

Electronic Auditory Stimulation effect



Sensory Processing Disorder

Sensory Processing Disorder refers to an individual's inability to properly experience, habituate and respond to sensory information from the world around them. In a hypersensitive child, a touch of the skin can feel like a burn, a quiet sound can be frighteningly loud, smells can be putrid, tastes can gag and the feedback from one's own body can cause a person confusion and imbalance because they are unable to properly relate to gravity. Auditory Processing Disorder refers to the inability to properly process sound.

EASE Listening Therapy apps

Electronic Auditory Stimulation effect (EASE) music, games and apps are designed to stimulate, challenge and promote sensory processing in children on the autism spectrum and others experiencing difficulty with sensory processing and organization.

EASE Listening Therapy apps for iPhone, iPod touch and iPad are inspired by principles of sensory integration from Jean Ayres, neuro-plasticity and organization from Glenn Doman and Auditory Integration Training from Guy Berard.

Using music as a foundation, EASE apps deliver short, intense bursts of high frequencies to carefully stimulate and challenge a child experiencing difficulty with auditory processing. This auditory challenge gently trains a child to cope with noise and so also to better cope with the sounds of the world at large.

While the EASe CDs have been the most popular disc-based Listening Therapy Program for more than fifteen years, all disc-based programs are a “one size fits all” solution to a very complex problem. However, limited access to expensive hardware-based systems has kept the majority of therapists from exploring more customized therapies for their patients, until now.

EASe apps from Audioforge Labs and Vision-Play recreate the functionality of \$10,000.00 hardware devices and in all parameters that we have measured, exceed their performance. The EASe Pro app even provides therapists setup parameters not found in hardware along with presets to quickly get a parent or therapist up and running, while he or she perfects their EASe app skills.

User’s Guide

The settings explained below should only be adjusted by a parent or therapist with Admin privileges and are password protected. If you have questions about the settings, please visit <http://www.easecd.com> and navigate to EASe app FAQ's. If you are a parent or therapist and would like formal training in the use of the EASe app visit <http://www.easecd.com> for a list of authorized EASe trainers.

Volume control/Safety warning

EASe apps analyze each song before playback and make pre encoding volume adjustments to maintain consistent peak-to-peak levels for every song. Our intention is to create a safer playback environment than even a stock iDevice playing unprocessed music.

However, you are in control of the volume, so please be careful when setting the iDevice playback level (as you would for any music player) for your patient or child and LOCK it before giving it to him or her.

An EASe Listening Therapy program should always begin at a very low volume and with the controls adjusted for the softest filtering profile. An auditory hypersensitive child can be much more sensitive to sound than you, so err on the side of safety. Over a period of two or three sessions, you can then raise the level to a louder listening volume. If the user experiences discomfort, reduce the volume.

If a child contracts an ear infection, discontinue any EASe listening sessions until the child is well again. Do not share a child’s headphones with other children without cleaning the pads with a disinfectant as that may spread germs and ear infections.

Headphones

EASe Listening Therapy requires high quality headphones that can reproduce music through the highest ranges of human hearing. Because manufacturers constantly change their products, it is best to understand the requirements. Headphones should have a frequency response from 20hz to 20khz and be an “over the ear” type to block out noise. Heavy headphones or headphones with extra large ear cups are not appropriate for small children, so are not advised. Currently, Sony MDR-V6, Sony MDR-7506 along with ATH-FC700a headphones are low cost, high quality headphones and work well with EASe Listening Therapy. Sennheiser HD500A headphones are also quality headphones. Ear buds supplied with iDevices are NOT high enough quality to work properly with EASe Listening Therapy.

Presets

The EASe Listening Therapy **Lite**, **Personal** and **Pro** apps all have four presets to make the process simple and easy. Pressing the Preset button cycles through four presets on the



iPhone and iPod, while on iPad there are four distinct preset buttons. Preset 1 is the least intense, easiest to listen to preset and presets 2, 3 and 4 gradually become more intense, with busier filter modulation and higher filter boost levels.

To use the EASe app presets, simply begin listening to preset 1 and then after a maximum of six half-hour sessions, switch to Preset 2. Listen to Preset 2 for a maximum of another six half-hour sessions and then switch to Preset 3. After listening to Preset 3 for a maximum of four half-hour sessions, switch to Preset 4 and listen for a maximum of four half-hour sessions.

Note: these are maximum times. After ten hours of listening to the same music, we feel it becomes too predictable and less effective. So after a maximum of ten listening hours, put the app away and observe the listener for improvements in appropriate response to sound, improvements in regulation, behavior and concentration.

Play music

Press play. If at least one album is selected, music will play. Remember to turn 'airplane' mode on to prevent interruptions from incoming email or other notifications.



User/Admin privileges

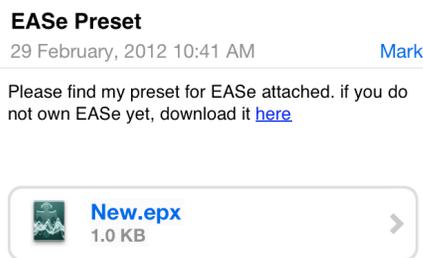
User privileges are minimal: Play and Skip.

Admin privileges allow a user to change setup parameters, album selection, presets, etc, and then lock the app until the next session. To lock the session, navigate to the advanced settings (set Password) screen in the control panel and change the password in both fields. Then flick the switch to user to lock the device into user mode. The app will now ask you for the password every session you try to access therapist features.

We HIGHLY advise the Administrator to also use the Apple Passcode Lock by clicking on General in the Settings app, then Passcode Lock and then setting a code and LOCKING the device before giving it to a child. That way the global volume control, which is under the control of the Apple iOS is locked and the device cannot be turned up accidentally.

Import presets from email

In email on your iPhone, iPad or iPod touch, bring up the “open in” dialog by taping and holding the .epx attachment. In the “open in” dialog tap on open in “EASe” and EASe is launched and will automatically load the emailed preset.



Timer

In the advanced setting screen there is a button top right to reach the timer screen. In the timer screen, a wheel allows the selection of a time interval. This has the consequence of stopping the music once that time is reached during play. So in order to make sure, the patient listens only 30 minutes



and not more, set the timer wheel to 30 minutes and the app blocks music play beyond 30 minutes. Touching the 'clear session time' button will clear the timer for another session.

Email reports

Enable email reports in the advanced settings screen. Once enabled, session reports can be emailed out to the therapists after the session has concluded. Session reports include what songs have been played for how long and with what settings.

Custom settings in the EASe Pro Listening Therapy app

A very successful program can be accomplished using just presets, but if you know how the presets were programmed, you can further customize the settings for your child or patient. The EASe Pro app features additional controls beyond the presets available in the EASe Lite and EASe Personal versions. See the descriptions of the controls below to better understand the EASe Pro app and to use it.

Even though the following features are only available in the EASe PRO version, a therapist can use the PRO version to create and email an advanced preset (for example with mute channel settings and a notch filter) to a parent using an EASe Personal app.

Select Music Modules

The EASe Lite and EASe Personal versions only play the music already contained in the app. However, the EASe Pro app can import additional custom made music modules from www.easecd.com. To select a music module tap the control panel button and tap 'Select therapeutic modules' to see the list of available albums. Select an album for play by tapping it until there is a checkmark next to the album name. Tap again to uncheck it. There is additional information below to show you how to purchase additional music modules and import them into your EASe Listening Therapy Pro app.



Burst length

This knob controls the maximum duration of the high shelf burst. Values are in milliseconds. So divide by 1000 to obtain values in seconds. The actual burst length is a random duration between 300 ms and the time set with the knob. Default is set to 1500 ms, so it will vary in duration between 300 ms and 1500 ms. Short bursts are recommended for early EASe sessions, so as not to overly stimulate the child's neuroauditory system and cause him or her discomfort. A few days into a listening schedule, the burst length can start to be lengthened.

Gap length

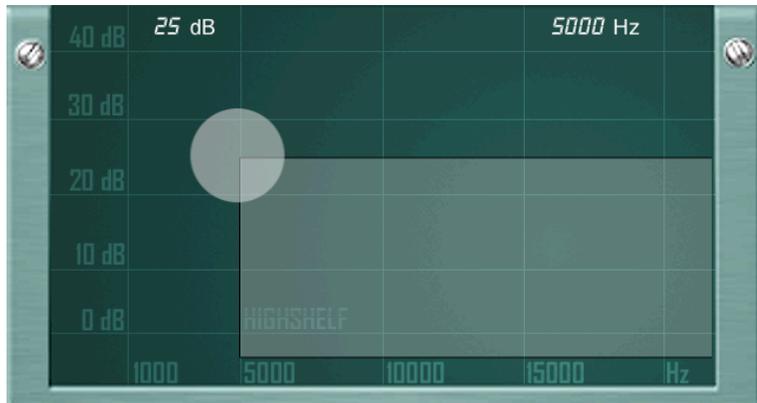
This knob controls the maximum time between two bursts. The effective time between two bursts is a random number ranging from 1ms up to the maximum gap length set by this knob. For a lower number of EASe burst events, set this control to a longer number. Again, this is for earlier EASe sessions. Further into the listening schedule, Gap length can be shortened to create more bursts and a more intense program.

Attack

This knob controls the attack time. At the lowest setting of 10 ms the burst is most intense. Early in a listening program, set it to a higher ramp up time for a more gentle burst and then move it to shorter Attack times to increase the intensity toward the end of the listening program.

Highshelf (Burst frequency cut off)

Touch the Clock area at the top of the interface to switch the display from Clock and track ID to the Highshelf control. This is actually a very sophisticated control that sets both the frequency above which the burst audio is affected and the amount of the burst. The frequency is read in the upper right corner of the screen and defaults to 5000 Hz. In the upper left of the screen you can see the amount of burst, which varies from 0 db to 40 db. Place your fingertip on the control point to adjust gain and frequency of the burst filter.



Mute left or right

Touch the left or right speaker button to mute the channel. Touch again to unmute. This feature is designed for therapists trained to use the device to stimulate one hemisphere more than the other. If you have not been trained in this technique, we recommend leaving both channels Unmuted.

Notch filters

Open up the notch filter screen and drag the control points around to set the notch filters. Use pinch gestures to make the band more narrow (larger Q) or wider (smaller Q). You can also enter the frequency, cut or Q directly by tapping on the respective numbers. Make sure to select the desired control point first. If you need more space to adjust the notch filter on iPhone and iPod touch, you can rotate your screen to landscape. Just rotate back to portrait to come back to the main screen.

Exporting Presets via email

Go into the custom preset screen (where your own presets are listed) and tap on the chevron to the right. The usual email dialog comes up. You can change/add text and edit the recipients etc. And send off the email.

Additional Music Modules

If you own the EASe Listening Therapy Pro app, you can purchase additional music modules that can extend and improve your EASe Listening Therapy program.

See <http://www.easecd.com/ease-app-music.html> for more details.

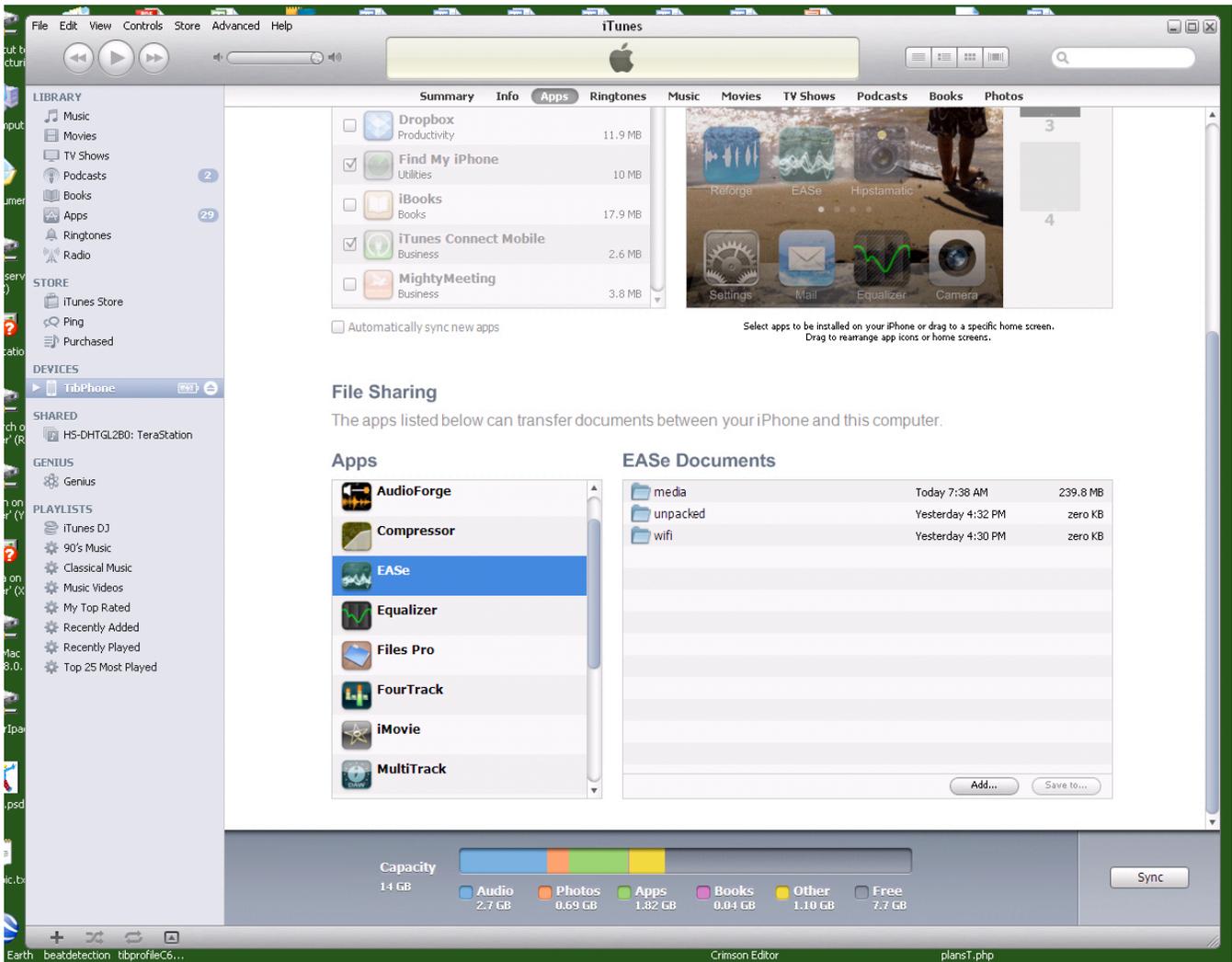
There are two ways to add more music to EASe app: via iTunes filesharing and wifi upload. Both are only able in the pro version of EASe.

iTunes filesharing

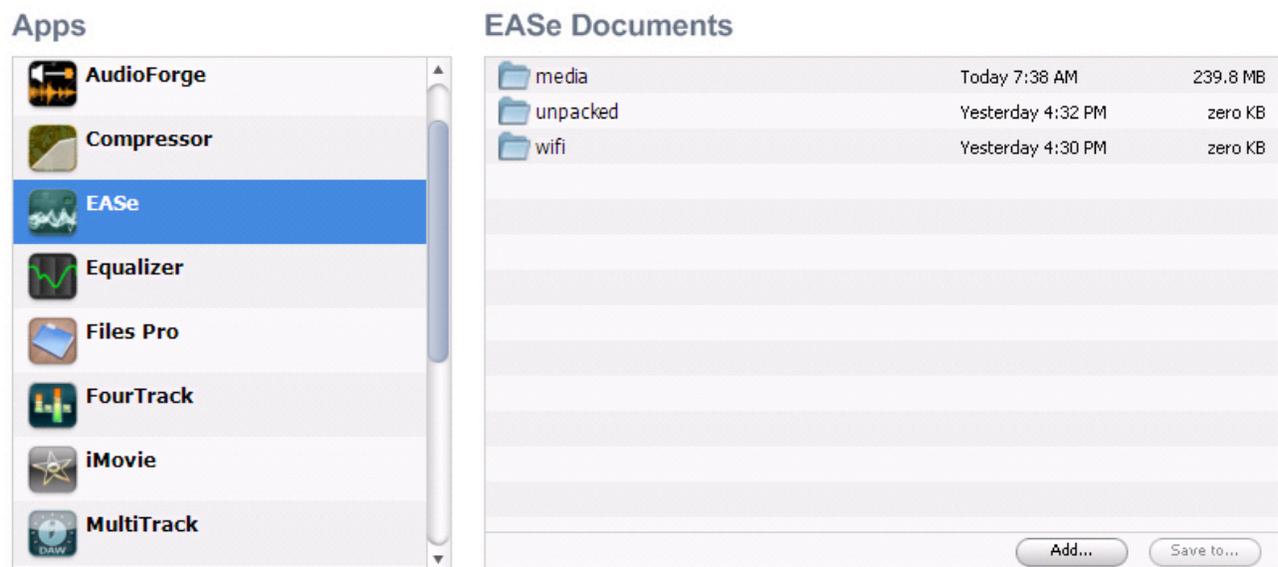
- Connect your iOS device to your computer using the included Dock Connector to USB cable.
- Launch iTunes 9.1 or later on your computer.



- Select your iOS device from the Devices section of iTunes.



- Click the Apps tab and scroll down to the bottom of the page.



- Under the File Sharing section, select EASe to view a list of the files associated with it on your iOS device.
- Drag and drop files onto the Documents list to copy them to the app on your iOS device or...Click the Add... button, locate the file or files you want to copy from your computer, and click Choose. The selected files will be copied to the app on your iOS device immediately. Select only files that are supported by EASe. They have a .eas extension. Other files are not supported.

Wifi upload

- Make sure your computer and your iPod are on the same network and the router settings allow for sharing between clients.
- Tap the vault icon and then select 'Import .eas archive via wifi'
- The new screen will show an IP number if your wifi is set up correctly. (192.168.0.1:8080 or similar)
- Type this number into the web browser (Internet explorer, Chrome, Safari etc.) on your computer. From there you can upload .ease archives into the EASe app.
- Remain on this screen until the app has been completely uploaded. When the progress bar is all the way on the right side, return to the control panel and your new songs are being added to the vault. This might take a couple of minutes to complete.

Additional Info

Sensory Processing Disorders

Exaggerated reactions and abnormal behavior in response to auditory stimuli are often observed in children on the autism spectrum and in others challenged by sensory processing disorder. Typically 40% to 80% of children on the autism spectrum are reported to be either auditory hypersensitive or to have been auditory hypersensitive in the past. In addition, it is thought that as many as 20% of the well population also exhibits auditory processing disorder (APD).

Marie Gomot et al, studied a group of autistic children to determine the possible source of this problem. Their conclusion, "The electrophysiological pattern reported here emphasized a left frontal cortex dysfunction that might also be implicated in cognitive and behavioral impairment characteristic of this

complex neurodevelopmental disorder". In other words, APD is in the brain, not the ear and that makes correcting it a potentially trainable skill.

These hypersensitive reactions to sound closely parallel other sensory processing disorders (SPD) involving taste, touch, feel and smell. To a person with SPD, the world can be a very scary and often, dangerous place full of bitter tastes, foul smells, touches that burn, lights that blind and unbearably loud sounds.

In many cases a therapeutic approach that involves specific activities to carefully stimulate and challenge those senses without overpowering the child, can be useful in helping the child learn to habituate and cope with the sensory world. Jean Ayres, PhD, OTR/L developed such a system called Sensory Integration Therapy.

The EASe CD series

Electronic Auditory Stimulation effect (EASe) music CDs, PC video games and now iPad, iPhone and iPod tools are inspired by principles of Sensory Integration Therapy and neuro-plasticity. EASe music is encoded according to our understanding of the principles of Auditory Stimulation. The work by Sheila Frick OTR, to connect auditory and vestibular integration inspires the visual/vestibular/auditory link. The EASe audio CD program was the original disc based Listening Therapy program in 1995. The EASe CD program has been an easy to use, simple and safe tool for parents, occupational, physical, speech and listening therapists to train a child challenged with sensory processing issues, central auditory processing disorder (CAPD), and developmental issues, to better manage noise, improve organization, sensory modulation and proprioception.

The EASe CD program can be carried out at home, at school, or in a therapist's office with an inexpensive CD player and a high quality pair of headphones. The EASe CD program integrates well with sensory integration activities, enabling a child to more easily develop additional skills through an enhanced "sensory diet". The EASe CD program can help a child learn to cope with noise and ease the pain of hyperacusis and auditory hypersensitivity in Autism, Autism spectrum disorders (ASD), PDD, PDD-NOS, ADD, ADHD, and Down Syndrome.

There have been nearly 100,000 EASe CDs distributed into the community since 1995 and currently there are over 10,000 therapists trained to use EASe CDs.

EASe CD's each contain approximately one hour of pleasant, up-tempo, instrumental music, encoded by a dynamically variable filter set. The initial low pass filter causes the music to sound soothingly muted and dull. A dynamic equalizer then dramatically boosts the high frequencies in random, short pulses, causing a small sensory shock to the listener's neuroauditory system. The shock is intense enough to cause a slight reaction but short enough to not cause a fight or flight response in the listener. Once the listener's brain learns that the small shocks are not threatening, he or she begins to habituate to them and eventually starts concentrating on the music itself. Once the session is complete, this newly learned habituation skill is automatically applied to the world at large, leaving the listener more in control of his or her auditory environment.

EASe Games

EASe Games represent a revolution in the development of software for children on the Autism spectrum and all other children diagnosed with Auditory Hypersensitivity, Hyperacusis, Central Auditory Processing Disorder (CAPD) Sensory Processing Disorder or Sensory Integration Disorder.

In 2007 we recognized that encouraging an active child to sit and listen to music when they would rather be at play can be a challenge. Parents regularly asked us if their child could play with toys or video games while listening to EASe CD's. Our answer had always been, "Yes, with the sound down." But that was a compromise and we knew we could do better, so we embarked on a journey to create software that would use the same approach to visual tracking and organization that EASe Listening Therapy used to help children learn to cope with noise.

Now children can listen to their EASe music, while enjoying fun and nonviolent driving and flying video games.

Your child will love playing EASe Games. They will drive a powerful dune buggy up and down steep hills and cliffs, zoom over the snow in a snowmobile, fly a hovercraft over the ground and fly their airplane in the clouds! While EASe Game music stimulates the auditory/vestibular cochlea, the on-screen action challenges a child's smooth pursuit and saccadic eye movement systems with constant stimulation of their sense of altitude, attitude and spatial orientation. Together, these systems engage and challenge the child to manage noise and integrate conflicting vestibular and visual information. This all happens in an exciting gaming environment.

EASe Games Pilot study

In 2011 EASe games underwent a pilot study at Brenau university. See the conclusion below.

Conclusion

The hypothesis that the use of Electronic Auditory Stimulation Effect (EASe) games for 28 days, twice a day for thirty minutes would significantly improve a child's visual attention skills, spatial organization skills and occupational performance at home, as measured by EASe game tracking scores was supported by the significant predicted outcomes calculated using the Semiparametric Ratio Estimator (SPRE).

The researchers consider the predictive validity of SPRE as a noteworthy finding of this study. As seen with participant 1Q in the Off Road dataset, the change point was identified as Day 6, although data was also available up to Day 11. Based on the predicted outcome at Day 11, the prediction was only 3.28% higher than the measured data, providing great validity of researcher predictions and reliability of the SPRE to predict maximum benefit from EASe game play. Our results conclude that EASe interactive games, Fun House and Off Road, provided multi system sensory input that promoted improved sensory modulation as evidenced by the percent increase in the participants' ability to habituate to interactive EASe game play.

Furthermore, this is the first instance in the field of occupational therapy research, of which the researchers are aware, where a study's results using SPRE to analyze data provide comparisons of the group mean to the exact individual scores from which they were derived in order to examine how well the mean reflects the individual responses to the EASe games. The findings of this study conclude that, based on Fun House means predictions with a p -value of .024 and a high R^2 at the change point, the benefit of using EASe games and music compact discs seen in this study's participants could be generalized to the greater population of children with sensory sensitivities.