Mastering AVS Session Creation

Comprehensive Guide to Using ASP Format for AVS Session Creation

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While the techniques, methods, and exercises discussed in this guide, including brainwave entrainment and audiovisual stimulation, have been shown to benefit some individuals, results may vary from person to person. Use of the application should be done at your discretion and responsibility.

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Brainwave Entrainment

Brainwave Entrainment (BWE) is a method that aligns brainwave patterns with an external stimulus, such as sound or light, to induce specific mental states like relaxation, focus, or deep meditation. Audiovisual Stimulation (AVS) combines auditory and visual stimuli, synchronising them to create powerful brainwave entrainment effects. Through this multisensory integration, the brain can more effectively "tune in" to desired frequencies, enhancing awareness, cognitive function, and mood regulation.

The Enkidu Light Machine utilises this principle, delivering optimised AVS (Audio-Visual Stimulation) sessions through cutting-edge technology. With its newly developed AudioStrobe Plus (ASP) format, the Enkidu ASP decoder now supports frequencies of up to 500 Hz, far beyond traditional BWE ranges. This allows for precise control over visual stimuli' brightness and frequency.

With ASP, you can now experiment with PWM (pulse-width modulation) dimming to control brightness dynamically during the session. These high-frequency settings enable the creation of custom visual effects, including smooth fade-ins and fade-outs, sine waveforms, and other dynamic adjustments that add depth to the user experience.

Target frequency

The target frequency in Audio-Visual Entrainment (AVE) refers to the specific brainwave frequency that a session is designed to induce through rhythmic auditory and visual stimuli. The goal is to entrain the brain to match this frequency, which correlates with specific mental states, such as relaxation, focus, creativity, or sleep.

Common AVE Target Frequencies for Specific Applications:

- Anxiety and Stress Relief: 8-10 Hz (Alpha)
- Meditation and Deep Relaxation: 5-7 Hz (Theta)
- Memory Enhancement: 8-12 Hz (Alpha), 12-15 Hz (Low Beta)
- Sleep Induction: 0.5-3 Hz (Delta)
- Focus and Attention: 12-15 Hz (Low Beta)
- Cognitive Stimulation: 16-24 Hz (Mid Beta), 30-40 Hz (Gamma)

Most commonly used frequencies and their applications:

Delta Range (0.5 – 4 Hz)

- (0.5 Hz - 3.5 Hz): Deep sleep, healing, and recovery. Used for studies on cellular regeneration, immune function enhancement, and deep restorative sleep.

- (1.5 Hz - 2.5 Hz): Treatment for chronic pain and insomnia. It's been used in studies focusing on pain relief and sleep disorders.

Theta Range (4 – 8 Hz)

- 4 Hz - 6 Hz: Meditation, deep relaxation, and creativity. Used in research on states of deep meditative consciousness and creative problem-solving.

- 6 Hz - 7.5 Hz: Memory enhancement, intuition, and visualization. Studies indicate benefits for memory consolidation, creative visualization, and improved emotional connection.

Alpha Range (8 – 12 Hz)

- 8 Hz - 10 Hz: Light relaxation, stress relief, and mood elevation. Research links these frequencies with increased relaxation, reduced anxiety, and mood stabilization.

- 10 Hz - 12 Hz: Accelerated learning and focus. This range is used in studies exploring neurofeedback training, focused attention, and learning enhancement.

Beta Range (12 – 30 Hz)

- 12 Hz - 15 Hz (Low Beta): Alertness, concentration, and problem-solving. It is common in cognitive performance studies, especially for attention and working memory.

- 16 Hz - 24 Hz (Mid-Beta): Cognitive function improvement and mental stimulation. Studies often focus on improving memory recall, concentration, and productivity.

- 25 Hz - 30 Hz (High Beta): Anxiety and stress response modulation. AVS studies often investigate the relationship between this range and anxiety disorders or high-stress scenarios.

Gamma Range (30 – 100 Hz)

- 30 Hz - 40 Hz: Peak mental state, heightened perception, and information processing. Used in research on heightened cognitive awareness, learning speed, and sensory perception.

- 40 Hz and above: Studies on memory, consciousness, and higher states of awareness. Higher gamma frequencies are often associated with states of deep meditation, spiritual experiences, and advanced cognitive functions.

40 Hz

Research shows that 40 Hz (gamma frequency) stimulation can reduce amyloid plaques, improve cognitive function, and activate microglial cells—the brain's immune cells that clear harmful proteins like beta-amyloid and tau, both associated with Alzheimer's disease.

How to Use 40 Hz in AVE Sessions:

Use the Enkidu light machine or specific AVE devices to synchronise light to the target frequency. For optimal results, use synchronized 40 Hz sound and light. This enhances the brain's ability to synchronize gamma oscillations across multiple regions, amplifying the cognitive and neuroprotective benefits.

Session Guidelines:

- Duration: Sessions typically last 20-30 minutes.
- Frequency: Daily or multiple sessions per week are suggested for best results.
- Comfort: Ensure the user is comfortable in a quiet space and avoids visual overstimulation if prone to epilepsy.

Expected Benefits:

- Reduced amyloid buildup
- Improved memory and cognitive function
- Increased brain activity in the gamma frequency range (associated with attention, learning, and memory).

By incorporating 40 Hz AVE into regular sessions, you aim to slow cognitive decline and potentially restore some brain functions affected by Alzheimer’s and similar conditions.

AVE Protocols

In Audio-Visual Entrainment (AVE), specific protocols are designed to either inhibit (calm) or excite (stimulate) brain activity, depending on the desired outcomes. These protocols dictate an AVE session's frequency ranges, duration, and progression. Below is an overview of standard inhibitory, excitatory, and full-journey protocols used in AVE sessions.

1. Inhibitory Protocol

The inhibitory protocol is designed to reduce brain activity, promote relaxation, and help alleviate anxiety, stress, and insomnia.

- Target Frequencies: Theta (4-8 Hz) and Low Alpha (8-10 Hz).

- Purpose: This protocol helps calm an overactive mind, reduce anxiety, promote relaxation, and induce sleep.

- Session Structure:

Beginning: To ease into the session, start with a brief period in low Beta (12-15 Hz).

- Middle: Gradually decrease to Alpha (8-10 Hz), helping the brain transition into a relaxed but alert state.
- End: Move into Theta (4-7 Hz) to encourage deep relaxation or a meditative state.

Application:

- Anxiety and Stress: 10-12 Hz to help alleviate mild stress, gradually lowering to 7-8 Hz for deeper relaxation.
- Sleep Induction: Start at 8-10 Hz and slowly progress to 4-7 Hz, ideal for initiating deep sleep

2. Excitatory Protocol

The excitatory protocol aims to stimulate the brain, increase alertness, and enhance focus and cognitive function.

- Target Frequencies: Beta (12-30 Hz) and Gamma (30-40 Hz).
- Purpose: Used for cognitive enhancement, improving focus, attention, and alertness.

Session Structure:

- Beginning: Start in Alpha (8-12 Hz) to establish a relaxed but alert state.
- Middle: Increase to Low Beta (12-15 Hz) to enhance focus and mental clarity.
- End: Finish at Mid to High Beta (15-25 Hz) or Gamma (30-40 Hz) for peak cognitive stimulation and heightened mental processing.

Application:

- Focus and Cognitive Enhancement: Use 12-15 Hz to boost mental clarity, gradually moving to 16-20 Hz for heightened alertness.
- Mood Elevation: Move between 10-14 Hz to elevate mood and focus.
- Memory Enhancement: Increase to 30-40 Hz for stimulating gamma waves linked to cognitive function and memory.

3. Full Journey Protocol (Progressive Entrainment)

The full-journey protocol guides the brain through different states of arousal and relaxation, starting with stimulation and ending in relaxation or deep rest. It combines both inhibitory and excitatory protocols.

- Progression: Moves through different brainwave states, providing a complete "journey" from alertness to relaxation or sleep.
- Purpose: Ideal for stress reduction, performance enhancement, or transitioning into the dream state.

Session Structure:

- Stage 1 (Excitatory Phase): Begin with Low Beta (12-15 Hz) to Mid Beta (16-20 Hz) for focus and stimulation. This boosts energy and alertness, helping the user transition from under-aroused to focused.

- Stage 2 (Inhibitory Phase): Gradually decrease to Alpha (8-10 Hz), shifting to a relaxed but alert state. This phase helps calm the brain while maintaining focus.

-Stage 3 (Deep Relaxation/Rest Phase): Slowly drop to Theta (4-7 Hz) to induce the dream state or even Delta (1-4 Hz) if you want deep relaxation. This phase is excellent for meditation, recovery, or pre-sleep states.

Application:

- Stress Relief: Begin with 12-14 Hz (low Beta) to energise and engage the brain, then gradually reduce to 8-10 Hz (Alpha) and finish with 5-7 Hz (Theta) for deep relaxation.

- Sleep Aid: Start at 8-10 Hz for relaxation, then move down to 4-7 Hz (Theta) and finish in Delta (0.5-4 Hz) for deep sleep induction.

A full AVE session typically follows a structured flow:

1. Preparation (2-5 minutes):

- Begin with smooth and low-brightness light stimulation, starting in Alpha or low Beta (8-12 Hz), allowing the brain to settle.

2. Excitatory Phase (5-15 minutes):

- Increase to Beta (12-20 Hz) or Gamma (30-40 Hz) for cognitive stimulation, energy, and focus. During this period, complex visual effects can further stimulate the user. This phase sharpens focus, improving cognitive function and alertness.

3. Transition Phase (5-10 minutes):

- Gradually reduce the frequency to Alpha (8-10 Hz) to ease into a relaxed but alert state. This phase helps users transition from heightened focus to a calm, meditative state.

4. Inhibitory Phase (10-20 minutes):

- Move to Theta (4-7 Hz) for deep relaxation or Delta (1-4 Hz) for sleep. Reduce the brightness and audio stimulation to induce a calm and relaxed state. This phase brings the brain into a deeply relaxed or restful state, ideal for meditation and inner journey.

5. Conclusion:

- End the session gradually, either leaving the user in a relaxed state or gently reintroducing Alpha frequencies if they need to return to a calm but alert state.

By carefully choosing the suitable protocol based on goals (relaxation vs. stimulation) and progressing through these phases, AVE sessions can be optimized for various outcomes—from cognitive enhancement to deep relaxation.

Integrating Music with Audio/Visual Stimulation (AVS)

When designing Audio-Visual Entrainment (AVE) sessions, the choice of music plays a crucial role in reinforcing the brainwave entrainment process. Matching the music's tempo, frequency, and phase with the light and audio stimuli is important for optimal entrainment effects. Here's how you can fine-tune your AVE sessions for Enkidu Light using music and Low-Frequency Oscillators (LFOs) to enhance the experience.

Choosing Music for AVS Sessions

Music with a solid rhythmic beat is naturally engaging for the brain. Whether drums or another percussive instrument, rhythmic music can be a powerful entrainment tool. For optimal synchronization with AVE, the music's tempo (measured in beats per minute or BPM) should match the overall rhythm of your light pulses and audio beats.

- Syncing Music and Light Pulses: Ensure that the host tempo (in software like Ableton Live) is aligned with the tempo of the music. This synchronizes the LFOs used for audio and visual effects with the brainwave frequency, amplifying the entrainment effect.

- LFO Frequency and Octaves: To enhance entrainment, use LFOs set to frequencies that match the brainwave frequencies (e.g., 10 Hz for alpha). You can experiment with octaves of these frequencies, which resonate harmoniously. For instance, a 5 Hz tone can work alongside a 10 Hz tone, amplifying the BWE effect. However, using unrelated frequencies or mismatched octaves will reduce the effectiveness of the entrainment.

Synchronization and Phase Alignment

The frequencies must match, and the phase of each LFO (the point in the wave cycle where the beats occur) must also be aligned. Even if the frequencies match, misaligned phases can weaken the BWE effect. To check if your LFOs are in sync, lower all LFOs to 1 Hz and observe whether the light pulses on both channels and the auditory tones turn on and off simultaneously.

This will help you ensure everything is phase-locked and working coherently, from isochronic tones to visual pulses.

Music Selection Based on Frequency Range

In a theta and delta AVS session, subtle stimulation is key to maintaining the user's brainwave state. Theta (4-8 Hz) is deeply associated with relaxation, meditation, and accessing the subconscious mind. Overly intense visual or auditory stimuli can disrupt this delicate balance, pulling the brain out of theta and back into more active states like alpha or beta.

Why Subtle Stimulation?

Theta waves are sensitive, and harsh stimuli can cause the user to wake from a meditative or dreamlike state. Using gentle, gradual audio-visual effects ensures that the brain remains relaxed and receptive, facilitating subconscious access without jarring interruptions.

Music Integration

To enhance a theta AVS session, the music should be soft, ambient, and non-intrusive:

- Slow-paced, ambient music helps the mind stay calm without distraction.
- Smooth, tonal transitions with minimal abrupt changes prevent disruption to the flow.
- Binaural beats or isochronic tones tuned to theta frequencies (4-8 Hz) reinforce the AVS effects.
- Low BPM for Lower Frequencies: For delta (1-4 Hz) and theta (4-8 Hz) brainwave entrainment, choose music with low BPM to create a calming, background-like soundscape. The music should not be too dynamic but rather static to serve as a subtle backdrop to the entrainment stimuli, especially the visual effects.
- You can add guided meditation or vocals during the alpha (8-12 Hz) or beta (12-30 Hz) brainwave ranges, where the brain is still actively engaging with external stimuli. However, avoid using vocals during lower frequencies like theta or delta, as the brain will try to engage with the external voice, which could interfere with achieving more profound relaxation or meditation. When working within the theta range, mantras, affirmations, or vocal hypnosis are used in a rhythmic, repetitive, and minimalistic manner.

Integrating Drumming into AVE

Kick-like sounds similar to shamanic drumming are powerful tools for avoiding falling asleep during AVE. Their steady rhythm (around 4-5 beats per second) aligns with low-theta brainwaves, helping the user stay in a dreamlike state without slipping into deep sleep. The rhythmic beats keep the brain engaged enough to prevent full relaxation and falling into sleep while still promoting subconscious exploration.

Incorporating drumming into an AVE session:

- Keep the drumming rhythm steady and fixed to the target frequency in theta (4-7 Hz).
- Maintain a steady volume to keep the user alert but relaxed.

When combined with pure AVS (no background music), drumming provides the needed auditory anchor to prevent sleep, enhancing the session's overall effectiveness for accessing the subconscious dream state.

By carefully selecting your music and ensuring synchronization across all AVE elements, you can create effective and immersive brainwave entrainment sessions that help users access desired mental states, whether relaxation, meditation, or cognitive enhancement.

Creating AVS Sessions Using Live Template

The following guide walks you through designing AVS sessions optimized for the AudioStrobe Plus (ASP) format. The template and samples presented in this training package are designed for Ableton Live.
Upload the sample audio file to the first track of the template as the background music.
Before creating sessions, use the Volume Adjustment file at the last track of the template to adjust your system volume while connected to the light machine.

With ASP Rack, you can control the brightness and create complex visual effects, modulating (pulsating) the ASP carrier tone to trigger the lamp's LEDs on the left and right audio channels. Each channel can control half the number of LEDs on the light.

The rack uses the Operator instrument in Live to generate a pure sine wave at 19.2KHz as the AudioStrobe carrier tone, and Live LFOs modulate this tone using sine and square-shaped pulses. In other DAWs, you can use any signal generator (in sine wave) for ASP carrier tone and LFOs to recreate this rack. Different third-party plugins, except the Xfer LFO, are unnecessary for this template.

Due to high-frequency modulation for brightness control, a high audio resolution should be chosen while exporting the file. Export the files in a lossless audio format such as WAV or FLAC for optimal quality. You can export the session based on your player output resolution. You can play the files on DAP or other Hi-Res (96/24 or higher) certified music players over an AUX connection between the player and lamp. If your device supports LDAC Bluetooth, you can also play the files at Hi-res 96/24 in lossless format over a Bluetooth connection with the lamp. Apollo and Luna versions support LDAC Bluetooth connection (Hi-Res 96/24).

Export the rack in 48/24 for AUX and Bluetooth connection in .aif format for iPhone.
Most Android devices support 96/24 resolution in lossless formats, such as WAV and FLAC.
Export the session in 48/24 in FLAC or other lossless format for devices with lower audio output resolution.

ASP Rack

ASP Rack can create light pulses in square and sine wave formats at a desired frequency. With the ASP Rack, you can control the modulation depth and transition between waveforms. This rack also controls the phase, intensity, and brightness of the light pulses.

The new capabilities of the Enkidu Light Machine enable users to explore advanced visual effects:

- Adjust the brightness throughout the session. Implement custom fade-ins and fade-outs to enhance relaxation during transitions in and out of the session.

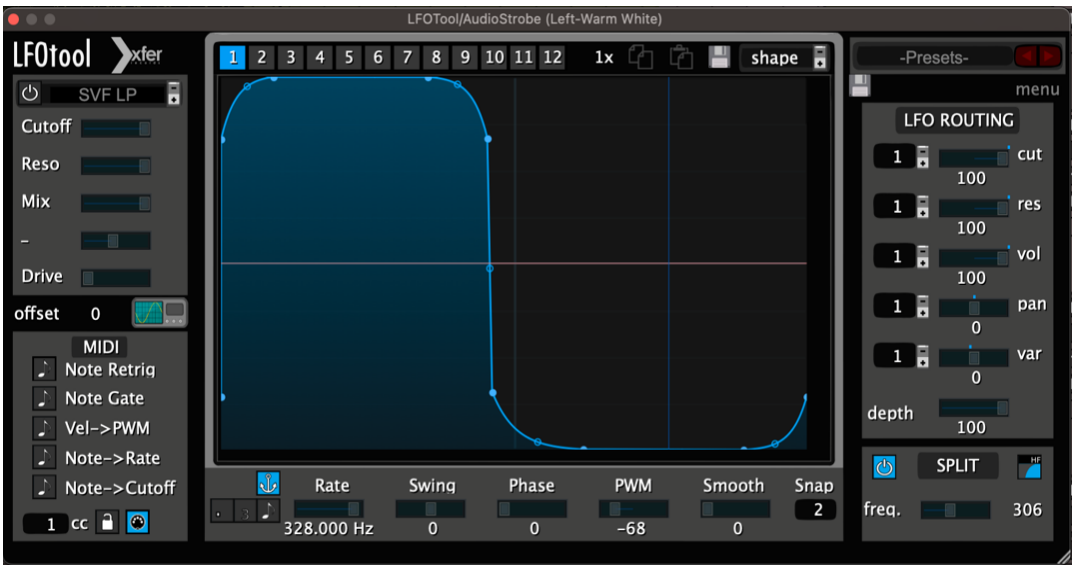
- Create sine, triangle, and custom waveforms to introduce smooth transitions between light intensities.

- Add dynamic visual patterns that correspond to the rhythm of the music or tones for an immersive experience.

There are three separate LFOs for each ASP Rack:

The first two LFOs modulate the carrier tone (which turns the lamp on and off) in square and sine waves to create the visual AVE effects.

The third LFO (Xfer LFOTool) modulates the carrier tone at a high frequency for PWM dimming to control the lamp's brightness. This frequency (Rate) should be higher than 200 Hz and below 500 Hz to avoid unwanted flickering and eye strain. The higher the frequency, the smoother the brightness control. You can set this frequency to higher octaves of your target frequency, which is in this frequency range for optimal synchronicity.



Important Notes

- The brightness control option is only available on Apollo, Luna, and the latest Selene II and Helios III versions.

- To use this template to create AVS sessions for older Enkidu Light Machines or Mind Machines, such as Kasina, you should turn off the LFOTool and the LFO for Sinewave and use only the LFO for square wave, and disable the knobs for Brightness and Sine Depth controls.

- The lamp is not designed to be on continuously without blinking, as it will overheat quickly at high brightness. Therefore, the PWM knob maximum range is limited to 80%.

- Keep the PWM knob at 50% (for any duration) to use the lamp at full brightness.

- At 80% PWM, run the lamp at full brightness for up to 2 minutes before it gets too hot or intense for the eyes.

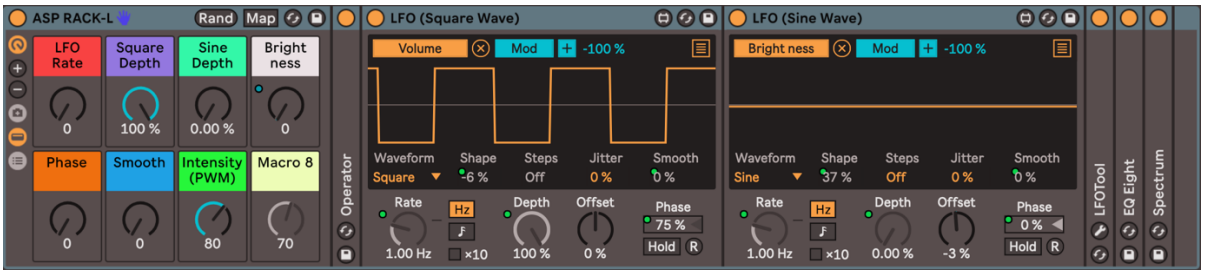
- To avoid overheating the lamp, use square waves at full depth and brightness if the PWM (duty cycle) is limited to 50%. The lamp will overheat at high PWM and brightness, which can damage it. However, you can use higher PWM with lower brightness settings.

- To keep the lamp on continuously for any duration, lower the Depth to zero to stop the blinking and set the brightness lower around 50% to avoid overheating.

- Monitor the ASP signal level (AudioStrobe signal's carrier frequency at 19.2 kHz). Ensure this level is high enough for the lamp's AS decoder to detect the light signals. Use the Spectrum (Live audio effect plugins) on the ASP Rack output to monitor the signal level. The peak of the ASp signals (19.2KHz) should be below -24db and above -30db. Lower or higher levels can affect the quality of the visual effects.

- Ensure you use the volume adjustment track to set your system's volume for audio output, driving the lamp to the optimal level.

ASP Rack Control and Settings



LFO Rate

- LFO Rate Knob can adjust the frequency of the light pulses either per second (Frequency Mode) or by divisions of the tempo (Sync Mode). This template is set to Frequency (free running) Mode. You can switch between Frequency Mode and Sync Mode using LFOs Sync toggle switch and change the mapping for the knob accordingly.

    1. Sync Mode: When LFOs Sync is enabled, the frequency of the light signals is determined by the divisions of the host (Live) tempo. It is best to synchronise the music's BPM with the light signal for rhythmic music to ensure effective entrainment.

       Sync mode is preferred for music with drums and repetitive notes for better synchronisation. The downside of this mode is that you have to switch between the divisions of the BPM, and you can't have a smooth transition between the octaves/divisions/frequencies (1/4, 1/8, 1/16, ...).

    2. Frequency Mode: When the LFOs are in free-running mode, they generate pulses by Hz. In this mode, you must manually sync the light and audio beats by calculating the beats' frequency and converting your music's tempo (BPM) to Hz.

       Calculation: Divide the BPM of the music by 60 to get beats per second (Hz). You can divide or multiply this frequency by 2 to find the corresponding frequency in different brainwave ranges (at lower or higher octaves) to maintain the synchronisation between the audio and visual entrainment filters, especially when using multiple frequencies for the ASP Left and Right channels. Otherwise, using frequencies not in the same octaves (notes) can reduce the entrainment effect.

       Example: For music with a tempo of 66 BPM:

       - 66 BPM / 60 = 1.1 Hz
       - 1.1Hz x 2 = 2.2Hz (Delta)
       - 2.2Hz x 2 = 4.4Hz (Theta)
       - 4.4Hz x 2 = 8.8Hz (Alpha)
       - 8.8Hz x 2 = 17.6Hz (Beta)
       - 17.6Hz x 2 = 35.2Hz (Gamma)

For music without apparent repetitive beats, such as ambient music, set the BPM to match your desired entrainment target frequency.

Example: To entrain the brain to 5 Hz, the tempo of the host (Live) should be set to 75 BPM:

- 5 Hz / 2 = 2.5 Hz
- 2.5 Hz / 2 = 1.25 Hz
- 1.25 Hz x 60 = 75 BPM

Depth

- Function: Controls how much the LFO affects the light signal. At the lowest setting, the lamp will stop strobing. Switch smoothly between square waveform (LFO1) and sine wave (LFO2) by using the LFO1 Depth and LFO2 Depth knobs. Increase one while decreasing the other in the automation lane.

- Use the Depth knob for transition from sine to square or vice versa. Use both LFOs at different times!

  Note: Lower the brightness at lower Depth settings to avoid overheating the lamp. If the light stops strobing, it will overheat fast at high brightness settings.

LFO 1 (Square Wave)

- Square waves in visual brainwave entrainment are effective because they generate harmonics and higher-frequency components resulting from their sharp transitions. For example, entrainment (in square wave) at 8Hz can generate harmonic entrainment at 16Hz (higher octaves).

  In visual stimulation, these harmonics broaden the range of stimulated brainwave frequencies. This allows square waves to engage multiple brainwave patterns simultaneously, leading to a more flexible and effective entrainment process.

- Square waves produce multiple frequency bands (harmonics) that stimulate the fundamental brainwave (e.g., theta or alpha) and its higher multiples, such as beta or gamma. This multi-frequency engagement has been linked to improvements in cognitive function, including enhanced memory and focus.

- Research shows that by entraining multiple frequencies simultaneously, square waves can enhance relaxation (lower frequencies) and mental clarity or problem-solving (higher frequencies). This makes square waves especially beneficial in visual entrainment. They offer a wide-ranging cognitive boost and make sessions more effective for improving focus and relaxation.

- Due to the contrast between on and off signals, square waveforms can create better visual effects with geometric/fractal patterns. The square wave is preferred for high theta, alpha, and beta due to the more substantial entrainment effect it generates. Still, it can be overstimulating for low theta and delta ranges.

LFO 2 (Sine Wave)

- Use the LFO 2 to generate light signals with sine waveforms. Due to the smooth transition between dark and light signals, sine waves are more effective for entraining the brain into the Delta frequency range than square waves. Sine waves also feel gentler on the eyes, while square waves below 5 Hz can irritate the eyes.

- With sine waves, you can limit the entrainment to a specific frequency required at the target frequency without creating additional harmonics.

Phase

- Function: Determines the starting point of the waveform. The left and right light signals start simultaneously if both are in phase. If one is set to zero and the other to the maximum setting, one channel will be on while the other is off, creating alternating on and off signals.

- Visual Patterns: Adjust the phase between left and right AS signals to create evolving visual patterns by gradually Increasing or decreasing the phase of one channel on the automation lane.

  Note: If you set the PWM settings below %50 duty cycle while the Phase is set at the highest setting (180-degree phase difference between channels or alternating mode), the perceived strobe frequency of the lamp for the eyes will multiply by 2.

PWM (Pulse Width Modulation)

Function: This adjusts the PWM or duty cycle rate for LFOs. A higher PWM results in longer lamp on-time per pulse, increasing intensity and brightness. A lower PWM results in narrower light pulses, creating more contrast. Lowering the PWM to less than 50% can create more vivid visual effects while increasing the PWM can result in more intense entrainment effects and perceived brightness.

Brightness

- Control: Adjust the brightness of each channel with this knob. Use the brightness knob to dim the LEDs and create fade-in and fade-out effects at the start and end of the song.

- General Use: When using high-frequency ranges such as Alpha and Beta, use higher brightness settings for LFO1 (square waves). For Delta and Theta entrainment, use lower brightness settings because sine waves keep the lamp on longer, increasing intensity for the eyes.

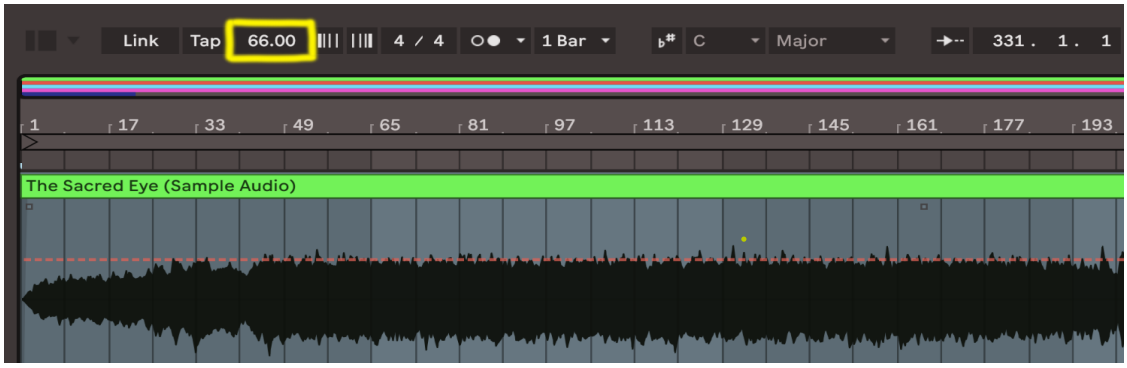
- Square waves with lower PWM can create more vivid visual effects, especially in the Alpha and Beta ranges. However, low-setting PWM can decrease the overall brightness. To increase the brightness while lowering the PWM, use ramps in the automation lane.

Audio entrainment (Background Music)

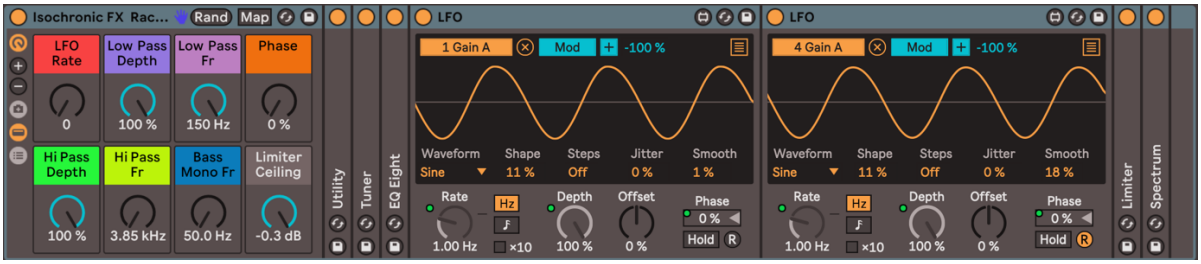
1. Add your music to the first audio track of the template.

2. Use the ‘Warp” option in “Clip View” to find the tempo of the music. If the Warp is on before you upload the music to Live, the software can calculate the tempo with some accuracy. To turn it on, access the Warp option settings in the Live settings menu.
   Other methods can be used to calculate the tempo more accurately for optimal synchronisation of audio/visual entrainment filters. After calculating the BPM, make sure to turn the Warp option off.

3. Set the tempo in Live to match the music's tempo to sync the audio beats with the lamp's strobing rate.



Isochronic FX Rack Settings



Adjust the rate of the LFOs for the isochronic FX Rack to modulate the music's low and high pitch frequencies to generate isochronic audio entrainment effects. Match the rate of the LFOs to your desired AVE frequencies.

LFO Rate: The LFO Rate knob can adjust the frequency of the LFOs in Hertz (Frequency Mode) or by divisions of the tempo (Sync Mode). You can switch between Frequency Mode (Free Running) and Sync Mode using LFOs sync toggle.

Low and High Pass Depth: Adjust the depth of LFOs to add subtle entrainment to your music's low and high frequencies.

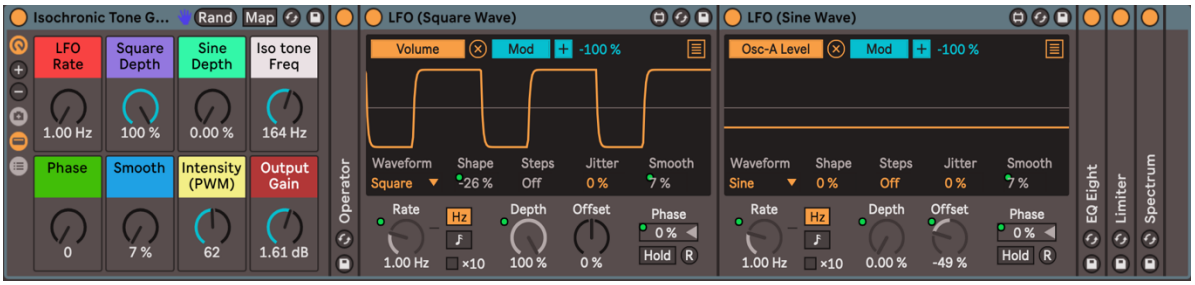
Low and High Pass Frequency: Adjust the frequency range of your music, affected by LFOs, for low and high-frequency modulation

Bass Mono Frequency: Adjust the frequency range for bass mono.

Limiter Ceiling: Adjust the limiter maximum level for your music/audio

Use the automation lane to set the frequency and other parameters for each knob at different time points on the automation lane and for a smooth transition between parameters.

Isochronic Tone Generator



The Isochronic tone generator modulates the auditory input, enhancing the overall AVS experience. Add isochronic tones in square or sinewave and synchronise them with your visual effect by matching the frequency and phase. Use the Isochronic Tone Frequency knob to adjust the

frequency of the isochronic tones. This frequency setting differs from the LFO Rate and can adapt the carrier tone to the pitch of the isochronic tones you want to hear.

Use the Iso Tone Freq knob to adjust the frequency of the isochronic carrier tone. This tone frequency should be lower than 300Hz, and the volume should be low and barely audible under the music. Use the output gain to adjust the volume of the tone so that it is low enough not to disturb. For better harmony with your music (tuning scale), try matching the carrier tone frequency to the lower octaves of the root note.
For example, the frequency for the root note of music in the scale of A (major or minor) would be 440Hz. Divide the frequency for lower octaves: 440/2=220/2=110Hz

Safety Guideline for Epilepsy

In the context of Audio-Visual Stimulation (AVS), the use of specific frequencies can potentially trigger epileptic seizures, particularly in individuals with **photosensitive epilepsy**. This occurs when flashing lights or visual patterns stimulate abnormal brain activity. Here's what studies and safety guidelines suggest:

Frequencies to Avoid

1. **3 to 30 Hz Range (especially 15–25 Hz):**
    - The frequency range most commonly associated with triggering seizures, especially in photosensitive individuals, is between **15 and 25 Hz**. This corresponds to the beta frequency range and overlaps with the flicker fusion threshold of the human visual system.
    - Frequencies **below 3 Hz** and **above 30 Hz** are generally considered safer in this regard.
2. **High-Intensity Strobes:**
    - Brightness and intensity of the stimulation can exacerbate the risk. Even at safe frequencies, overly intense light can increase the likelihood of an adverse reaction.

Known Risks in AVS Studies

- **Photosensitive Epilepsy:**
    - It is a specific condition affecting about 1 in 4,000 people, most often children and teenagers. Individuals with this condition are more susceptible to light-induced seizures.
- **Pre-existing Neurological Conditions:**
    - AVS may have unpredictable effects in individuals with a history of epilepsy, migraines, or certain neurological disorders.

Guidelines for Safe AVS Use

1. **Screen Users:**
    - Exclude individuals with a known history of epilepsy or photosensitivity.
    - Ask users about a family history of epilepsy, as it can sometimes be a genetic factor.
2. **Stay Below 8 Hz:**
    - Frequencies in the **theta (4–8 Hz)** or **delta (<4 Hz)** ranges are less likely to trigger seizures and are commonly used for relaxation and meditation.
3. **Avoid High Flicker Rates:**
    - Limit sessions with flicker frequencies in the **15–25 Hz range**, particularly when combined with bright lights or high contrast.
4. **Test Sessions Gradually:**
    - Introduce AVS at low intensities and durations, gradually increasing if no adverse effects are observed.

Important Note on Epilepsy in Non-Photosensitive Individuals

- While the risks are generally lower for individuals without photosensitive epilepsy, it is essential to monitor for discomfort, dizziness, or other abnormal reactions.

Individuals using AVS devices like the Enkidu Light Machine should consult the user guide and ensure that sessions are designed to minimise risk.

Studies on Audio/Visual Stimulation (AVS)

One of the most comprehensive studies done on the effectiveness of AVS, “Lightening the Mind: Comparing Audiovisual Stimulation and Meditation for Mood and Cognition Enhancement,” explores how audio/visual stimulation (AVS) compares to traditional meditation practices in improving mood and cognitive performance. The experiment was randomised, controlled, and double-blind, involving 262 participants.

The study involved a large sample of participants who were exposed to different interventions: AVS and meditation. The AVS group involved synchronised light and sound, similar to standard brainwave entrainment techniques, but with both auditory and visual components.

In the Meditation group, the participants were asked to engage in breath-focused meditation, a well-researched practice known to improve mood and cognition. The effects of both interventions were compared, focusing on mood improvement and performance on cognitive tasks sensitive to changes in emotional states. Both AVS and meditation led to significant improvements in self-reported mood states, particularly in reducing anxiety and depression symptoms.

Interestingly, despite being a shorter, more passive technique, AVS often showed effects comparable to or even greater than meditation. This suggests that AVS might be a more efficient method for enhancing mood. In some cases, just five minutes of AVS exposure was sufficient to produce mood benefits similar to those achieved through meditation sessions lasting 10 to 20 minutes.

The study found that AVS also improved participants' performance on mood-sensitive cognitive tasks. These effects were consistent regardless of whether binaural beats were present, indicating that visual stimulation played a key role. The benefits of AVS were found to be relatively independent of the duration of the experience, meaning short AVS sessions were just as effective as longer ones. This contrasts with meditation, where optimal results often require longer durations.

The study positions AVS as a promising alternative to meditation, especially for individuals who struggle to maintain a regular meditation practice. AVS is presented as a "plug-and-play" option, making it more accessible to a broader population due to its simplicity and shorter time requirement. The combination of visual and auditory stimuli creates a synergistic effect that enhances the entrainment process, resulting in notable improvements in mood and cognitive performance.

The study reinforces the strong connection between mood and cognitive performance, highlighting how techniques that enhance emotional well-being (like AVS and meditation) can lead to broader cognitive benefits.

In conclusion, this research suggests that combined audiovisual stimulation can be highly effective. AVS provides a more efficient, accessible alternative to traditional meditation practices, especially for those seeking rapid mood and cognitive improvements.For further reading, you can check the complete study [here].

Phase and Frequency Synchronization in Multisensory Stimulation

Several studies emphasise the importance of synchronisation between auditory and visual stimuli, particularly regarding frequency and phase coherence, in the context of brainwave entrainment and cognitive or emotional enhancement. The alignment of these factors is crucial in maximising the effectiveness of audiovisual stimulation for brainwave entrainment.

Phase Synchronization: Studies show that synchronising auditory and visual stimuli in phase (i.e., their peaks and troughs match over time) leads to more effective brainwave entrainment and enhances neural coherence. This synchronization helps the brain process both inputs in a unified way, which boosts the entrainment effect on specific brainwave frequencies like alpha, theta, or gamma waves.

Frequency Synchronization: When auditory and visual stimuli are aligned simultaneously, it creates a more substantial entrainment effect than asynchronous or mismatched frequencies. For example, if both audio (e.g., binaural beats or isochronic tones) and visual (e.g., flickering light) components are pulsing at 10 Hz (alpha wave frequency), the brain more easily tunes into that frequency, promoting relaxation and focus.

Here are several relevant studies and articles related to Audio-Visual Stimulation (AVS) and brainwave entrainment that can be useful for your guide:

1. "Open-Loop Audio-Visual Stimulation (AVS): A Useful Tool for Management"
   This study discusses AVS as a non-pharmacological intervention for symptom management and performance enhancement. It explores open-loop and closed-loop AVS applications in clinical settings.
2. "Entrainment and Resonance Effects with a New Mobile Audio-Visual Stimulation Device"
   A detailed exploration of photic and auditory driving effects in a therapeutic context, assessing the brainwave entrainment caused by visual stimulation.
3. "Audio-Visual Entrainment in Relation to Mental Health and EEG"
   This paper reviews the effects of AVE on cerebral blood flow, EEG patterns, and mental health, particularly about conditions like ADHD and cognitive performance enhancement.
4. "Effects of Audio–Visual Stimulation Automatically Controlled by Bioelectrical Signals"
   Focuses on how real-time biofeedback can enhance AVS effectiveness by adapting to the user's brainwaves and physiological states.
5. "Are Isochronic Tones Effective? The Impact of Isochronic Tones on Brainwave Entrainment and Stress"
   Analyzes the impact of different brainwave entrainment techniques, including visual stimulation (AVE) and its effects on stress and cognitive function.
6. "Journal of Neurotherapy: Investigations in Neuromodulation, Neurofeedback, and Applied Neuroscience"
   This journal features multiple studies on the therapeutic effects of AVE, including its application in relaxation, performance, and ADHD treatment.
7. "A Comprehensive Review of the Psychological Effects of Brainwave Entrainment"
   This review explains how AVS modulates brainwave patterns and discusses its psychological effects, including focus, relaxation, and creativity.
8. "Pre-sleep Alpha Brainwave Entrainment by Audio or Visual Stimulation"
   This is a study focusing on the use of AVS to promote sleep in individuals with chronic pain or sleep disturbances by inducing alpha brainwave states before sleep.
9. "Audio-Visual Stimulation in Cognitive Enhancement"
   This paper examines AVE's role in improving cognitive performance, particularly in educational settings. It also touches on relaxation and stress reduction.
10. "The History and Physiological Mechanisms of Audio-Visual Entrainment"**
    A detailed look at the physiological mechanisms behind AVE, its evolution, and its applications in modern therapy.

These studies provide a robust foundation for discussing the integration of AVE into therapeutic practices, relaxation, and cognitive performance enhancement in your user guide.