

The background of the cover is a cosmic scene with a bright, glowing blue and white light source in the center, creating a lens flare effect. The surrounding space is dark with scattered orange and yellow stars or distant galaxies. At the top, the letters 'AVS' are rendered in a large, 3D, metallic blue font with a glowing effect. Below the title, the words 'Auditory / Visual Stimulation' are written in a bold, black, sans-serif font. In the top right corner, the words 'Premier Issue' are written in a white, serif font. In the bottom left corner, a list of topics is presented in a white, serif font. In the bottom right corner, the price '\$12.95' is displayed in a white, serif font.

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## **AVS Journal Vol. 1, #1 Fall '00**

Welcome to the premier issue of our AVS Journal. AVS stands for auditory / visual stimulation and is also referred to as light and sound technology. This journal is about pulsed light and sound frequency stimulation, on- going and recently completed research programs utilizing AVS instrumentation, upcoming events and interesting methods for maximizing your light and sound session experiences.

Our goal is to increase public awareness to the benefits and effectiveness of AVS technology and to provide AVS users (professionals and non-professionals alike) with a forum for sharing their AVS views and research. And please keep in mind that these views and research are not limited to just medical applications, but also pertain to enhancing personal growth, mind exploration and personal / public entertainment.

You are invited to submit articles, offer comments, even give your opinion concerning AVS technology and utilization. If submitting an article, it must be current, be copyrighted by the author and be accompanied with a signed release stating it is okay for us to print your article. We cannot return articles that are submitted, but if your article is chosen for an upcoming issue, we will be contacting you. If you would like to comment on a particular AVS subject or should you wish to offer your opinion about a certain aspect of AVS utilization, write to us. We will be having a reader's forum beginning with our next issue. So if you have something to say, here is your opportunity.

I would like to thank all of you who have helped turn this idea into reality. The authors, who have taken time out of their busy schedules to submit articles, have given this journal the information necessary to have an immediate impact, and for that I am most grateful. And to the advertisers, whose assistance and faith enabled this journal to be published, my sincerest thanks. Please show your appreciation by visiting the websites of these leaders in AVS research and sales. And be sure to let them know where you received their contact information!

And to all of you, our readers: many of you have been involved with light and sound instrumentation for years, many of you are just beginning. There is one common thread that ties us all together: we all know that AVS works. We need to make this knowledge available to the general public. AVS needs to be viewed as a credible technology for improving the quality of life. For making a good thing better. Now is our chance. Please get involved!

Thank you,

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# Quality Light

by Jeff Labno

It is useful to think of quality light pertaining to Audio Visual Stimulation (AVS) in two ways. The first is the waveform(s) present; while the second is the brightness factor.

Waveforms of light are expressed in light frequencies called nanometers. For example, red is expressed as 660 nanometer (plus or minus). White light is expressed as a compendium of all the visible light frequencies which include red, orange, yellow, green, blue and violet.

Manufacturers of light and sound machines typically use incandescent bulbs or LEDs (light emitting diodes).

Incandescent bulbs are what most people use in their homes. While they appear to be white, they in fact contain a higher presence of yellow, and the warmer colors such as red and orange are diminished in presence.

John Ott pointed out that house-hold use of incandescent light was causing seasonally-related problems in northern latitudes of the northern hemisphere and in southerly latitudes of the southern hemisphere during their winter months. He urged the use of fuller spectrum light which matched more closely the spectrum of visible light radiated by the Sun.

Our Sun radiates a broad spectrum of electro-magnetic radiation of which a small percentage manifests as visible light. Even the radiation from our Sun is incomplete as anomalies in space absorb specific light frequencies radiated by the Sun eclipsing them from ever reaching the Earth (Frauenhofer Lines).

Full spectrum light is man's best attempt to replicate the visible spectrum from our Sun. A noble challenge for our industry is to somehow find a fuller-spectrum light to mount on light glasses.

Colored LEDs typically emit a narrow band of light frequencies which means that the colors are bright and pure. This is called monochromatic light. The band frequencies of light you mix together, the greyer or duller the colors become.

Brightness. The next issue of light quality is the brightness factor. The brighter the light, the more interesting the colors and patterns your brain creates in response.

Dim lights create a "flickering effect". Brighter light generates a vivid display of colors and patterns which dazzle the imagination. Dim light machines generally end up in the closet, while bright light units are used over and over again.

Many early manufacturers of AVS machines had no choice as to quality of LEDs and therefore

used dim lights. LED technology has changed tremendously such that super bright LEDs are now available in most colors including white.

Super bright LEDs mean that the light show you see with your eyes closed is spectacular. Also, mental acuity is significantly increased with brighter light. Have you ever tried to read a book via candle light versus turning on the standard lights in your room? There is a big difference.

Over fifteen years ago, would-be inventors brought me quite a number of versions of light and sound machines they created in their garages. They used LEDs of many colors and combinations of colors. Most of them were boring because the light show was not of any quality.

When ultra-bright blue light became available in light glasses, the results were stunning. Ultra-bright blue LEDs puts the average person right out. Blue light never ever did that.

Ultra-bright yellow light produce yet other stunning results; the intellect process is expedited.

The use of color, however, is quite enigmatic. Medical research shows that the warmer colors such as red are more excitatory (energizing), where as the use of cooler colors such as blue are inhibitory (calming).

Color perception however is filtered through societal programming and also through personal psychological experiences.

In the United States we have different societal significances of colors than say people do in China. In the United States, white is worn at weddings; in China, white is worn at funerals. In the United States, traffic signals program people to respond to colorations of red signifying stop, green go and yellow caution.

Psychological impact of color is yet another filter we all experience. Green, for example, is often associated with healing. What if, when you were growing up, green was the color of your room and you had a troubled childhood?

The physiology of color is filtered through societal mores and psychological experiences making it impossible to predict or attempt to understand its impact on any given individual.

When selecting color of light glasses, it is best therefore to give the public a choice. People on their own cognition seem to gravitate towards particular colors. A "pro-choice" selection of light color in light glasses is a superior way to go. Some people like a variety of available colors to suit their mood.

"Eyes-open" color therapy is yet another great thing to try. Many people are using their machines with their eyes open because they find a specific color has a more powerful effect. Try red even for five minutes to help you get motivated for exercise. Turn the light intensity down so your eyes are comfortable.

"Eyes-open" light glasses are now available. The lenses in the glasses are clear, allowing you

to see through them. The placement of the lights are further apart and not in the center giving you the ability to clearly see through them.

You can accelerate your mental acuity by using them while doing work. Adjust the light intensity to be comfortable. Put your machine in manual mode so you can adjust the light frequency. Try editing copy while in beta (13+ cycles per second [c/s]). Try creative writing while in alpha (8-12c/s). Try doing art or playing an instrument while in theta (5-7 c/s).

Light intensity is a very important part of one's experience. Make sure that your eyes are always very comfortable. When hooking up beginners, show them how to adjust the light intensity at any time during their session. Too many times, beginners take off the glasses within just a few minutes saying they did not like it; the light intensity was too bright. There are some people who can only enjoy it when the intensity is about 2-5%.

Color therapy. You can create your own therapy device using your light and sound machine. Purchase white glasses for your machine. Then you can place color filter gels over them. Here's how:

Put your white light glasses on top of a desk with the light shining towards you. Take a color filter gel and lean it against the light glasses so the light shines through the filter. Use your machine in manual operation so you can change the frequency.

Set the frequency at any rate you wish. Many professionals allow the patient to set the frequency based on how it makes them feel. Then, meditate on the light with your eyes open.

The best quality color filters come from professional photographic supply companies. They publish the nanometers of each color filter. I have a set of 120 different colors. Purer colors are the best, monochromatic. They are called color filter gels.

Enhancing the light show. One of the best ways to enhance the light show is to do eye exercises at the beginning of each session. Rotate your eyes clockwise, then move them up and down, and finally left and right.

This sensitizes the photoreceptors in the retina and the colors and patterns you see will take on more dimension and richness. Also, this will relax your eyes so you can enjoy the session even more.

Enjoy the light!



In spite of the more inclusive summary warning generally given on light/sound systems, even if a person has problems with epilepsy, there is only about a 5% chance that he/she is photosensitive. Such persons could check with a neurologist to find out if they are photosensitive, and may be able to use light/sound without seizure concerns.

A large part of the discussion in ref (1) is devoted to television watching, because so many man-hours are devoted to this pastime and because it seems to be a necessary part of life for so many people. It is interesting that TV manufacturers do not find it necessary to post seizure warnings on their products, which cause far more seizures than light/sound machines. Light/sound machines are probably stronger seizure triggers than TV sets, because of the regularity of the stimulation, but the population using light/sound is minuscule compared to the one using TV, so relatively little research has been devoted to comparisons.

## Triggering Seizures

The types of photic stimulation that can cause photosensitive seizures cover a wide gamut. Historically, the story of a seizure caused by watching flickering light from a potters wheel, reported by Apuleius in the book *Apologia* written about AD125, is debunked in ref (1), as is the story of a seizure induced by viewing the sun through trees on a tree-lined road. Ref (1) reports that the first reliable reference to PSE is Gowers, *Epilepsy and Other Chronic Convulsive Diseases, Their Causes, Symptoms and Treatment* (1885).

The seizure type most often provoked by photosensitivity is the tonic-clonic (formerly called grand mal) seizure. Self-induced photosensitive seizures are possible, by viewing a light source and waving the hand with fingers outstretched rapidly across the eyes. Some persons can have seizures provoked by closing their eyes. PSE seizures are more likely with the eyes closed, probably because of the lights being diffused across the entire retina.

Some persons are sensitive to certain visual patterns, but most PSE appears to be from flickering lights - intermittent photic stimulation (IPS). Besides TV, the sun reflecting from water, windshield wipers, discotheques and many other sources are mentioned in ref (1). The book was published in 1994, a new edition done today might mention light/sound machines.

Flash rates that can cause seizures vary widely, but the optimum rate to induce PSE is between 10 and 25 Hertz, with the peak between 15 and 20. The length of the exposure used when testing for PSE has varied from two seconds to 20 minutes. It is generally agreed that a longer exposure increases the probability of a PSE response. Medina and Leston (1990) compared IPS with and without a diffuser, and found that the results with the eyes open and a diffusion screen could be as marked as those with the eyes closed. There is a lot of evidence that a PPR response (see next paragraph) is more likely in the 2 second interval following eye closure. A background illumination seems to reduce the PPR likelihood.

## Photoparoxysmal Responses

A response to IPS can be measured by EEG equipment, usually at a lower stimulation level



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## **Neurofeedback & Light / Sound Program in the Caldwell, Idaho School District**

**by L. Jerry Cunningham, Ph.D.**

The Caldwell School District initiated a Neurofeedback program in the Fall of 1999. L. Jerry Cunningham, Clinical Psychologist, directs the program.

My experience in the field of biofeedback began with peripheral procedures in research conducted by John and Patty House, M.D. and Ph.D. respectively. The research utilized temperature and muscular training in the treatment of Otologic disorders. The technology was very primitive in those days by comparison, but the results were significant and indicated the power and promise inherent with biofeedback procedures. The author's more recent experience was obtained with the Othmers at EEG Spectrum. The experience included their comprehensive course in Neurofeedback, their alpha-theta course and a course in peripheral procedures using Thought Technology systems; my experience also including working in the EEG Spectrum Encino (California) Clinic with Sue and Siegfried Othmer. Additionally, the author assisted in the development of a small Neurofeedback program at the Holman Group which is a managed mental health company. During this time Michael Landgraf and myself worked conjointly with several clients and began exploring the possibility of integrating Neurofeedback with light / sound procedures, a binaural beat generator, affirmation tapes, as well as the Syncroenergizer. The above experience provided the background for initiating the Neurofeedback program in the Caldwell School District.

In order to start the program the Caldwell School District purchased the Neurocybernetic System from EEG Spectrum as well as the peripheral software from Thought Technology and the TOVA (Test of Variable of Attention). Our initial goal was to treat Attention Deficit Disordered and Conduct Disordered children and to develop a program that eventually utilized various modalities such as the New Visions program had already done under the direction of John Anderson and Michael Joyce.

The experience with the program throughout the year was both interesting and challenging. It became immediately apparent that the impact of the program on a district-wide basis would be very limited. The limitations were due to our very limited budget and time allotments. One Neurocybernetic system and three days of time allotment for both administration and treatment made the number of students reachable with classic Neurofeedback quite limited. Our first decision was to limit the program to one school out of the nine in the district. This decision in retrospect was a very wise one and further expansion of the program will be on a school-by-school basis rather than district wide.

We also began addressing the question of how to increase the impact of our particular program given the limitation of our budget. Consequently, once again the possibility of interfacing light / sound procedures with Neurofeedback seemed a logical direction. The research by

Russell and Carter. The Michelette dissertation and clinical research by Ruth Olmstead suggested that light / sound procedures with certain children might be able to accomplish results similar to those obtained by Neurofeedback. Given our interest in exploring this possibility Michael Landgraf donated very generously to the Caldwell School District three Pro Tutor light / sound units, two dual binaural beat generators, a CD with dual binaural beat session tracks and the ADHD light / sound programs developed by Ruth Olmstead.

With these additional devices we began exploring how to utilize them effectively in our program. As a result some students were given a combination of Neurofeedback and light / sound. We utilized open-eye l/s glasses so that the student could receive simultaneously auditory and visual feedback from the Neurofeedback system as well as entrainment from the l/s equipment. During simultaneous administration we would use l/s frequencies that were compatible with the chosen Neurofeedback frequencies being trained. For example, if we were training within the beta range with a theta inhibitor, we would utilize the 17Hz-Olmstead light / sound program. The value of the Olmstead ADHD programs is that she has kept the frequency constant throughout the entire program and only the tone pitch is altered. This permits one to train as well as entrain at compatible frequencies. Other children were given light / sound exclusively and others given Neurofeedback one day and light / sound the next. Since we had three light / sound devices we could provide interventions for three students at one time and by this method dramatically increased the number of students we were impacting.

Another observation that was very critical during the year was the student's interest and motivation to cooperate and participate in either intervention. Students would routinely become bored with Neurofeedback about ten to twelve sessions into the treatment regime. First they wanted to try all of the games that were available on the Neurocybernetic system and after that they wanted new or different or more challenging tasks. With persistence, persuasion and coaxing, one could often get their cooperation for additional times. Light / sound was also difficult to keep their interest past the first six or seven sessions. They were clearly fascinated with the light and pattern displays at first and then they began to get bored. However, when I discovered, with binaural beats, the student's experience and cooperation changed dramatically. We would use music that they loved as the selections to be utilized during the light / sound sessions. Many of the students wanted the Disney classics: Lion King, Aladdin, etc.. Some students even loved more classically oriented music. The important issue, however, was the immersion effect that occurred when the music was simultaneously fed into the same headphones that delivered the binaural beats. After this adjustment there was very little resistance to the light / sound procedure. As a matter of fact, students would often come by and beg to have a light / sound session above and beyond their scheduled appointment. It is difficult to describe the shift that occurred with their interest and motivation with just this one adjustment. It was the music- that they loved -that was the changing factor.

During the year several students made very dramatic changes both on the TOVA and a district however, were not as complete as we had hoped. Due to one of our staff being very severely ill and out of the district for six months, the district workload in the Psychology Department at the end of the year made it impossible to do all of the final assessments that we had intended. However, those that were completed were very encouraging. One case in particular is very interesting and noteworthy. Janice (not real name) was a junior high student with severe

behavioral problems, high levels of resistance to the treatment program and yet a normal TOVA. We did SMR training for the first fifteen sessions and she remained resistant and oppositional throughout. However, at that point we changed to Alpha-Theta Neurofeedback and she began to quiet and respond. During the third Neurofeedback session light / sound closed-eye light glasses with the Schulman frequency was added. Within five to six minutes she manifested the classic Alpha-Theta crossover that Penniston suggests is a goal of Neurofeedback treatment. This combination was maintained for the remainder of the school year and each and every session she showed the classic Alpha-Theta crossover. In addition she made very significant clinical gains thereafter. She became very cooperative with therapy, she became pleasant and delightful and her mother stated that she is a changed girl. At the end of the year it was a delight to work with her whereas at the beginning it was painful just to attempt therapeutic intervention.

This next year we will begin to add more therapeutic modalities with our treatment program. Specifically, the author has been impressed with the information regarding the procedure known as Brain Gym. This is a simple procedure to initiate in conjunction with both Neurofeedback and light / sound and also something that teachers can be trained to do with the student in the classroom. Two of the psychology staff members will also complete training in Rapid Eye Therapy and Thought Field Technology. We will explore introducing these two modalities with some of the students in the Fall. Some of the algorithms of Thought Field Technology can be taught to the students and they may be able to use these to produce "self-calming" and to increase focus and attention.

Clearly, many new and exciting therapeutic interventions are emerging in the mental health field. Some of these interventions appear to have increased effectiveness and treatment time that is shorter than the classical talk-oriented therapies. Our program will continue in the Fall and is one of a very few in the United States that is using both Neurofeedback and light / sound interventions.

## **Light / Sound Systems and Seizures**

**by Ray Wolfe**

When I first saw a light/sound system in 1990, it had a seizure warning, saying persons with epilepsy problems should not use the system. As far as I knew I had no such problems, so I used the system and many more since. When we began selling light/sound systems under our own Photosonix name, we used warnings copied from other manufacturers, assuming they



knew what they were doing.

Over the years, I have researched the light/sound, seizures and epilepsy subject quite a bit, and, while still falling far short of having real medical knowledge, and possessing credentials neither in the medical nor legal fields, I believe I understand a lot about the risks involved. This article is an attempt to make this information generally available, as well as to provide sources for additional inquiry for those interested. It will provide a better understanding for most readers, but I would encourage any readers who need authoritative information to follow up on the references or to consult with a legal or medical professional as appropriate.

The main source for the information given here is the definitive book on photosensitive epilepsy, titled appropriately "Photosensitive Epilepsy" (ref 1). Several other sources were used for tidbits here and there and are also listed as references.

## Some Definitions and Probabilities

To set the stage for some of the following discussion, here are some definitions, descriptions and statistics.

### Seizure

A seizure is a paroxysmal (sudden, spasmodic) self limited (stops by itself with no outside assistance) event caused by an excessive electrical discharge of the central nervous system. There are several varieties of seizures, from a simple absence seizure, where the subject just "blanks out" for a short period, to the most dramatic, the Tonic-Clonic (formerly called Grand Mal) seizure, usually characterized by falling, muscles stiffening, body extremities jerking and twitching for a small number of minutes, and temporary loss of consciousness. Seizures are usually harmless, with any injury coming from falling or hitting a hard object, although serious consequences including death are possible in unusual circumstances. About 8.8% of the general population (1 person in 11) will experience a seizure at some point in their lives (although most seizures are not Tonic-Clonic).

If you are in a safe place, seated or lying down, you have some protection from the major cause of injury from a seizure, namely falling and striking a hard object. Light/sound sessions should always be experienced while seated or lying down in a safe place, even after you are thoroughly convinced that you are not photosensitive. This assists the relaxation process as well as giving some protection from injury in the unlikely event of a seizure.

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## Epilepsy

Epilepsy is a condition characterized by recurrent seizures. The frequency of epilepsy is about 0.65% in the general population (1 person in 153). Thus epilepsy is much less common than isolated seizures, and a patient is usually not diagnosed as epileptic until a second seizure.

## Photosensitive Epilepsy

Photosensitive Epilepsy (PSE) is a relatively rare condition, affecting approximately 1 person in 4,000. Persons with this condition can have seizures precipitated by flickering lights, such as those produced by a light/sound machine. Photosensitivity is rare enough in the general population that most books on seizures and epilepsy do not even mention it. Reference (1) is the only thorough treatment in the literature. If you look up photosensitive epilepsy on the web, you will find several sites that got all their information from this source.

Most persons with photosensitive epilepsy have a first seizure during their teenage years (75% by age 20). About half of initial seizures are induced by watching television. Some persons who are susceptible during their teenage years outgrow the condition, about 25% by age 25. As a result, adults over age 25 who have never had a seizure have about 1 chance in 20,000 of being photosensitive and not knowing it. So for a person who has not had a seizure, the likelihood of being photosensitive varies from 1 in 4,000 for children to 1 in 20,000 for adults over 25. Even if a person has never had a seizure, there is a small chance that they are photosensitive and a light/sound session could cause a seizure.

than that required to evoke a seizure, and this is used in testing for susceptibility to PSE without inducing seizures. A photoparoxysmal response (PPR) is a discharge evoked by IPS which is bilateral and recorded simultaneously from all areas of the scalp. It is usually a 3 to 3.5 hertz spike wave discharge. This response has been found to be associated with PSE, and is used by researchers in testing for PSE. Ref (1) goes into great detail in discussing the various types of PPR waveforms. PPRs which consist of 3 hz spike-wave discharges are very rare in normal subjects. An EEG test for a PPR response is the accepted technique for testing for photosensitivity.

## Color

There has been a lot of discussion of the effect of the color of the stimulating lights in evoking a PPR or seizure. Several researchers have reported increased sensitivity to red light, although the literature reported in ref (1) is by no means unanimous in this conclusion. A PPR response is more likely with the eyes closed, and the eyelids act as a red filter, reducing the effect of blue or green light. Some researchers have concluded that this factor alone accounts for the reported increased sensitivity to red light. According to ref (1), putting a red filter in front of open eyes does not increase EEG discharges. Harding and Jeavons (ref 1) conducted their own study and concluded that the color of the light did not significantly alter the presence of occipital spikes. Reading the section on color in ref (1) pages 57-61 left me with the feeling that red may be somewhat more provocative, but the case is certainly not clear. There is no dispute that blue is the least provocative color, definitely less provocative than white. It is interesting to note that incandescent bulbs are not white, but have a strong bias towards the red end of the spectrum, whereas white LEDs have a very strong blue component and relatively little red.

## Advice to Photosensitive Patients

Aside from drug treatment, therapy for the photosensitive patient is to avoid the stimulus. The drug sodium valproate has few side effects and is effective in preventing photosensitivity in most patients. A photosensitive person should avoid flickering lights and, if accidentally exposed, should cover one eye while getting away from the stimulation. Obviously such persons should avoid light/sound machines. In watching TV, the following precautions should be observed:

- View TV in a well lit room at a distance of 6 feet or more.
- A small illuminated lamp should be placed on the TV.
- Do not approach the TV for adjustments. If it is necessary to do so because the remote control is lost, cover one eye.
- Polarized sunglasses outdoors on sunny days are of assistance. Ordinary colored glasses are useless.

## Treatment of Epilepsy

Drugs are available that reduce the frequency of seizures in persons with uncontrolled epilepsy. These drugs usually have undesirable side effects. Furthermore, initiating drug treatment and hence establishing the diagnosis of epilepsy will have significant consequences for a person's



life. It may restrict their driving privileges and can eliminate them from consideration for certain jobs such as pilot, commercial diving or commercial automobile or truck driving. It can make obtaining health and life insurance difficult. It often attaches a social stigma, which can have profound negative effects on self-esteem and social opportunities. For these reasons, most neurologists and epileptologists (a neurologist with a specialty in epilepsy) are reluctant to diagnose epilepsy from a first seizure unless the risk of recurrence is high.

A person who has experienced a first seizure should be examined by a physician, to determine if any injury has occurred and if treatment for epilepsy is appropriate. Except in unusual circumstances (see First Aid for Seizures below) it is not necessary or even desirable to visit an emergency room, as emergency room physicians often do not know how to deal with seizures. It is better to see a neurologist, preferably an epileptologist, as soon as possible.

The neurologist will conduct several tests to see if there is any underlying cause for the seizure that should be treated, or if it was just a single seizure triggered by the flashing lights. If flickering lights and photosensitivity was the cause of the seizure, then the patient knows he/she should avoid flickering lights in the future, but probably no other life style changes will be required and the diagnosis of epilepsy is not appropriate. If you or anyone you know has a first seizure while using a light/sound machine, and drugs are prescribed without finding an underlying physiological cause for the seizure, you may want to get a second opinion.

In some states (currently California, Delaware, Nevada, New Jersey, Oregon and Pennsylvania), a physician examining a person who has epilepsy is required to report to the department of motor vehicles, and the individuals drivers license may be taken away until the doctor reports that the individual can drive safely. This is another reason to avoid emergency room physicians, many of whom are not sure how to deal with seizures, and may incorrectly diagnose epilepsy just to play it safe.

A seizure is said to be provoked if it is triggered by an external influence, such as alcohol, drugs or flashing lights. It is unprovoked if it had no such external trigger, but arose spontaneously from within the subject. There is some controversy in the medical community on the desirability of treating a first unprovoked seizure. See the web site [www.seizures.net/Articles/new onset.html](http://www.seizures.net/Articles/new%20onset.html) for an excellent coverage of this subject. I think there is good agreement that a first provoked seizure should not be treated, unless an underlying physiological problem is found. Ref (1) page 137 says that if a person has a seizure evoked by TV or other flickering light source, but the EEG is normal and spike-wave discharges are confined to IPS, then drugs are not appropriate.

We have seen a case where a seizure patient was taken to an emergency room (UCLA no less) and drugs were prescribed in just such a case. Side effects of the continued drug treatment were a problem for this person two years later. While we do not know for sure, this is probably a case of medical malpractice. In our legal system, the device causing the original seizure is still held responsible, on the grounds that otherwise the patient would have never been exposed to the malpractice. By the way, the seizure in this case was not caused by a Photosonix device. But the case pointed out clearly to us that the treatment of a seizure can be far more harmful than the seizure itself.

## First Aid for Seizures

This material is from "The Epilepsy Handbook" (ref 2), copied by permission.

These procedures are for Tonic-Clonic (formerly called Grand Mal) seizures, the kind most commonly caused by photosensitivity.

During the Seizure: The person may fall, become stiff and make jerking movements. The person's complexion may become pale or bluish.

- DO help the person lie down and put something soft under the head.
- DO remove any eyeglasses and loosen any tight clothing.
- DO clear the area of sharp or hard objects.
- DO NOT force anything into the person's mouth.
- DO NOT try to restrain the person. You cannot stop the seizure.

After the Seizure: The person may awaken confused and disoriented.

- DO turn the person to one side to allow saliva to drain from the mouth.
- DO arrange for someone to stay nearby until the person is fully awake.
- DO NOT offer the person any food or drink.

Calling for Help: (Usually not necessary)

Call 911 or the local police if...

- The person does not start breathing within 1 minute after the seizure ends (begin mouth to mouth resuscitation).
- A generalized tonic-clonic seizure lasts more than 2 minutes.
- The person has one seizure right after another.
- The person is injured.
- The person requests an ambulance.

## Conclusions for Light/Sound Dealers

The likelihood of a seizure from a light/sound experience is small for persons who have not had a seizure before. But it is possible, and the person involved should have the opportunity to make his own informed decision about taking the risk. Persons purchasing light/sound equipment are warned by labels on the equipment and in manuals, although the standard warning targeting persons who already know of their condition is not adequate. We are changing the Photosonix warning from "do not use this device if you have epilepsy problems" to "this device can cause seizures in photosensitive persons, you may be one and not know it".

If you give demos or run a spa, you are giving people sessions without showing them the warnings on the manual. It is your responsibility to spread the warning in this situation, and let the individual make his own informed decision. If you are running a spa, signed waivers are

recommended. See your attorney for proper wording.

## References

- 1) Harding and Jeavons, 1994, Photosensitive Epilepsy, London, MacKeith Press.
- 2) Gummit, 1995, The Epilepsy Handbook, The Practical Management of Seizures, New York, Raven Press Ltd.
- 3) Medina and Liston, 1990, Photosensitive Epilepsy, Electrophysiological Aspects. Medicina, 50, 9-15.

## Links

What is epilepsy? (Includes a first aid section) [www.lhsc.on.ca/eeg/epilepsy.htm](http://www.lhsc.on.ca/eeg/epilepsy.htm)

Photosensitivity [www.epilepsynse.org.uk/pages/info/leaflets/photo.html](http://www.epilepsynse.org.uk/pages/info/leaflets/photo.html)

Driver licensing [www.efa.org/advocacy/drivelaw/driving.html](http://www.efa.org/advocacy/drivelaw/driving.html)

Initial management of new onset seizures, to treat or not to treat? [Www.seizures.net/Articles/new\\_onset.html](http://Www.seizures.net/Articles/new_onset.html)

## **Therapeutic Use of Auditory and Visual Stimulation in the Treatment of Attention Deficit Hyperactivity Disorder**

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## Abstract

Attention deficit hyperactivity disorder (ADHD) is a learning disorder that is becoming increasingly prevalent amongst school-aged children. Scientific studies have implicated brainwave irregularities and various neurobiological abnormalities within the prefrontal cortex of the brain in those exhibiting symptomology of this disorder. Treatment strategies for ADHD are typically behavioral approaches to address the problem behaviors associated with the disorder, and a pharmacological approach to treat the hyperactive and impulsive symptoms. The use of auditory and visual stimulation (AVS) has been found to have efficacy not only addressing the

symptoms of this disorder, but may be a method of treatment that directly regulates brainwave activity and affects the physiology of the brain. Though current research is limited, studies utilizing AVS on children have demonstrated significant changes in academic performance, and in the reduction of the behavioral symptomology and cognitive deficits associated with ADHD and other disorders that are neurologically based. There is also some promising evidence that AVS may be an effective substitute for neurostimulant medication.

## Attention Deficit Hyperactivity Disorder

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most prevalent and intensely studied syndromes in child psychology and is characterized by deficits of poor attention, impulsivity, and hyperactivity (American Psychological Association, 1994). Children who demonstrate ADHD characteristics generally score seven to 15 points lower than peers on standardized intelligence tests (Barkley, Anastopoloulos, Guevermont, & Fletcher, 1991). Common treatment interventions are behavioral modification techniques to address the problem behaviors of hyperactivity and impulsivity, and pharmacology to address the attentional deficits in the form of stimulant medications. Due to medication cost, possible psychostimulant side effects, and compliance, many individuals are interested in a safe, effective, and less costly alternative treatments for this disorder.

Auditory and visual stimulation (AVS) therapy has been used to alter brainwave irregularities and increase brain activation in those with ADHD characteristics. Research is being conducted using this technique as a non-drug approach to aid in regulating brainwave function, decreasing medication intake, increasing concentration and academic performance, and decreasing problematic behavior.

## Neurobiological Aspects of ADHD

Neuroimaging studies have implicated deficits in frontal lobe functioning, differences in corpus callosum measures (Giedd et al., 1994), decreased brain volume (Castellanos et al., 1996; Filpatrick et al., 1997; Hynde et al., 1991), impaired cognitive and behavioral functioning, and other brain abnormalities in those with ADHD. Although none of the current findings result in locating a primary cause of the pathophysiology of ADHD, many studies do contend that there are fundamental neuroanatomical abnormalities within the developing brain of those individuals with ADHD that effect cognitive functioning. The use of auditory and visual stimulation has been found to be effective in aiding in brainwave irregularities in those with ADHD (Lubar, 1991; Othmer, 1992), and findings suggest that AVS initiates dendritic enhancement as evidenced by cognitive increases and higher scores on standardized testing (Carter & Russell, 1981, 1993, 1994; Micheletti, 1999; Patrick, 1994).

Earlier studies found that electrical stimulation administered to the frontal cortex in animals demonstrate significant enhanced recovery of neurons in the visual cortex, suggesting increases in visual input processing and improved attention paid to external stimuli (Spinelli & Pilbram, 1967). Diamond (1988) discovered that challenging environmental stimulus result in increases in dendritic growth, brain weight and density, as well as changes in molecular, synaptic, and behavior in animal studies resulting in increased memory and maze learning. Later, Dia-

mond, Kolb & Whilshaw (1990) found greater dendritic length and structural changes in the cortex of postmortem humans who had lead more challenging lives. These physiological brain studies demonstrate that various forms of stimulation produce increases in dendritic growth and length which can be associated with enhanced cognitive abilities and functioning. Auditory and visual stimulation appears to be another promising method that can effect changes within the brain's physiology.

### Recent Studies Utilizing AVS to Enhance Cognitive Abilities and Behavioral Functioning

In a recent study by Micheletti (1999) utilizing AVS with ADHD children demonstrated both enhanced cognitive and behavioral changes. Micheletti (1999) compared four treatment groups of 99 ADHD children ranging from seven to 13 years of age. The treatment groups consisted of an AVS Group, an AVS and Stimulant Medication Group, a Stimulant Medication Group, and a Self-Selected Comparison Group. All groups were tested off medication to evaluate differences at baseline. Cognitive functioning was evaluated using achievement tests in Reading, Spelling, and Arithmetic from the Wide Range Achievement Test-Revised (WRAT-R). Listening comprehension and verbal ability was measured using the Peabody Picture Vocabulary Test (PPVT). The Raven Progressive Matrices (Raven's) was used to measure reasoning ability and the ability to organize spacial perceptions into systematically related wholes. Behavioral changes were changes were noted using the Intermediate Visual and Auditory Continuous Test (IVAC) and the Attention Deficit Disorder Evaluation Scale (ADDES).

The study also evaluated the effectiveness of the stimulant medication (Ritalin and Adderall) and the efficacy of combining AVS and medication. Both the AVS and the AVS/Stimulant Medication Group demonstrated significant statistical cognitive and behavioral changes at  $p < .05$ ,  $p < .01$ , and  $p < .001$  level. The AVS training Group demonstrated statistical changes in five out of nine tests or 55.6 % of the time. The AVS/Stimulant Group demonstrated changes on eight out of nine tests or 88.9 % of the time. The Stimulant Only Group demonstrated less change when compared to the AVS and AVS/Stimulant Groups. This group showed only change in three out of nine tests or 33.0 % of the time. The Self Selected Comparison Group indicated no statistical change on cognitive or behavioral defendant measures over time.

This study findings indicate that the use of AVS appeared to impact the neurological functioning of the ADHD individual as evidenced by increases in cognitive functioning levels as demonstrated by increased performance in Reading, Spelling, and Arithmetic as evidenced by WRAT-R scores and improved behavioral functioning as evidenced by behavior rating scales (ADDES; IVAC).

An earlier Canadian study investigated the efficacy of AVS in decreasing stimulant medication intake and ADHD symptomology in subjects diagnosed with ADHD (Olmstead, 1997). The study consisted of 65 participants, 55 males and 10 females between the ages of six and 45 years of age who met the DSM-IV (APA, 1994) criteria diagnosis of ADHD. Twenty-five of the subjects were on stimulant medication when beginning AVS treatment. Results demonstrated that of the 65 subjects undergoing AVS treatment, 68% noted moderate to significant reduction in negative behavioral symptomology according to ADHD diagnostic criteria checklists. A chi-square test (1 df) was statistically significant  $\chi^2(1) = 8.14$ ,  $p < .01$ . indicating a sig-



nificant difference from the 32% who noted no reduction in symptomology. The significant effectiveness of AVS on those subjects taking stimulant medication was concluded due to decrease in medication intake as correlated to the reduction of ADHD symptomology. Analysis of data gathered using a chi-square test (1 df) was significant  $\chi^2(1) = 13.0$   $p < .001$ .

Of the 25 subjects taking stimulant medication prior to beginning AVS treatment, 76% of the subjects were able to reduce or completely discontinue medication and 24% did not. Though this study did not conduct a formal follow up to measure sustained results, these findings suggest that an AVS treatment program can lead to significant reduction in ADHD symptoms and may be a viable non-drug approach to treating this disorder as evidenced by the significant decrease in medication intake.

Both of these studies indicate that auditory and visual stimulation is effective in producing academic enhancement (WRAT-R), as well as increases in verbal ability and non-verbal reasoning (Raven's, and PPVT). AVS was found to decrease problem behaviors such as impulsivity and hyperactivity as noted on parent and teacher behavior rating scales (ADDES, IVAC), and the ADHD diagnostic checklist (DSM-IV).

The above findings suggest that auditory and visual stimulation may be a viable replicable physical phenomenon that increases brainwave activity, resulting in neuronal changes and dendritic growth. Such findings are important and have significant application to the intervention of individuals diagnosed with ADHD and other learning and neurological disorders.

Due to the promise of increased cognitive functioning, research studies have begun to investigate the efficacy of AVS, thus the use of such devices in clinical settings is broadening. Additionally, compact, portable, low-cost devices are now available with specific programs and instructions for use as an intervention for specific symptom reduction. These are important developments for the ADHD individual who can now utilize this technique safely and relatively inexpensively at home.

Ruth Olmstead M.A. has developed a number of intervention programs for ADHD that have been duplicated for use with various light and sound devices. She has utilized AVS for many years in a medical setting as a method of intervention for a number of psychological and neurological disorders such as brain trauma, migraine, learning disabilities, and stress related disorders. She currently uses AVS in conjunction with psychotherapy in a clinical setting as an adjunct intervention for learning disabilities, anxiety, trauma, and depression. She is currently completing her Doctorate degree in Clinical Psychology, and trains licensed therapists in the clinical application of AVS stimulation and brainwave entrainment.

## **Creating a Resource Anchor by Michael Stevens**

This is a cool little tool you can use to have some choice over your states in a light and sound

session. I have used it several times and had a blast with it. It is simple, easy to perform and can be done ANYWHERE!....so you can use it with your light and sound session or use it when you do not have a light and sound machine handy. You can even use this technique to anchor a state that your light and sound machine induces! Have fun with it and be sure to anchor only POSITIVE states.

First, allow me to explain what an anchor is. It is basically a specific stimulus which, when applied, produces a specific response. Remember Pavlov? He accidentally had his dogs anchored to salivate as if they were going to receive food whenever he rang a bell in the feeding room. Well, humans respond in much the same way! Anchoring has four key points: 1) the replication of the stimulus (the stimulus has to be the same when you activate it as when it was originally set); 2) the intensity of the positive state (the more intense the positive state, the more effective the anchor); 3) the uniqueness of the anchor (if it is a stimulus that is perpetually present, the effect of the anchor can become diluted); 4) the timing of applying the anchor (ever been around someone who had a really, really good sense of comedic timing?).

For convenience, we will be using our hands for this example. Imagine putting all the states elicited into your right hand. Simply follow the directions and everything should work just fine.

-Recall a time when you were totally motivated towards something positive. Put it in your right hand.

-Recall a time when you were totally powerful. Put it too in your right hand.

-Recall a time when you were totally loved. Put it also in your right hand.

-Recall a time when you knew you could have whatever positive things you wanted, when you knew that life is enjoyable and it feels wonderful to be alive; when you knew you could have it all. Put that in your right hand. Recall a time when you were totally motivated towards something positive. Put it in your right hand.

-Recall a time when you were totally powerful. Put it too in your right hand.

-Recall a time when you were totally loved. Put it also in your right hand.

-Recall a time when you knew you could have whatever positive things you wanted, when you knew that life is enjoyable and it feels wonderful to be alive; when you knew you could have it all. Put that in your right hand.

-Recall a time when you had infinite energy and a zest for life. Put that in your right hand.

Now look at the shape...and the color...feel how good it feels. And notice what it could say to you if it could talk.

Now close your hand and make a fist and know that you can recall those feelings at any time just by making your fist.

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- Skunk Magazine

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