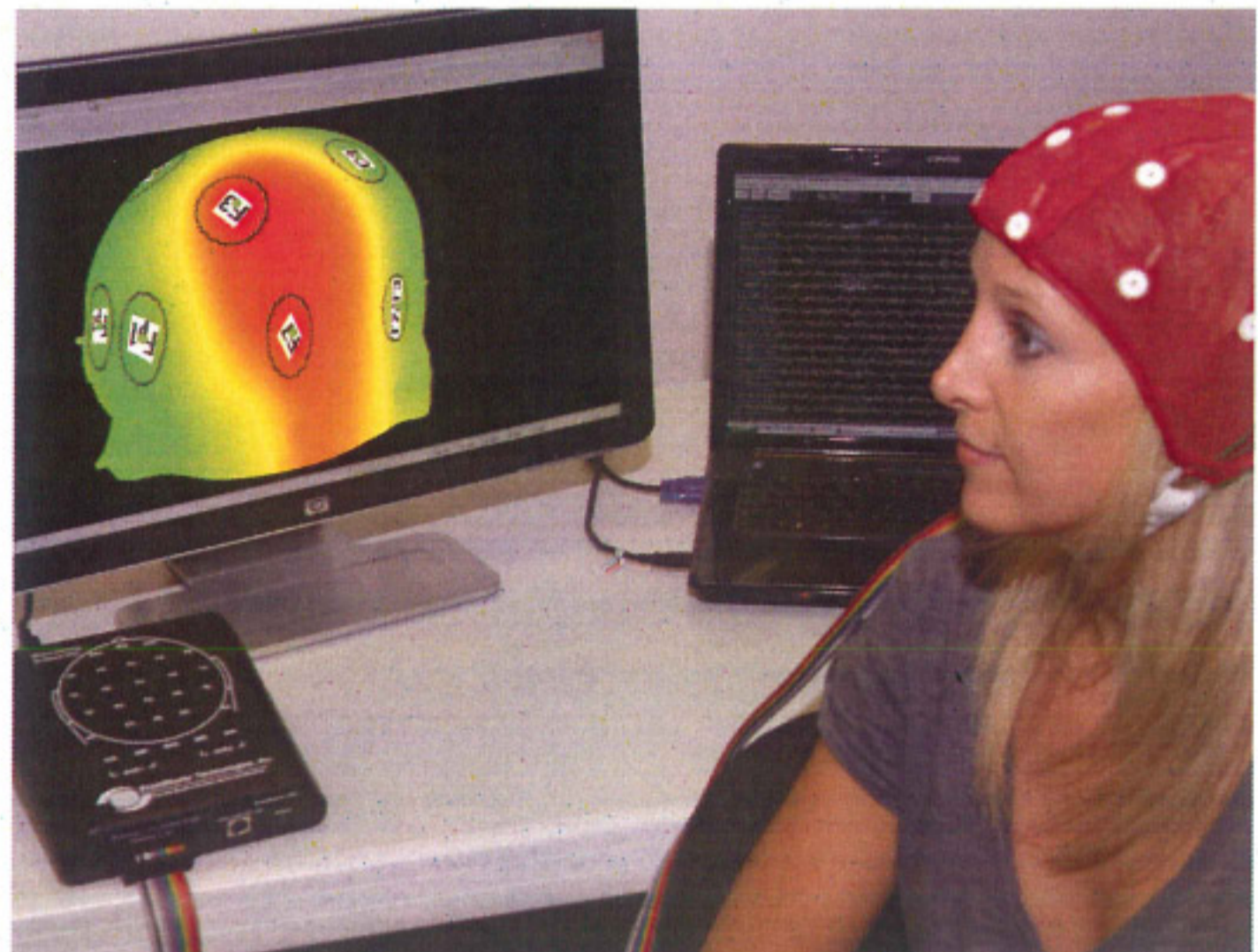
Laplacian Surface Mapping

Note: Live Z-Scores should not be used as a substitute for QEEG clinical evaluations when using BrainAvatar™. BrainAvatar™ is a live training and visualization system. Only a QEEG analysis involving comparisons to a valid static normative database after artifacting should be used for clinical evaluation.

Live sLORETA Projection (Frontal and Occipital Alpha)
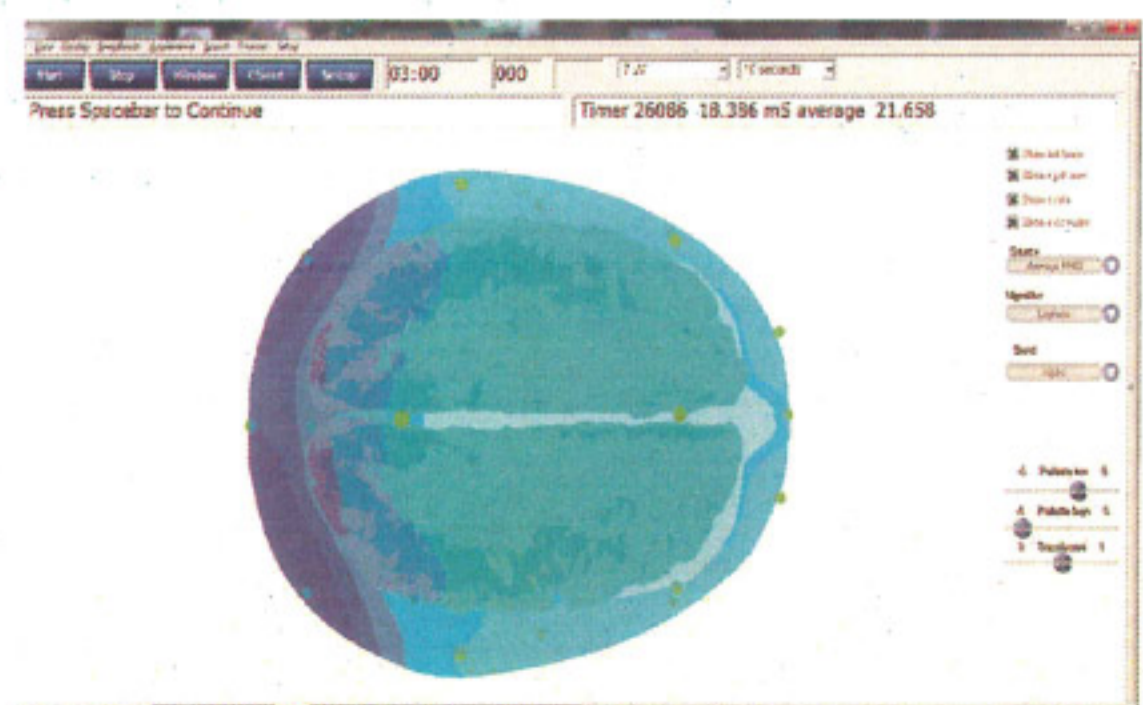
Simple, Intuitive Screens and Controls

LORETA Export option with BrainAvatar™

**BRAINAVATAR™ NOW OFFERS** a LORETA Export option allowing users to process EEG waveforms and export the data to LORETA for offline localization. This feature allows users to select portions of EEG, live or reviewed, process the data, and export the results to LORETA. Output can be provided in the form of raw EEG amplitude, filtered EEG (delta, theta, etc), or slow cortical potentials (SCP's). Once exported and read into LORETA, EEG data can be imaged and analysed using any LORETA tools and methods.

feature makes it unnecessary to operate the separate sLORETA software in connection with the system and allows instantaneous, live-animation representations of brain activity derived from surface EEG data.

LLP can be used to train any EEG components by brain region instead of by sensor site. Any types of conventional or connectivity training can be done with LLP which makes any chosen brain ROI look like just another Event Wizard variable or EEG channel.
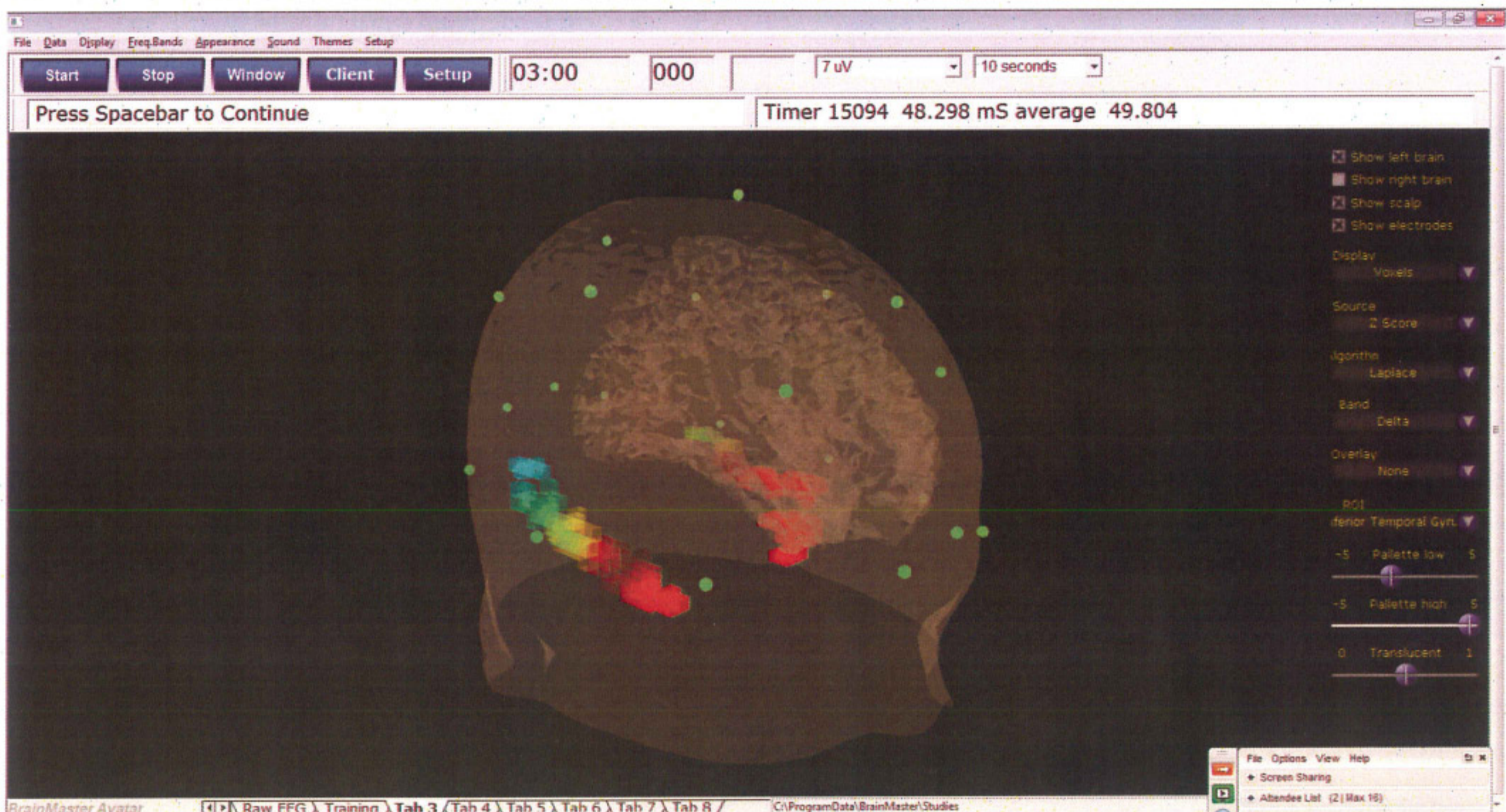
Live sLORETA Projection (Inferior Temporal Lobe)

## BrainMaster introduces LLP and ZBuilder as key components of BrainAvatar™

LLP (LIVE sLORETA PROJECTOR) IS A NEW SOFTWARE SYSTEM designed by BrainMaster that provides live high-resolution sLORETA projections using 19 channels of EEG. The LLP provides, for the first time, live EEG-based brain functional imaging and biofeedback based on scientific principals (Pascual-Marqui, 2002). It is possible to define regions of interest (ROI's) for any anatomical locations or Brodmann areas and to monitor and train EEG parameters specifically to those areas. Live scalp distributions as well as live sLORETA displays are possible during training. This

LLP MAKES IT POSSIBLE TO TRAIN BRAIN LOCATIONS SPECIFIED ANATOMICALLY, such as the anterior cingulate gyrus or dorsolateral frontal lobe, as well as Brodmann areas such as the visual association or speech production areas. This makes it possible to select brain structures as easily as selecting a different channel for training. LLP provides a seamless real-time bridge between live EEG and brain localization, useful both with or without Z-Score training norms. LLP uses the latest 5mm sLORETA voxel database providing over 6,000 voxels AND providing accurate, high-resolution mapping of brain function in real time.

LLP USES A DIPOLE-BASED MODELING APPROACH, so every voxel, region of interest, or Brodmann area can be represented by an equivalent dipole, or by individual dipoles. This provides unprecedented ability to visualize brain functional sources as collections of synchronous neurons (pyramidal cells), combining anatomical with functional perspective. Introduction of dipole angular information opens the door to BrainMaster's unique JSTFA analysis, Joint Space-Time Frequency Analysis. Now, brain function in space as well as time can be monitored, assessed, and trained.

WITH ZBUILDER, USERS CAN CREATE THEIR OWN targeting templates for live Z-Score training with or without using a normative database. In its simplest form, ZBuilder allows you to design training profiles for any of a wide range of EEG parameters including absolute and relative power, power ratios, asymmetry, coherence, phase, synchrony, spectral correlation, or comodulation. You can capture a client's EEG, use it to create a training template, and make changes suitable for clinical intervention. For example, if the goal is to "reduce beta in the cingulate gyrus," a training template can be created that is based upon the client's own EEG parameters, modified to reduce beta in that area only. This provides the possibility for individualized training that does not depend on training everyone to the same norm. This new capability takes live Z-Score training beyond the "one size fits all" perspective and opens the door to truly individualized LZT training.

ZBUILDER CAN ALSO BE USED TO VISUALIZE AND QUANTIFY changes in brain activation and connectivity associated with different states, including tasks. Acquire a baseline EEG and use it to create a visualization template. As long as the EEG does not change, the display will be clear. As soon as a particular brain location activates, it will show up in the display as a dynamic change. This makes it possible for the first time to visualize dynamic changes in brain activity associated with various functions, for diagnostic as well as for training purposes ("Digital Subtraction Brain Electrical Imaging"). Brain activity can be captured either as individual channels or as LLP regions of interest. For the first time, it is now possible to simply select a brain region, record from it, and perform brain structural operant training as easily as traditional training using individual leads. LLP training can also be combined with traditional training, allowing a flexible choice of training targets with the continual ability to visualize and measure brain activity in 3 dimensions.
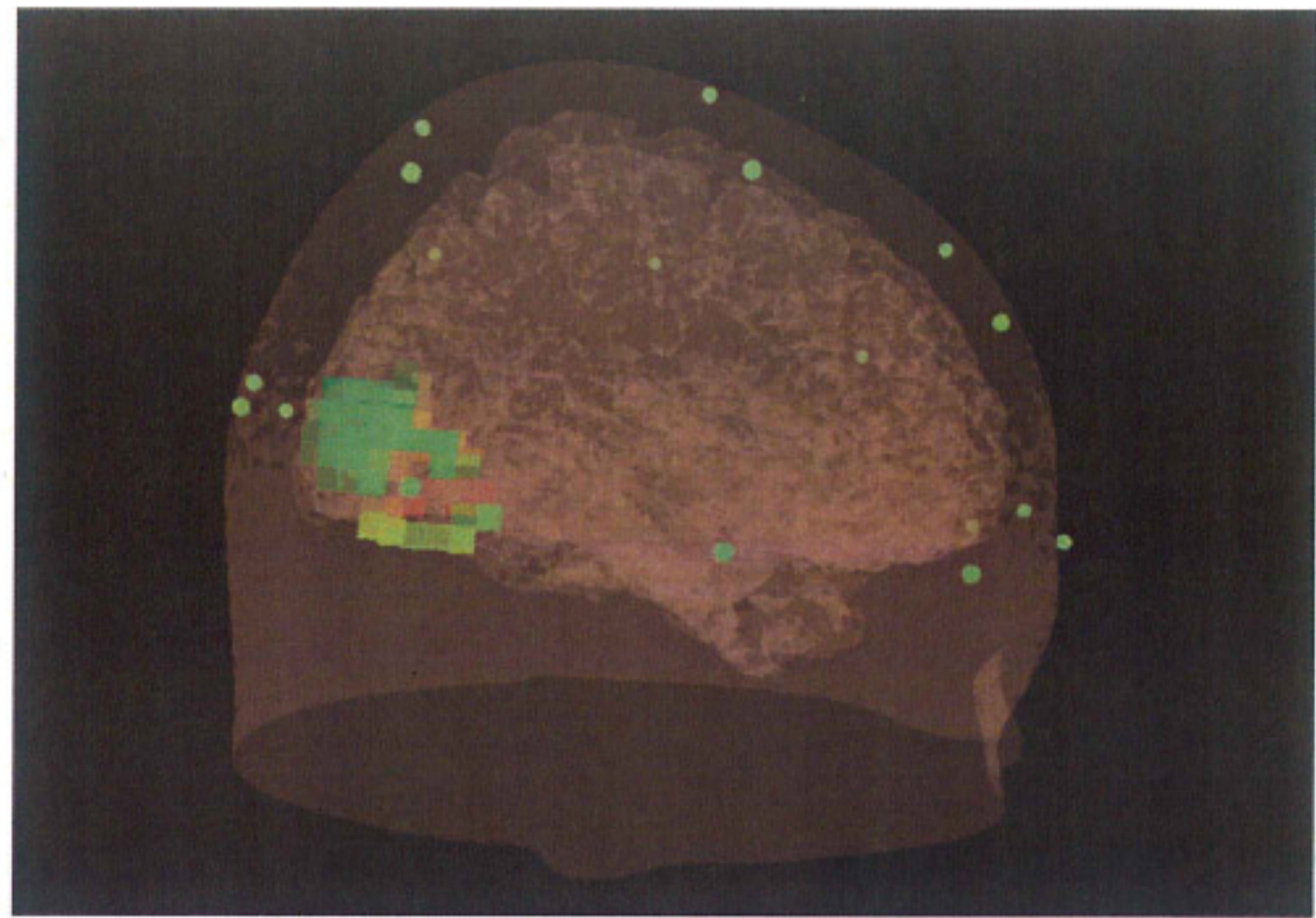
Live sLORETA-Based Brain Imaging (Occipital Lobe)

WITH LLP, IT IS POSSIBLE TO DO LORETA-BASED CONNECTIVITY TRAINING. Select any two regions of interest, and LLP allows you to monitor and train coherence, phase, spectral correlation, comodulation, or synchrony between those sites in any selected band. Specifically target functional connections using LLP to address functional connections in a simple, intuitive, easy-to-use and understand system.

LLP AND ZBUILDER ARE INTEGRATED WITH BRAINMASTER'S INNOVATIVE EVENT WIZARD, allowing users to instantly integrate sLORETA-based neurofeedback, with or without Z-Scores, into any protocol. Custom Z-Score templates can be combined with traditional or peripheral biofeedback in a seamless implementation. For example, to downtrain beta in the anterior cingulate gyrus, a single event using an equation as simple as "x=ROI(ANTCING, BETA)" will provide instantaneous training data derived from this brain locus.

sLORETA WITH LESS THAN A FULL CAP? LLP provides the flexibility to select any subset of the standard 19 10-20 sites and use the readings to do limited localization and lateralization for special needs. It is possible to identify lateralization, anterior-posterior position, and degree of closeness to the midline using LLP and 4 or more sites. While this is not intended for specific localization, as an assessment technique it has value in determining the gross location and magnitude of specific frequencies arising from these structures. LLP can also be used with any other number of sites with the resolution and accuracy depending on the sites selected. It is also possible, for example, to focus on posterior areas by recording from the rear 8 sites: Cz, Pz, P3, P4, T5, T6, O1, and O2. With LLP's live 3-D projector, it is possible to see all instantaneous sLORETA data in real time to confirm hypotheses and to guide training.
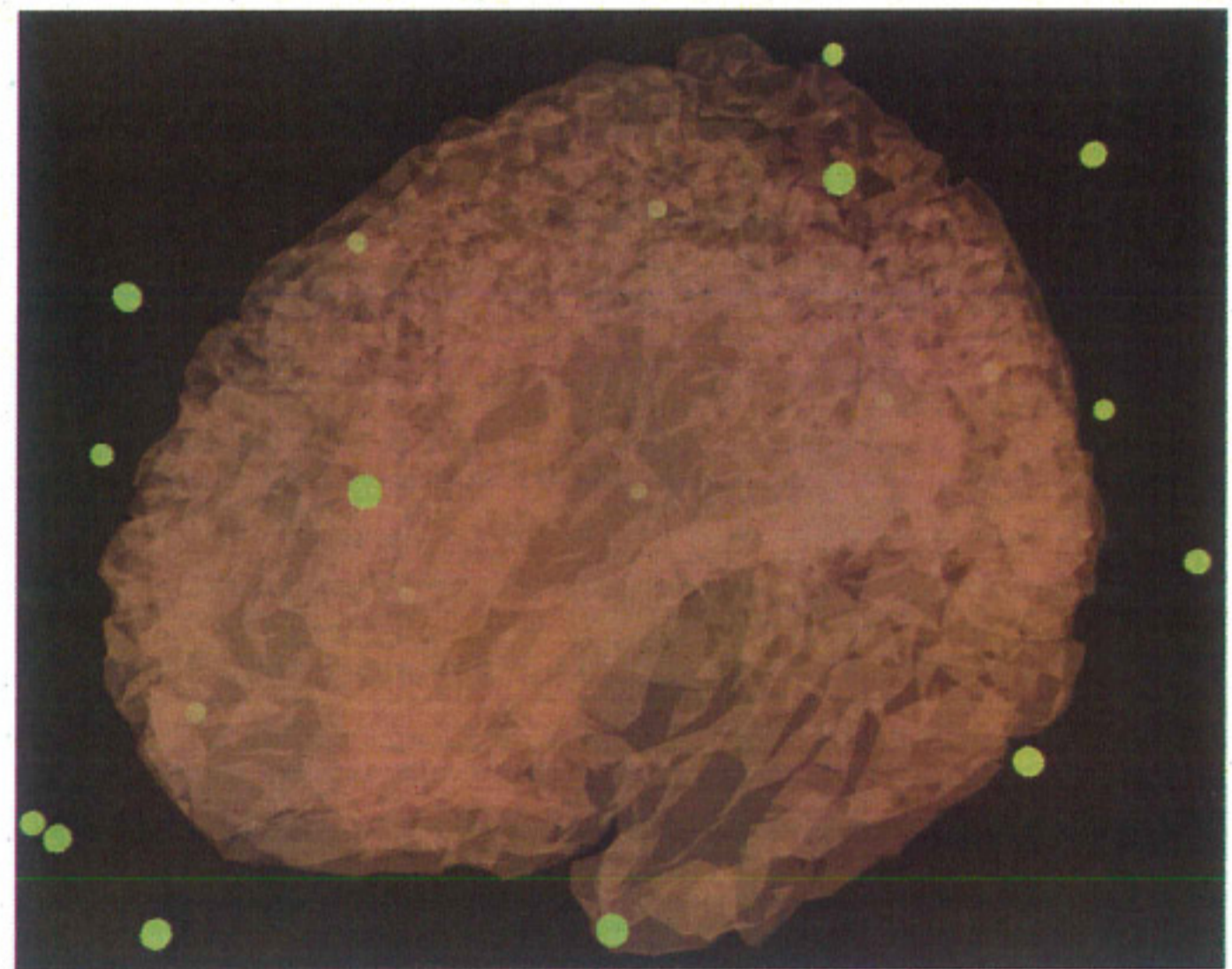
PERIPHERALS AND DC/SLOW CORTICAL POTENTIALS

BrainAvatar™ supports the full range of BrainMaster peripheral biofeedback devices including hemoencephalography (HEG), temperature (TEMP), blood-volume pulse (BVP), heart rate (HR), heart-rate variability (HRV), skin conductance response (SCR), respiration (RESP) and electromyography (EMG). Protocol and screen designs are available online to provide individual or combined biofeedback modalities, with or without concurrent EEG. Couples and healer/healee biofeedback and neurofeedback are also possible. New designs provide mind-body training, such as pioneered by Maxwell Cade, and adapted for heart/brain training using our new protocol concepts and approaches.

Because it is based on the BrainMaster Atlantis and Discovery devices, BrainAvatar™ provides a full set of DC and slow-cortical potential (SCP) capabilities. Bipolar infra-low frequency (ILF) training can be efficiently provided using simple designs, and combined with Live Z-Scores, peripherals, or Live LORETA training. In addition, the European style of SCP training can be conducted using randomized alternating trials of monopolar EEG training, as reported from the University of Tubingen.

BrainAvatar™ is based on the concept that the foundation of neurofeedback is in recognizing the power of the brain and its neuronal resources to implement change in the context of homeostasis. By combining EEG and peripheral modalities, BrainAvatar™ provides a means to empower the brain and the body to self-regulate in healthy and productive ways. By addressing the physical and mental as well as spiritual aspects of self-regulation, BrainAvatar™ helps to bridge multiple domains, and give you and your client maximum potential for change and growth.

**Live sLORETA-Based Brain Imaging
(scalp 10-20 sites shown in green)**

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BrainAvatar™ 4.0 for Atlantis (533-140)	$995	($795)
BrainAvatar™ 4.0 Upgrade from BMr 3.0 (533-141)	$895	($495)
BrainAvatar™ 4.0 Discovery Acquisition (533-145)	$895	($695)
BrainAvatar™ 4.0 Mini LLP for Atlantis (533-435)	$1095	($695)
BrainAvatar™ 4.0 Discovery Training up to 19 Channels* (533-612)	$1295	($995)
BrainAvatar™ 4.0 Training Upgrade from Discovery 1.0* (533-613)	$600	($300)
BrainAvatar™ 4.0 LLP for Discovery (533-614)	$2050	($1495)

* Requires BrainAvatar™ Discovery Aquisition

Pascual-Marqui, R.D. (2002) Standardized low resolution brain electromagnetic tomography (sLORETA): technical details. Methods & Findings in Experimental & Clinical Pharmacology. 24D:5-12.
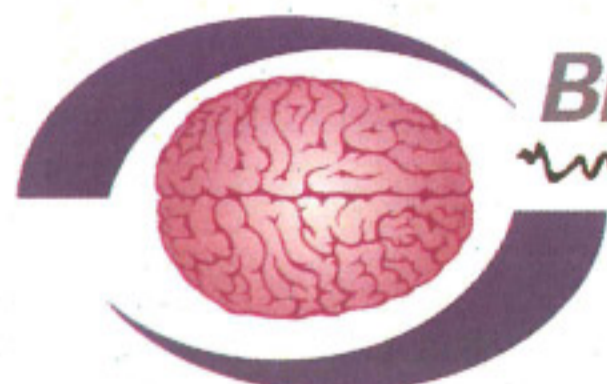
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Where the industry will be tomorrow

BrainAvatar™ 4.0 software presently in alpha testing period through 9/31/12. Some features of BrainAvatar™ 4.0 may be forthcoming in the form of updates which will be available at www.brainmaster.com.
Sold to or by the order of a licensed practitioner only.