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## Table of Contents

	<b>Title</b>	<b>Authors</b>	<b>Page#</b>
1	Severity Assessment of Social Anxiety Disorder in Default Mode Network using EEG signals	Abdulhakim Al-Ezzi, Nidal Kamel, and Esther Gunaseli	2
2	Integrating Hypnosis informed Neuroscience with Audio-Visual Entrainment (AVE) to Accelerate Behavioural change (Gaming Addiction)	Joachim Lee Tai Loong	12
3	Case Report: Neurofeedback to deal with Behavior Difficulties	Chen Chen Cheong, Kian Yong Koo	19

# Integrating Hypnosis informed Neuroscience with Audio-Visual Entrainment (AVE) to Accelerate Behavioural change (Gaming Addiction)

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## Abstract

This article aims to describe a basic working and understanding of how the brain “pattern matches” combined with the use of a basic Audio-Visual Entrainment (AVE) as an effective yet affordable treatment. The integration of neuroscience and AVE is an alternative approach to relying on a single treatment modality. This approach involves applying the “APET” model, which is a practical application of knowledge derived from Neuroscience and working collaboratively with the patient to co-create a personalized “empowering preferred future” to “pattern match” – a new response to override the old mal-adaptive behavior and thinking, thus accelerating the process of change. The AVE is subsequently introduced as an adjunct to reinforce the positive changes and progress. This results in a self-directed motivation to act on the changes. The outcome of this study suggests that while skilled delivery of the ‘APET’ model is necessary, the delivery of the AVE protocol requires minimal supervision and training, hence minimising the cost of treatment while delivering positive outcomes.

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## 1. Background

Audio-visual Stimulation (AVS) is often used interchangeably with the term “Light and sound machine” to increase/enhance brain activity. The word “entrainment” was introduced to train a particular brain activity (Bartley, 1937; Jasper, 1936). Using lights that are pulsed into the eyes and tones pulsed into the ears at certain frequencies, research findings indicated that nerve pathways from the eyes and ears carry the potentials into the thalamus (Siever, 2014). Studies in Neuroscience indicated that the thalamus is the gateway to gain access into the brain regions (Ward, 2013; Wolff & Vann, 2019). With a myriad of treatment options, length of treatment and affordability, AVS is a no-frills, cost saving treatment option when combined with Hypnosis instead of the conventional Neurofeedback treatment protocol which can take up to 40 sessions for a significant outcome (Mauro & Cermak, 2006; Berg & Siever, 2009; Marzbani, Marateb & Mansourian, 2016; Chapin, 2016; Moyosola, Alexandru, Nicole, Monadel, Pavaloiu and Boiangiu, 2019). Hypnosis is integrated into the treatment because of the human brain’s naturalistic ability to enter into the different brainwaves through focus attention and deep relaxation— Beta (12-35Hz), Alpha (8-12Hz), Theta (4-8Hz) and Delta (0.5-4Hz) brainwaves. Dr. Thomas Budzynski, one of the Neurofeedback pioneers reported using light and sound stimulation to assist his client to maintain at Theta brain state (4-8Hz) during psychotherapy (Budzynski, 1992). In this case study, hypnosis is used in tandem with David Pro Delight, an Audio-Visual Entrainment (AVE) device to accelerate behavioural change.

## 2. Case Presentation

This case involves the treatment of a 21-year-old woman who is addicted to gaming, socially isolated and lacking motivation. I shall refer to her as Jane. Although qualified as a technician in the engineering sector, Jane is not motivated to gain employment. She spends 14 hours daily on gaming and has no social skills. Her only response to any questions is, “I don’t know!” Jane was referred by the Hospital’s Medical Social Worker as they did not find anything biologically wrong with her. However, concerns were raised that she was addicted to gaming for long hours, was socially isolated and unable to articulate or express her needs. She has been having this problem for over five years, with the last year prior to therapy being the most intense, leading to complete isolation from family, friends, and society in general. Jane has never received any prior treatment for her condition.

### 2.1. Preliminary Assessment

My preliminary assessment of Jane encompasses the physical, cognitive or verbal communication style and affective state. Physically, Jane suffers from interrupted sleep and her dressing reflects her lack of concern for her physical appearance. She is dressed in casual home attire and mildly overweight. Jane’s affective state is “flat”, and nothing appears to raise her emotions. Her cognitive or verbal communication style is limited to a single response, “I don’t know!” She is unable to engage in conversation and shows little or no interest in engaging in any form of communication. Jane’s form of escapism from reality is gaming. Relating neuroscience to Jane’s condition, it is one where her brain pattern automatically matches an old pattern.

## 3. Neuroscience in Action

Joseph Ledoux (2003) discovered that the emotional brain has the ability to be one jump ahead of the neocortex or the thinking brain where reasoning is processed. His discovery revealed that certain fear signals from the senses, once relayed to the thalamus, are immediately sent along a neuronal ‘fast track’ to the amygdala. One of the functions of the amygdala is to trigger the physiological fight or flight response and serves to promote survival and to warn a person of possible danger. Therefore, when a stimulus causes significant emotional arousal, it is the amygdala which pattern matches and reacts before the neocortex. The amygdala can result in us reacting before the thinking brain can process the evidence and plan for an appropriate reaction. As a result, some emotional reactions and consequent emotional memories can be formed without any conscious participation from the thinking brain at all. The amygdala can hold on to emotional memories and impressions that have never come to full awareness.

### 3.1. Pattern Matching

The emotional brain is conditioned based on reward mechanism and emotional needs. The brain uses the chemical reward system, endorphin and dopamine to stretch a person for growth. Endorphin is a natural peptide chemical produced by the body to help a person feel more focused and satisfied. Dopamine raises and regulates emotional responses. Pattern Matching is an approach to condition the brain by “empowering preferred future” to “pattern match” and adopting a new response to override the old maladaptive behaviour and thinking, thus accelerating the process of change. Incorrect, inappropriate or out-dated pattern matching is the root cause of many types of psychological disorders such as anxiety, depression, addictions, inappropriate anger, obsessive-compulsive disorders, phobias and post-traumatic stress. Effective treatment of these disorders would involve detaching the old obstructive patterns and nurturing new empowering ones.

Understanding of how the emotional brain works helps a practitioner in the field of psychotherapy to assess an individual seeking help more efficiently and to provide interventions that are more effective and self-regulated. As a practitioner, I believe in the application of neuroscience in accelerating behavioural changes. The treatment for Jane is neuroscience derived by conditioning the emotional brain and pattern matches. By triggering the reward mechanism, the brain is conditioned to adopt new pattern matches to over-ride old pattern matches.

#### 4. Human Given Approach

The Human Givens approach provides a clear scientific yet practical framework that is based on research in psychology and neuroscience. This approach attempts to create a set of organising idea for treatment of human behaviour and mental health issues. The APET and RIGAAR models are the two models under Human Givens approach. I applied these two models to treat Jane in terms her thinking and behaviour. I believe that the two models have accelerated the change process on her journey to recovery (Griffin & Tyrrell, 2013; Andrews, Wislocki, Short, Chow & Minami, 2013)

#### 5. The APET Model

The APET model is a practical application of knowledge derived from Neuroscience and this model accords the use of nature's own pattern matching processes to make counselling or interventions more effective (Griffin & Tyrrell, 2013). This model provides many points of intervention in therapy to change beliefs and attitudes. Each letter of the model represents a point of possible change. The A in APET™ stands for activating agent which is any event or stimulus in the environment. Information about that stimulus is then taken in through the senses, processed through the pattern-matching part of the mind (P) which gives rises to an emotion (E) which may inspire certain thoughts (T). Hence, by changing the Activating agent (A), and changing the P (pattern matching) changes the E (emotion) and the T (thought) processes, resulting in positive and effective changes in a client's life.

I decided to adopt the intervention points in the APET model to help Jane to change her old patterns of thinking and to generate new ones through counselling and also the use of Audio-Visual Entrainment (AVE). By using an integrated approach instead of a single modality treatment, it is hoped that the behaviour change can be accelerated.

Table 1 shows the clinical considerations and the desired outcomes of the treatment plan that was drawn up for Jane. There is a necessity to change the activating agent (A) that is Jane's dependency on gaming, the external stimulus and to ensure her core emotional needs are met (E) by working together with Jane to co-create new pattern matching (P) which may change her thoughts; thus, resulting in new patterns of thinking and behaviour.

Table 1. Clinical considerations and desired outcomes

Change Objectives	Desired Outcomes
Core emotional needs met.	Control, achievement and meaning needs met.
Co-create a new pattern matching.	To respond in a new way in accordance with what she wanted. (Ability to hijack the amygdala.)
Co-create expectant hope (activating the Reticular Activating System).	To look forward to her dreams and take charge of her life. (Redirect the brain.)

#### 6. The RIGAAR model

The RIGAAR model include building rapport, information gathering, goal setting, accessing resources, activating strategy for change and rehearsing success. By applying this model into the treatment plan for Jane, I was able to assess her core emotional needs, co-create new pattern matching and expectant hope. I applied the 6-step processes in the RIGAAR model to work collaboratively with Jane to ensure that she achieves the desired outcomes of the treatment plane.

#### 7. Integrating Hypnosis Informed Neuroscience and Audio-Visual Entrainment (AVE)

Audio-visual Entrainment (AVE) is an adjunctive tool used to stimulate the natural reward mechanism in the brain (Siever, D. 2003). AVE appears to relax the mind yet stimulate the actual structure of the brain itself. This AVE tool has positive effects on the brain by adjusting brainwave activity, enhancing dissociation (meditation state), increasing cerebral blood flow and balancing neurotransmitters.



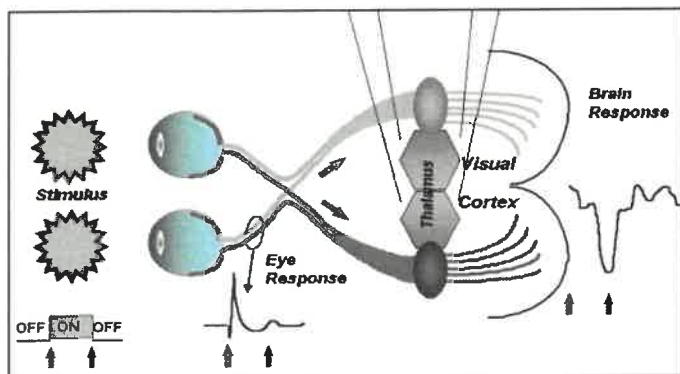



Figure 1 : Audio-Visual Entrainment (AVE) pathway

Figure 1 shows the basic model of the AVE entrainment (Siever,D. 2003). A strong and consistent stimulus, light and sound at a certain frequency is activated. This stimulus is then processed via the visual cortex.

### 7.1. Audio-Visual Entrainment (AVE) Protocol

The AVE protocol is presented in Table 2. The protocol related to the use of the AVE consists of five governing steps to be administered according to the needs of the client at the point of intervention.

Table 2: Audio-Visual Entrainment (AVE) protocol (taken from David Delight Pro Operator’s Manual, pp.13)

 <b>Energize</b> Sessions to wake you up and stimulate you			
<b>1</b>	<b>SMR</b> Used to achieve relaxed attention.	24 min	14Hz
<b>2</b>	<b>Beta 1 - Sharpen the Mind</b> A great way to get going in the morning without caffeine. This session helps reduce ADD and SAD symptoms. May cause anxiety.	20 min	19-21Hz
<b>3</b>	<b>Beta 2 - Sharpen the Mind</b> Like Beta 1, but with a higher target frequency range. May give a more energizing or intense feeling.	20 min	20-23Hz
<b>4</b>	<b>Mental Flexibility</b> To "loosen up" a stuck mind. Can also be used for fibromyalgia.	22 min	Variable
<b>5</b>	<b>Roller Coaster</b> This action-packed session is very engaging. Some with ADD can benefit.	7 min	Variable

When change has already happened and a new response to the old activating event, the AVE is an adjunctive to boost the change process. In Jane’s case, Protocol No.3 was administered, 3 times a week to help her reinforce the focus on her new preferred future. This protocol will reinforce the focus on her new preferred future, as applied using the APET model. The integration of AVE as an intervention will enhance Jane’s imagination on how good and positive it will be like at the brain level. The AVE functions as a way to bring about “*brain stabilization and normalization*” (Siever,D. 2003). Hence, the idea behind this treatment protocol is to reinforce the new direction and actions at the brain level so that it is a new normal in her daily thinking and acting out of her goal.

In practical terms, AVE allows Jane to stay focus on the new behaviours activated using the APET model in which a new way to responding to “A” by creating a new “P”. By sharpening the mind (protocol 3), Jane will not only be able to normalise a new ‘normal thinking and behaviour’, but she will also be able to think outside the box and generate and initiate new creative ways to enhance change. Please refer to appendix 1 for a more detailed treatment protocol.

## 8. Clinical Outcomes of Treatment

### 8.1. Pre-Treatment

Jane is addicted to gaming and spends 14 hours on gaming daily. As a result of gaming addiction, she has become socially isolated and withdraws from people. Her ability to communicate is limited to the phrase, “I don’t know”. Jane lacks the motivated to initiate taking any actions to change her current state. She remains unemployed and inactive.

I chose to integrate neuroscience ideas as developed by Human Givens with Audio Visual Entrainment (AVE) to accelerate behavioural change in Jane. This integrated approach is non-evasive and allows Jane to take charge of initiating the desired change and accelerate new pattern matching to counter the old patterns of thinking and behaviour.

## 9. Hypnosis Neuroscience Informed Therapy

The first session was to understand the unmet emotional needs, the current pattern matching sequence and the preferred outcome. Mindful of the need to be congruent while attending to the unmet emotional needs, I rapidly build rapport with Jane. Human Givens mentions nine emotional needs that every human being needs for healthy development and growth. Failure to meet any of the emotional needs may cause a disruption to an individual's mental health. According to Human Givens, the nine emotional needs are: -

- i) Security – having a safe and stable environment to develop
- ii) Attention – the ability to give and receive attention
- iii) Sense of autonomy and control – having the freedom to make choices
- iv) Emotional intimacy – having the sense that at least one person accepts us for who we are, want and all
- v) Feeling part of a wider community
- vi) Privacy
- vii) Sense of status
- viii) Sense of competence and achievement
- ix) Meaning and Purpose

The second and third session were focused on developing a new preferred future and exploring new strategies in managing the activating event (“A” in the APET model). A typical approach to achieve the preferred future and the accompanying strategies is to first relax the nervous system by guiding Jane through the Hypnosis guided process. Once Jane was in a state of calm and relaxation, the activating event “A” is recalled. Once the “A” begins to re-trigger the “Pattern Matching” (“P” in the APET model), Jane was anchored to the safe place created in the hypnosis process and only at this state of relaxation was Jane guided through a Guided Imagery exercise where Jane is able imagine seeing herself doing the things she wanted to do (Preferred Future elicited in session one) instead of reverting to gaming.

In session three, Jane was again led to the same process with more emphasis on strategies to pattern match a new action. Throughout the three sessions, there would be a conversation of what she will do after the session, what she would see and feel and by doing so, reorganizing her thoughts and focus on the new patterns – in short, activating her Reticular Activating System (RAS) to pay attend to what she desires now instead of what she was doing prior to the sessions.

After 3 sessions not lasting more than 50 minutes for three consecutive days, Jane reported to has stopped the 14 hours of gaming to only 45-60 minutes per day. However, her ‘I don’t know statements’ was still a prominent when asked to elaborate further on the changes she was noticing.

I integrated the use of the *David Pro Delight*, an adjunctive Tool-AVE for 20 minutes, three times per week to accelerate the desired outcomes of the treatment. Jane’s condition improved and she was able to intentionally communicate with her family. She was able to smile and keep eye contact with strangers at this juncture of the intervention. Her progress was quickened using this integrated approach. After 20 sessions of AVE (20 minutes each session), Jane was able to engage in more meaningful conversations and began to express personal feelings. She was able to redirect her brain and began to take initiative to work towards her goals. Without any mention about seeking employment, Jane went to the job agency on her own accord and began her journey into the working world. She was no longer reclusive and began to explore the world around her. Daily walks in the parks, malls and visits to the library became a routine that she enjoyed.

The treatment outcomes indicated that current mental stuck state can be easily and rapidly shifted. New mental state can be further reinforced with the aid of an AVE device. In the case of Jane, the David Pro Delight was the adjunctive AVE tool that was used to speed up the change process. Moreover, treatment need not be expensive nor require much technical knowledge.

## 10. Recommendations

The integration of Hypnosis Informed Neuroscience with Audio Visual Entrainment (AVE) to accelerate behavioural change is an alternative approach as compared to a single modality approach. I have applied Hypnosis Informed Neuroscience into my practice because it is effective, and clients are actively involved in co-creating the change patterns in their thinking and behaviour. In the case of Jane, this alternative approach has shown that the use of an integrated approach demonstrated that the change objectives were met which resulted in the desired change outcomes.

I would like to recommend that practitioners in the mental health field to be a Hypnosis Informed Neuroscience therapist to understand how the brain functions and how treatment can be effective and lasting. By applying Hypnosis Informed Neuroscience into treatment plans not only helps to accelerate behavioural change but also allows the individual to be autonomous and to be actively involved in the change processes. The treatment options may be expanded to include portable devices that will help to speed up the desired change and outcomes. The use of an adjunctive tool in the treatment plan is a pragmatic approach and also cost effective.

## Appendix 1

### Session 1 Assessment Phase

- Elicit the problem state and ascertain a concrete description of the 'doing' of the problem
- Take note of how the unmet emotions affect/lead to an unwanted action (doing of the problem) – looking out for the old undesirable pattern matching (APET Model)
- Pay attention to repeated words/phrases that are unwanted and elicit the preferred outcome in visual form (ask client to describe in vivid details a realistic description of how they would like to see themselves doing and feeling) – Initial stimulation of the Reticular Activating System (RAS)

### Session 2

- Step 1: Create safety by anchoring a safe feeling to pattern interrupt current behaviour - Using hypnosis, guide client through a process of focussing / mental relaxation. Allow the mind to soak in this state establish more neural connections (RAS)
- Step 2: In a hypnotic state (mentally relaxed state), facilitate the client to see the resolution of the problem and visualise a new preferred outcome. Anchor that visual and feeling state by a word associated to this preferred state e.g. Peace, Control.
- Step 3: Invite the client to imagine (eyes closed) and see, hear and feel themselves in the current problem state (Activating Event)
- Step 4: Interrupt step 3 but introducing step 1 and 2 and activate the associated word (e.g. Peace, control)
- Step 5: Break state by inviting the client to see and feel the new behaviour and then open their eyes
- Step 6 – Repeat step 3 – step 5 twice and elicit feedback on the positive changes

### Session 3

- Repeat step 2-5 of session 2 twice
- Facilitate the minds active involvement by actively visualising their new preferred behaviour and its accompanying feeling

### Session 4 – session 20

- Duration - Three times a week on alternate days, for 20 minutes duration
- AVE (David Pro Delight) - Energise Protocol 3 – Beta 2-Sharpen the mind (20-23Hz)

### Session 21 Termination session

- Review of outcomes and reinforce the new behaviour changes

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