Alive®

PIONEER VERSION

USER GUIDE SUPPLEMENT

SOMATICVISION

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Contents

Alive Pioneer Measurement Quick Reference

SMOOTHNESS (HRV)

Achieve balance in the autonomic nervous system to stabilize emotions.

Develop a clear mind, improve attention, concentration, and planning.

Facilitate acceptance, openness and a positive emotional state.

Create and maintain a sense of harmony and wellbeing.

BVP AMPLITUDE

BVP Amplitude shows cardiovascular, physical and mental stress, whereas SCL shows primarily nervous system / mental stress.

Helps differentiate “bad stress” from healthy stress. Bad stress is shown by a rise in heart rate with a constantly low BVP Amplitude.

Monitor and improve deep relaxation skills.

Monitor anticipation anxiety.

Monitor ongoing arousal and vigilance.

Use BVP Amplitude as an indicator of changes in peripheral temperature (BVP Amplitude increases precede peripheral temperature increases).

If BVP Amplitude is initially low and doesn’t rise, including BVP Amplitude as part of a course of training is highly recommended.

SKIN CONDUCTANCE (SCL)

Quick and easy introduction to how thoughts effect body and performance.

Identify anticipation and performance anxiety.

Monitor physiological relaxation.

Learn to relax or energize and boost arousal level on demand.

Improve attentional focus.

AVERAGE HEART RATE (AVERAGE HR)

Improve cardiovascular flexibility (*Alive is not intended to treat cardiovascular problems).

For people who see significant changes in heart rate when stressed (especially if SCL is not responsive).

Relaxation training to lower heart rate. Lower average heart rate is a sign of deep relaxation.

Lowering Average HR is a deeper experience of “letting go” then lowering SCL. Lowering SCL is more of an experience of quieting thoughts.

Easy to understand. Practice raising and lowering average heart rate as an introduction for people new to Alive.

EMOTION (AROUSAL AND/OR VALENCE)

Can more accurately measure excitement vs. relaxation, or happiness vs. sadness, by using a variety of heart rate and skin sweat measurements.

For people who want a more intuitive type of training, or are working with their emotions.

To help teach people to shift emotional states, and train them to access emotions that are hard to achieve. Improve access to positive emotional states and start to train a habit of experiencing positive emotions.

Facilitating emotional flexibility by practicing shifting into a negative state, then shifting out (playing a scary or sad movie clip may help create a negative state which can then be shifted out of).

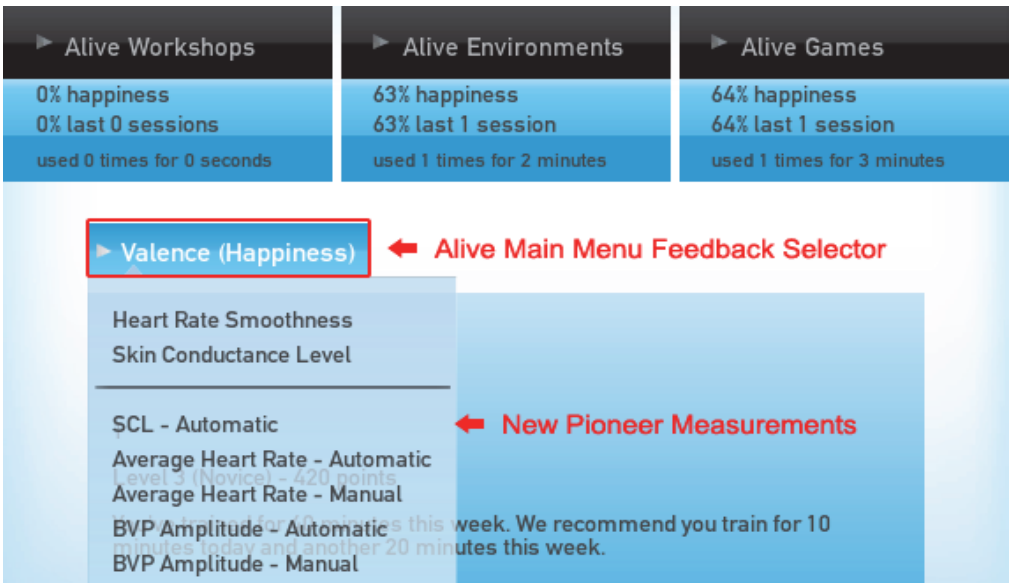
Welcome to Alive Pioneer

Alive Pioneer introduces new ways to train stress, relaxation, and emotional states using a variety of new Pioneer Measurements derived from your pulse (heart rate) and skin sweat.

You can use these measurements with any of the original Alive environments and games, as well as with the new graph screens and environments designed for Alive Pioneer.

If you haven't read the Alive User Guide and Alive Clinical User Guide, please read these before reading this Pioneer User Guide. All Alive User Guides can be found in the Alive start menu folder by going to Start Menu -> Programs -> Alive.

Pioneer Measurements can be selected in the **Alive Main Menu feedback selector**.

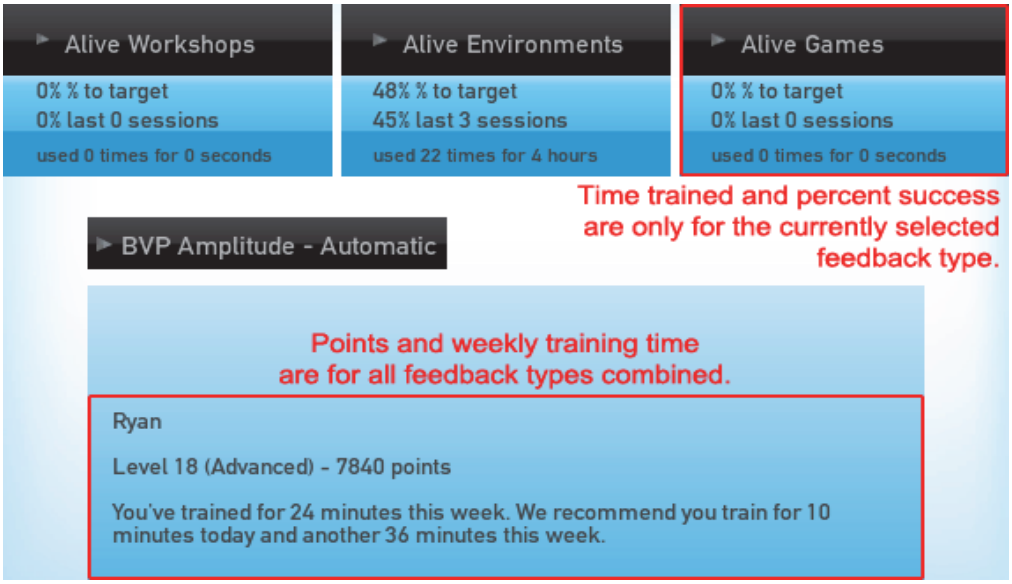


Alive Pioneer

1) Has new feedback measurements, such as BVP Amplitude and Valence which allow you to train in new ways.
2) Has automatically ranged versions of Smoothness, SCL and other measurements allowing you to train more easily.
3) Has new graphs and environments to train with.

4) Allows you to train with 2 IOMs/Lightstones or 2 BioSignals HS Devices at the same time, for two person training (available in specific games and environments only).
5) iFeel and emWave devices don't measure skin conductance, so you won't be able to choose skin conductance related measurements. emWave devices don't read BVP amplitude.

When first selecting a new feedback type on the Alive Main Menu (for example when selecting one of the new Pioneer Measurements) all Workshop, Environment and Game scores will show 0, as these scores are now shown per feedback type.



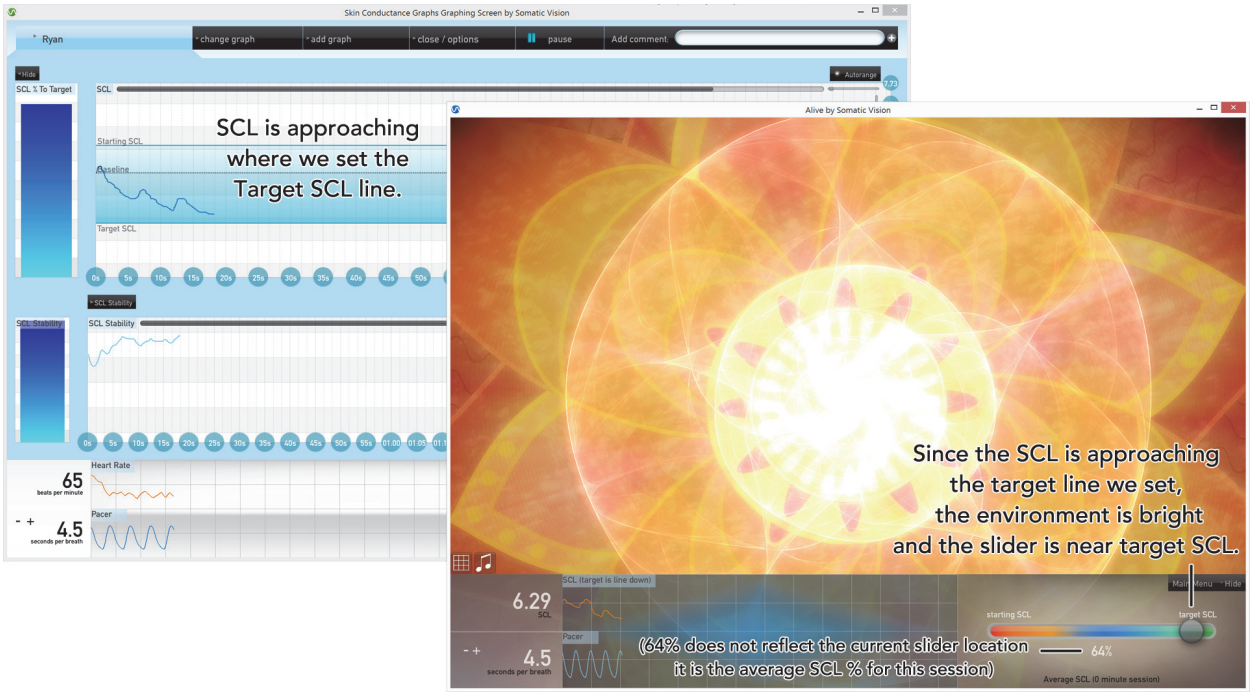
For example if Valence (Happiness) is selected as the current feedback you will see only time trained and percent success for sessions where you trained with Valence (Happiness).

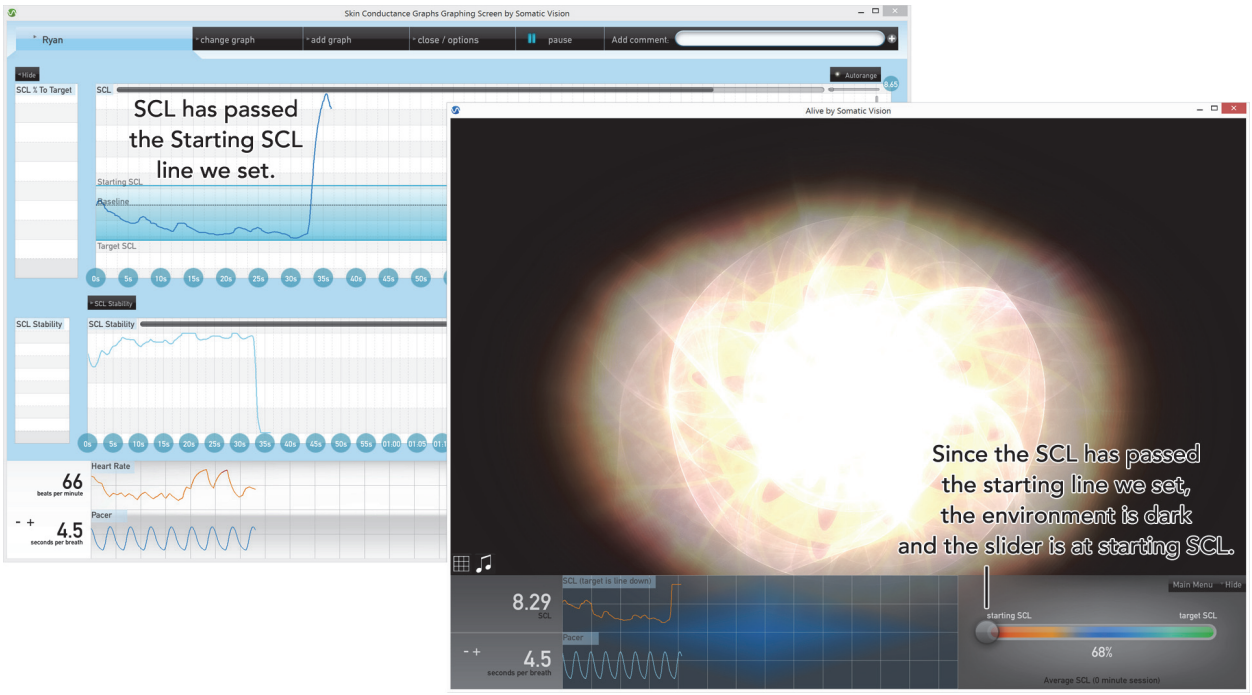
You will continue to accumulate weekly training time, and points to increase your level, regardless of the feedback selected.

Manually Ranged Feedback

If you choose a feedback that says "Manual" a graph will automatically open when you begin training with any

environment or game. You must set the Starting and Target lines in that graphing screen.





Try moving the Starting and Target lines and watch the changes in the % to Target bar graph (in the upper left corner). The % to Target is simply how far the current value has progressed from the Starting value to the Target value. The % to Target exactly matches the slider shown in the environments and games.

Alive Pioneer Feedback Measurements

The following new measurements are available in Alive Pioneer:

SCL – Automatic

Similar to the SCL (skin conductance level) measurement in Alive, but continuously sets the high and low SCL values automatically. This allows you to train to lower your SCL without having to worry about manually setting high and low SCL values. This measurement is calibrated to show momentary relaxation. To train for long term relaxation with major SCL decrease use the original Skin Conductance Level (manual) measurement.

Average Heart Rate – Automatic

Allows you to train average heart rate changes. Learn to relax and lower your average heart rate. Measures large changes in stress and physical activity. This measurement is automatically ranged so that lower heart rates are rewarded.

Average Heart Rate – Manual

Allows you to train average heart rate changes. Learn to relax and lower your average heart rate. This may be especially useful for people who feel their heart pounding quickly during stress. Babies and young children have much higher resting heart rates than adults. Athletes and highly fit people tend to have lower resting average heart rates. Using the manual average heart rate measurement you can train to decrease or increase your heart rate. Recommended for trained clinicians only.

BVP Amplitude – Automatic*

BVP (blood volume pulse) is the raw measurement that is used to determine heart rate in Alive. A decrease in the overall amplitude (vertical range) of the BVP is a strong indicator of bad stress. In

other words when stressed you will see the BVP signal shrink (vertically). This measurement is experimental, but seems to reflect stress changes of the cardiovascular system, as higher BVP indicates greater blood flow through the fingers.

* An IOM, Lightstone or other sensor that transmits raw BVP data is required for BVP training. emWave sensors do not transmit raw BVP data.

BVP training protocols are based on 10 years of research and clinical work conducted by Dr. Yuval Oded.

BVP Amplitude – Manual*

BVP (blood volume pulse) is the raw measurement that is used to determine heart rate in Alive. A decrease in the overall amplitude (vertical range) of the BVP is a strong indicator of bad stress. In other words when stressed you will see the BVP signal shrink (vertically). This measurement is experimental, but seems to reflect stress changes of the cardiovascular system, as higher BVP indicates greater blood flow through the fingers. Recommended for trained clinicians only.

Heart Rate Range – Automatic

Train towards having a greater range in your heart rate during each breath. Greater heart rate range (max heart rate minus min heart rate) within a session is highly correlated to an increase in Smoothness. Heart rate range increases dramatically with increased fitness.

Heart Rate Range – Manual

Train towards having a greater range in your heart rate during each breath. Greater heart rate range for the last couple of breaths generally increases with heart rate Smoothness, so this training can be similar to heart rate Smoothness training, although some people prefer to train range. Heart rate range increases with increased fitness in addition to when relaxed and

breathing properly. Using Heart Rate Range – Manual you can set the absolute heart rate range you want to train to achieve. Recommended for trained clinicians only.

SCL Stability – Automatic

SCL Stability sharply DECREASES during rapid changes in skin conductance level (SCL spikes). SCL Stability is recommended as a good way to introduce people to the idea that what happens inside of them is visible on screen, as it is very quick to respond and easy to control. If you see no stress reactions with SCL Stability – Automatic you may need to use the manual version of this measurement, or switch to BVP Amplitude as a way to measure stress changes. Once SCL Stability is controlled you may wish to move on to standard SCL training with a target SCL level or switch to Alive Smoothness training.

SCL Stability – Manual

SCL Stability sharply DECREASES during SCL spikes (or any fast changes in skin conductance level). SCL Stability is recommended as a good way to introduce people to the idea that what happens inside of them is visible on screen, as it is very quick to respond and easy to control. Once SCL Stability is controlled you may wish to move on to standard SCL training with a target SCL level or switch to Alive Smoothness training.

Smoothness – Automatic

The same as the Smoothness (HRV) measurement in the standard Alive training, but automatically ranges to focus on your particular range of high and low Smoothness. This measurement may be helpful for people who are having a hard time getting in the “green” using the standard Alive Smoothness training.

Smoothness – Manual

The same as the Smoothness (HRV) measurement in the standard Alive training, but where you can set the high (target)

and low (starting) Smoothness. Recommended for trained clinicians only.

Arousal (Target Relaxation)

This measurement is a proprietary combination of SCL and heart rate that attempts to determine arousal (how relaxed vs. excited you are). High arousal indicates any high energy state such as excitement or fear. Low arousal indicates a low energy state such as relaxation, tiredness or sadness. Arousal (Target Relaxation) trains toward a target of low arousal so an INCREASE in this measurement INDICATES RELAXATION.

Arousal (Target Activation)

This measurement is a proprietary combination of SCL and heart rate that attempts to determine arousal (how relaxed vs. excited you are). High arousal indicates any high energy state such as excitement or fear. Low arousal indicates a low energy state such as relaxation, tiredness or sadness. Arousal (Target Activation) trains toward a target of high arousal so an INCREASE in this measurement INDICATES ACTIVATION.

Valence (Happiness)

This measurement is a proprietary combination of various skin conductance and heart beat measurements that attempts to determine valence (how happy vs. unhappy you are). This measurement is experimental, but seems to be mostly accurate. Read the Emotion Graphs section of this user guide for more information about Valence.

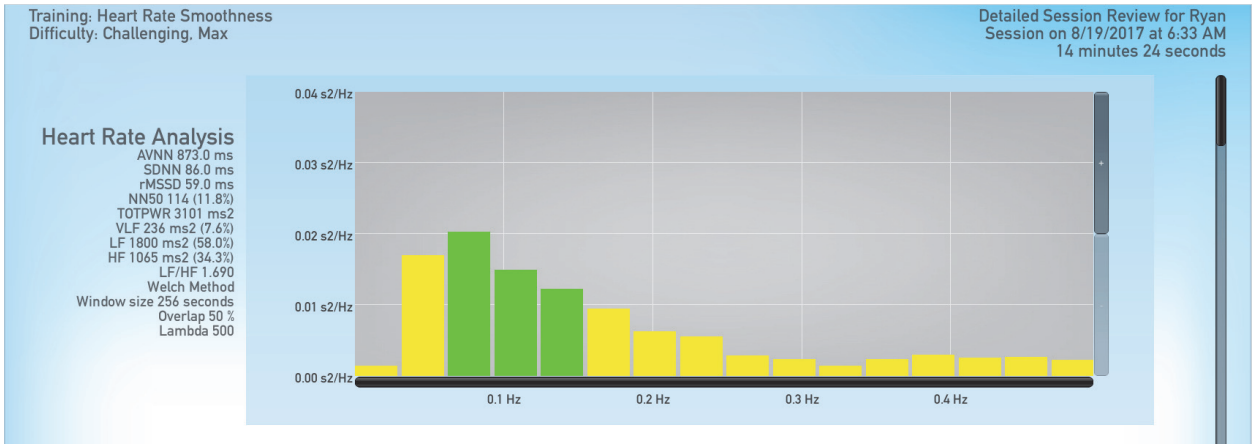
EMG, Temp and other GP8 Amp Measurements

If you are using a GP8 Amp learn about the GP8 Amp Feedback Measurements in the GP8 Amp User Guide.

Review – Heart Rate Analysis

Alive Pioneer has a Heart Rate Analysis section in session review.

From the main menu click progress review, choose a session to review, then click "Detailed View" to see the Heart Rate Analysis.



The frequency graph shows the heart rate power spectrum for the entire session. Green bars show the approximate frequencies which are being trained by raising Smoothness.

To the left of the graph are various HRV statistics which are commonly used in research. If you are not doing research, or have not been trained to interpret the statistics, either take a course in HRV biofeedback, or just ignore most of them (except LF/HF, see the LF/HF section below).

If you add comment markers using a graph training screen, you will also see the HRV statistics per marked area of the session.

The first few statistics refer to the NN intervals (the time between beats, sometimes called R-R intervals).

If the NN is 500 milliseconds (ms), this is the same as saying the time between one beat and the next was half a second, or the heart rate was 120 beats per minute. To convert from NN to heart rate use this formula: heart rate (bpm) = 60 / (NN/1000).

AVNN – The average of the NN intervals (the average heart rate for the session expressed in milliseconds).

SDNN – The standard deviation of the NN intervals.

rMSSD – Root mean square of the standard deviation of the NN intervals.

NN50 – The number of pairs of successive NN intervals that differ by more than 50 ms. The proportion of NN50 (pNN50) is also shown.

The frequency graph, as well as the following frequency statistics, are calculated with cubic spline interpolation, using Welch windowing with 50% overlap. Each segment is detrended using the smoothness prior method with a lambda of 500.

TOTPWR – The total power of all frequency bands up to 0.4 Hz in the heart rate power spectrum.

VLF – The total power of all VLF (0 to 0.04 Hz) frequency bands in the heart rate power spectrum.

LF – The total power of all LF (0.04 to 0.15 Hz) frequency bands in the heart rate power spectrum.

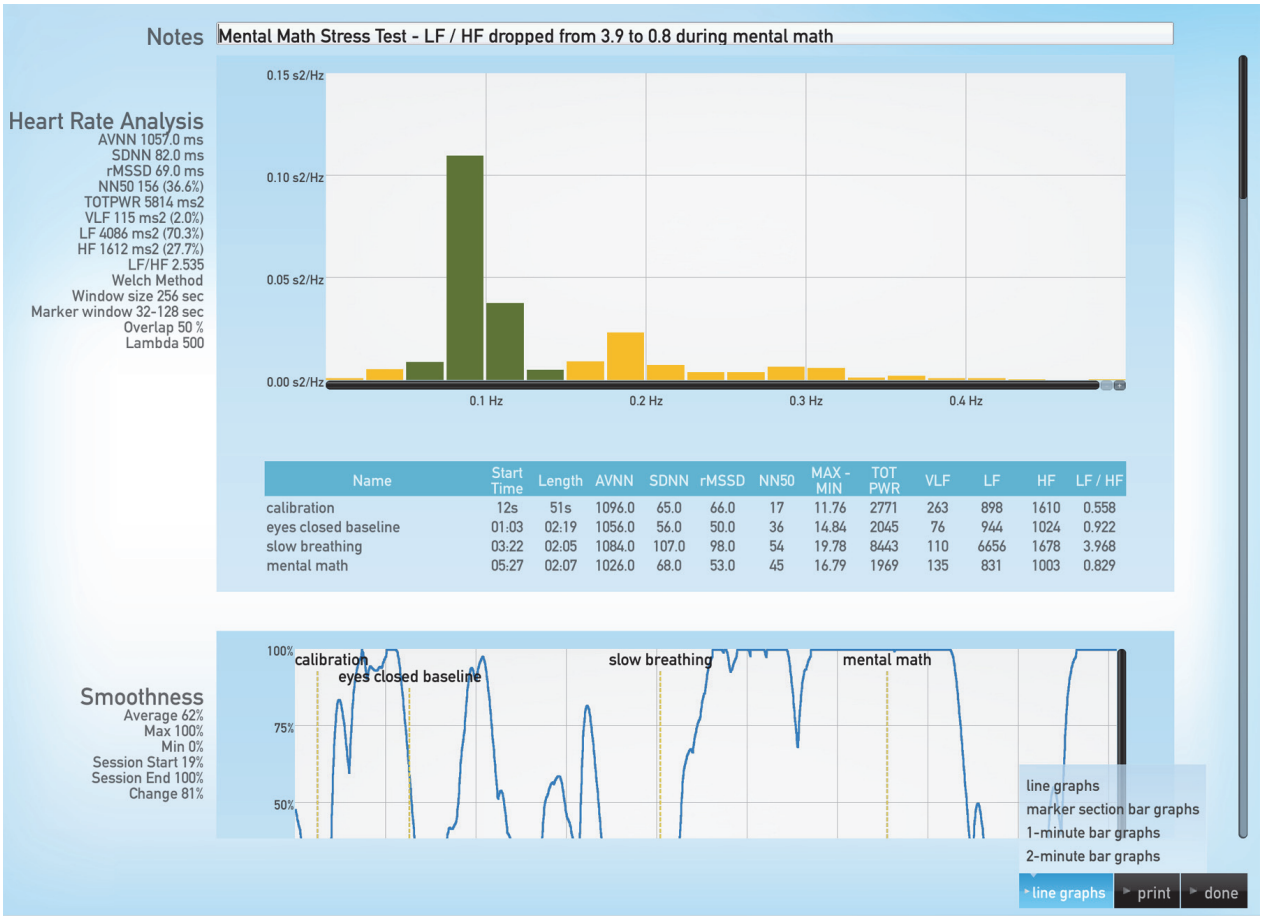
HF – The total power of all HF (0.15 to 0.4 Hz) frequency bands in the heart rate power spectrum.

LF/HF – The proportion of LF to HF power in the heart rate power spectrum. Smoothness is primarily calculated by using the proportion of LF, therefore the LF/HF is similar to an absolute value for Smoothness, where a higher LF/HF is a higher Smoothness. This number is not affected by difficulty level, so you can compare this number even between sessions of different Smoothness difficulty levels to see if there was an increase or decrease.

Review – Notes and Bar Graphs

In detailed session review, you can add notes about the session in the top Notes field.

All session notes, and all session data files, are saved in your Documents/Alive Sessions folder, sorted by user name and the date and time of each session.

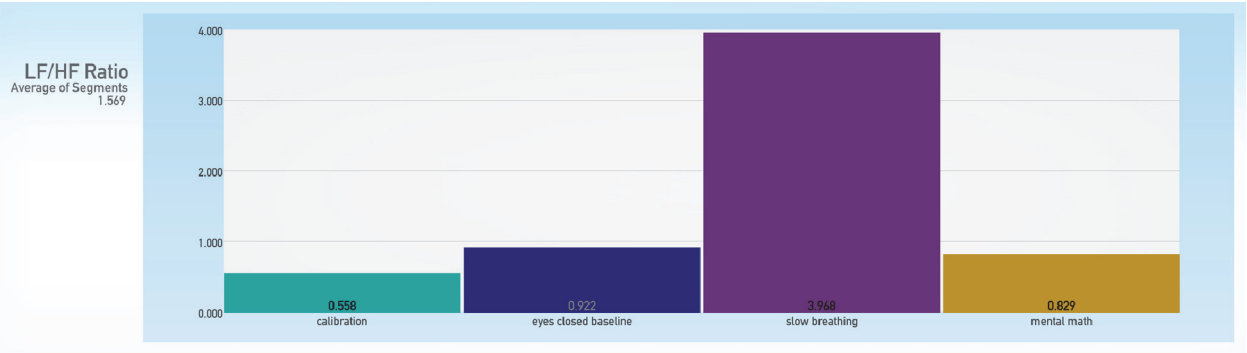


In this session 4 comment markers were added: calibration, eyes closed baseline, slow breathing and mental math. This creates 4 sections, and you can then see statistics about each section, for example that the LF / HF of slow breathing averaged 3.968, whereas the LF / HF of mental math averaged 0.829.

You can see this marked section data more easily by switching to bar graph view.

Switch to bar graph view from Detailed Session Review by rolling over the line graphs button in the bottom right corner, and selecting a bar graphs option.

If you have added comment markers, choose the marked section bar graphs option.



You can then see a large number of bar graphs, comparing each marked section.

This example shows the average LF/HF for each of the 4 marked sections, but you can also compare Smoothness, Average Heart Rate, Skin Conductance and much more.

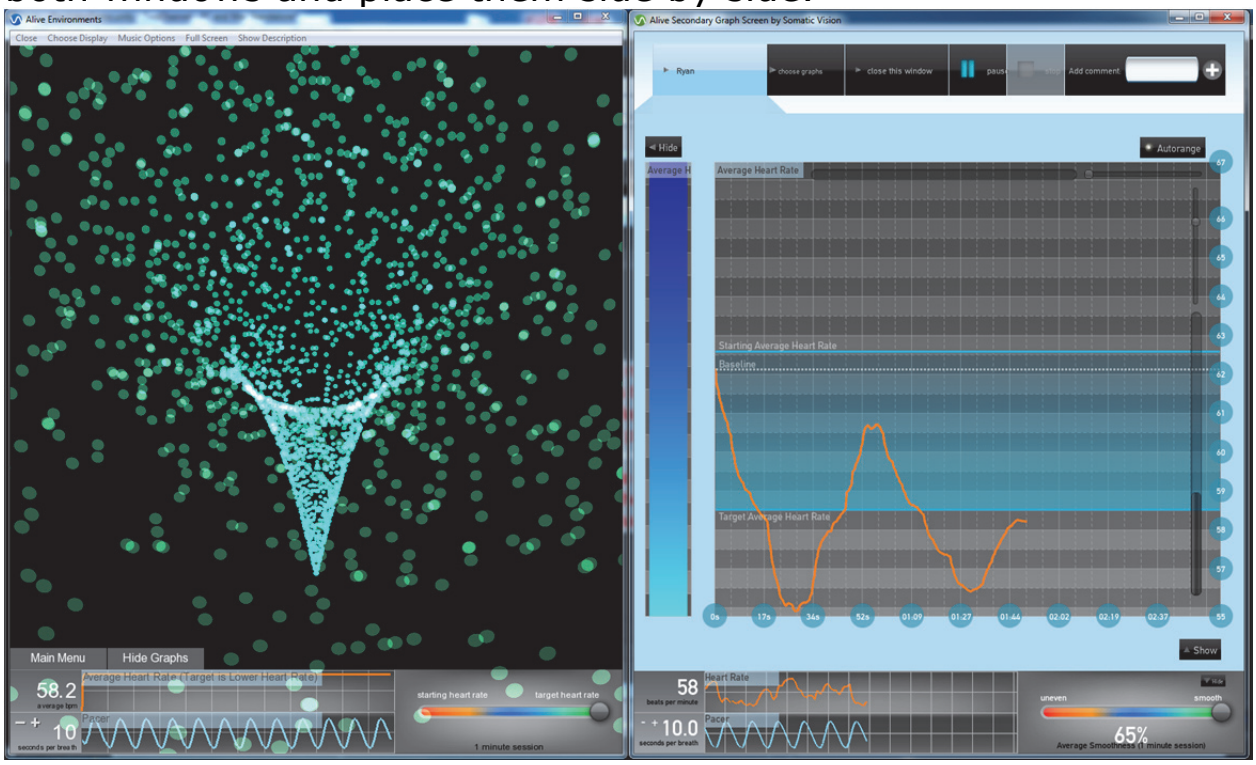
Session markers can be added while recording the session from any Graph Training screen. Enter text into the “Add comment” text field and press enter or the “+” button to add the comment marker at the current session time. If you need time to enter the comment text, you can pause the session, then enter the comment text while the session is paused.

If you haven’t added session markers you can still switch from line graph to bar graph view by choosing the 1-minute or 2-minute bar graph view. This divides the session into 1 or 2 minute sections, and displays the resulting bars.

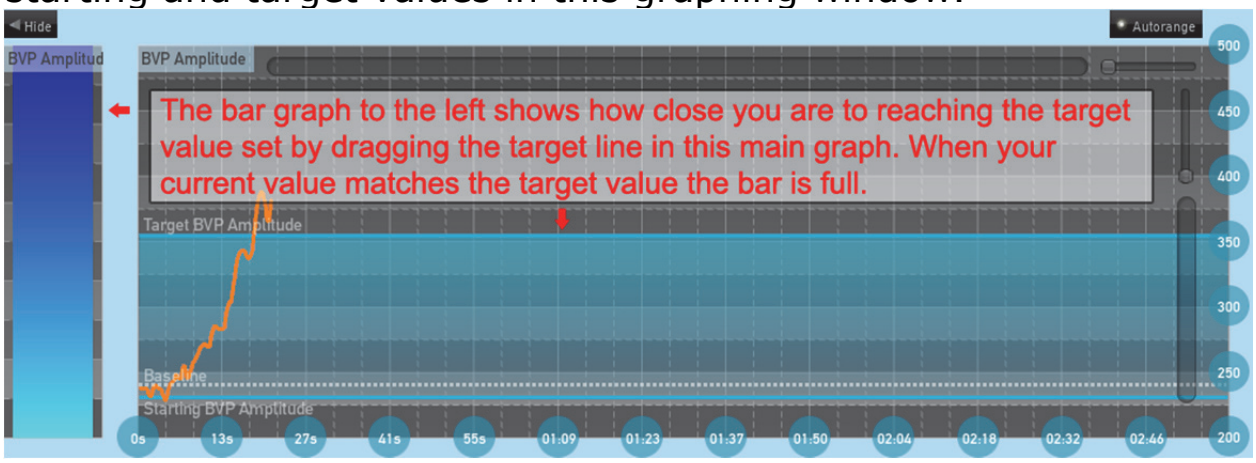
Alive Pioneer Secondary Graphing Screen

By default whenever a workshop, environment, or game is opened Alive Pioneer also opens an additional graphing window.

Using a computer with two screens (two monitors) is recommended so that you can put the game or environment on one screen and the graph window on the other screen. If you don't have two screens you can switch back and forth, or resize both windows and place them side by side.



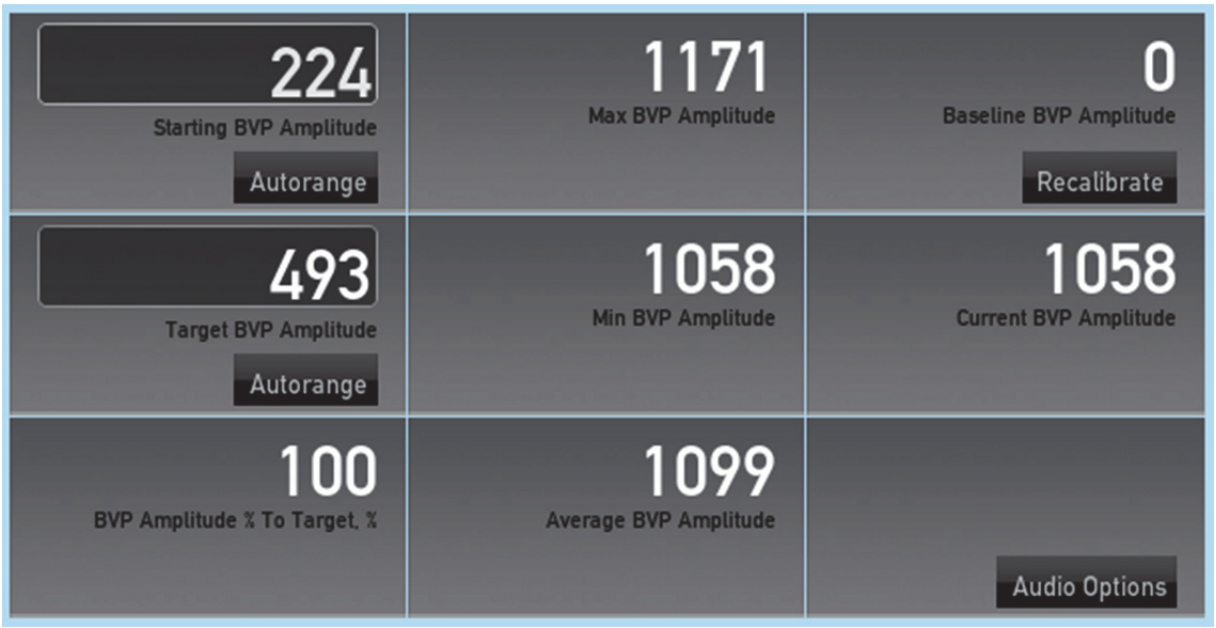
For manual (non-automatic) measurements you need to set starting and target values in this graphing window.



Environments and games respond to changes that occur within the starting to target range. At the starting value the bar graph to the left of the main graph is empty. As you near the target the bar graph fills. For example when the bar is full it is similar to achieving maximum Smoothness when training with Smoothness. When the bar graph is full in Dual Drive the car goes full speed, in environments the environment gets big and beautiful, and in all displays and games the in-game slider goes to the right and the music volume increases.

If you are not sure how to set starting and target values, you may need study more about the measurement you are training, or switch to the "automatic" version of the measurement you are training (in the feedback selector on the main menu). You can view a graph of the automatic version of the selected measurement using the selector under the bar graph.

At any point in time you can press the "Autorange" button below the Starting and Target values shown in the 9 squares in the bottom right area of the graphing screen. This sets the starting and target values based on the current measurement, assuming that you wish to train towards a more relaxed state than you are currently in.

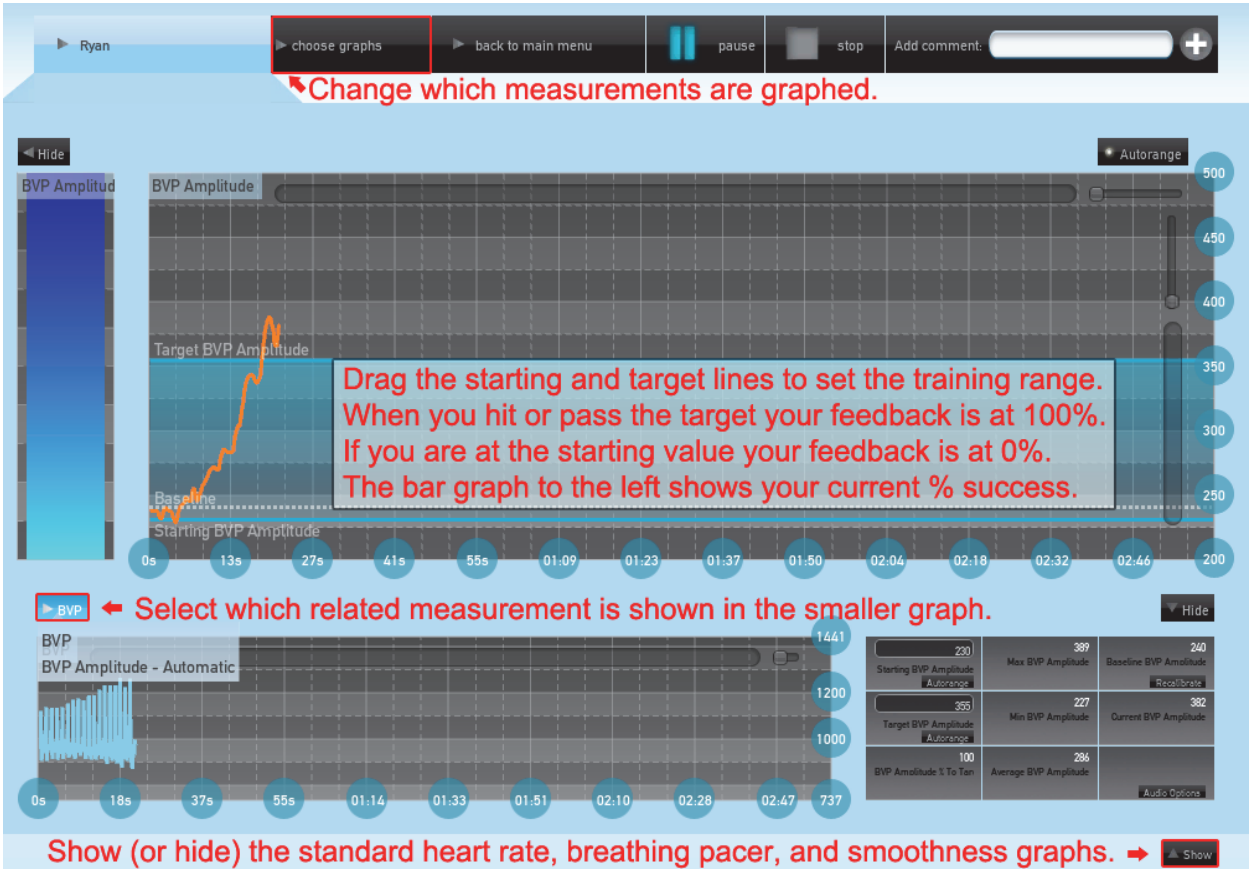


Alive Pioneer Graphs

Each Alive Pioneer measurement has a graph dedicated to it. These graphs are similar to the original Skin Conductance graphs in Alive.

From the Alive Main Menu go to Alive Workshops -> Graph Training to open the graphs.

After the graphing screen opens click "choose graphs" to change which graphing screen is displayed (which measurements you see graphed).



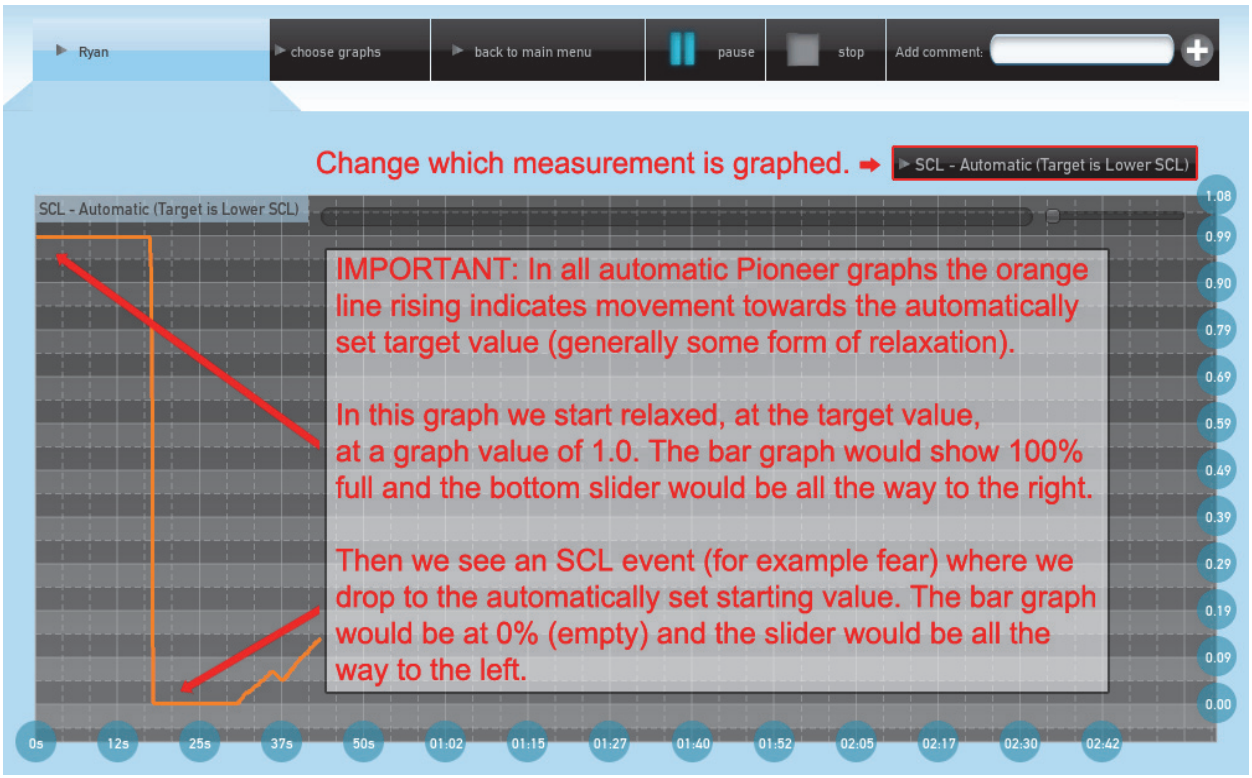
For the manual versions of these measurements the graph lets you specify starting and target values.

Automatic Feedback Measurements

Automatic feedback measurements allow Alive to continuously adjust to your current state. Automatic measurements are designed for continuous feedback, so small changes are easily noticed. SCL – Automatic, for example, doesn't train towards slow, long-term drops in SCL (skin conductance level), but rather shows moment to moment changes, constantly adjusting the range so that as soon as you relax you see an increase, and as you become more tense or excited you see a decrease.

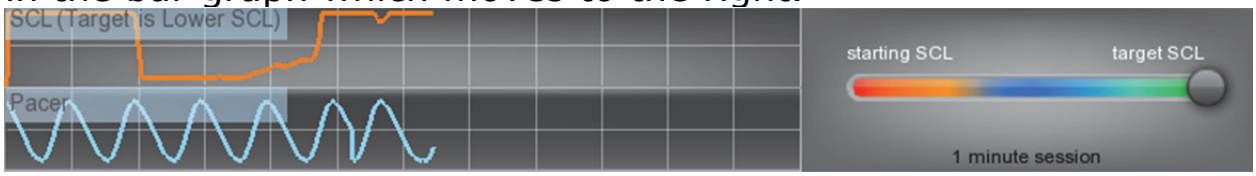
All automatic measurements are ranged so that 1.0 is the target. All automatic measurements train towards a relaxed and/or positive state.

For example if you are in Dual Drive training SCL – Automatic, the line moves up when you get closer to the target state of relaxation (this also removes the fog and accelerates the car).



All automatic feedback measurements can be trained using the Automatic Measurement Graph in graph training.

At the bottom of all environments and mini-games you see a small graph of the currently selected measurement. When this line rises up you are nearing the target state. This is also shown in the bar graph which moves to the right.



The starting and target states are determined automatically if you choose an "automatic" measurement from the Alive Main Menu feedback selector. The starting and target starting states are set by you manually if you choose a "manual" measurement from the feedback selector.

In any case, when the line moves to the top of this graph, and the slider moves towards "target", you are achieving the set target and the environment or game shows your improvement visually and auditorily.

Emotion Graphs

This Emotion Quadrants graph attempts to use a variety of heart rate and skin conductance based measurements to determine your emotional state.

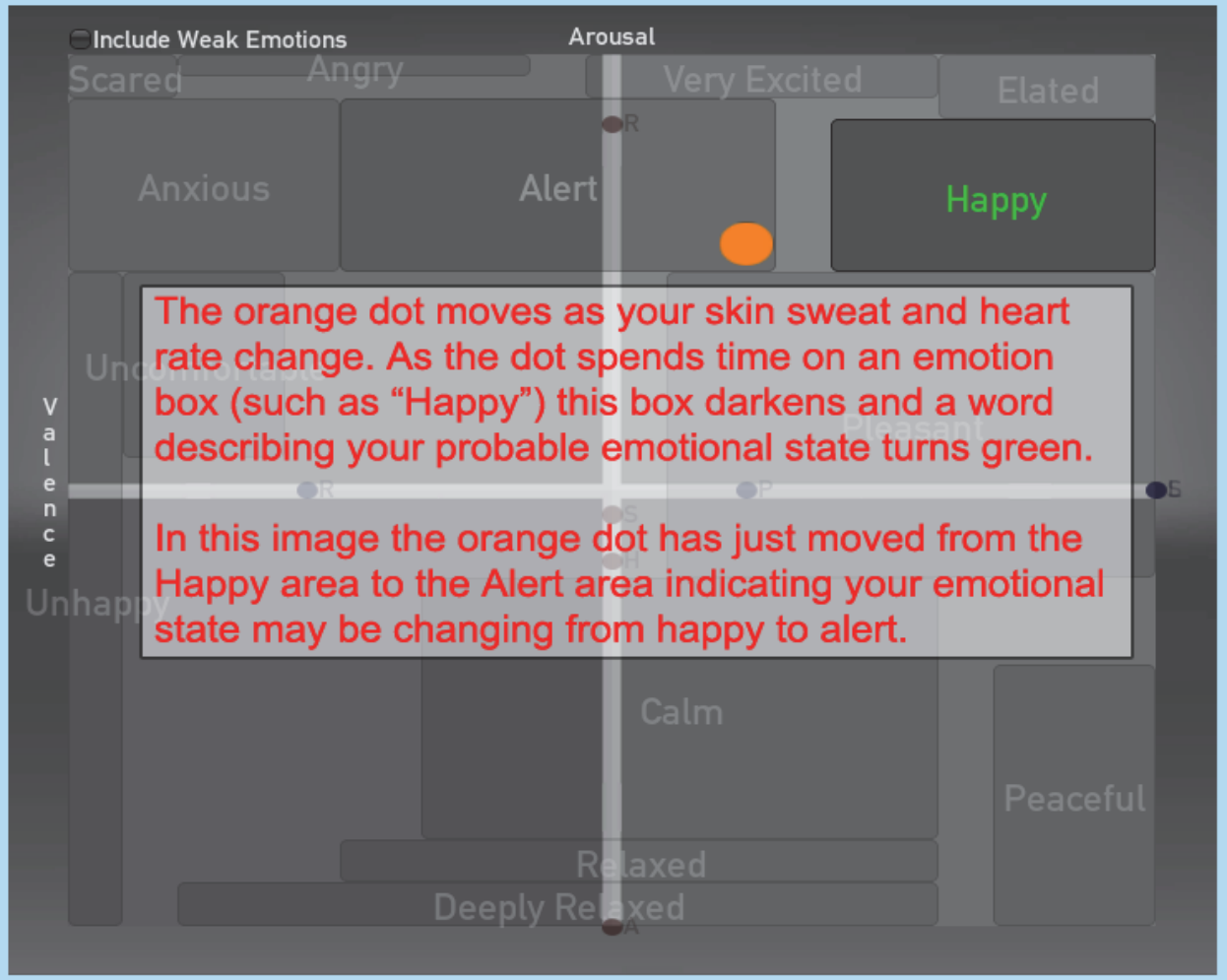
The emotion detection is experimental, but seems mostly accurate. This display will probably often, but not always, match your emotional state. It is good to note that although an emotion can produce a certain physiological response, it is also common for the physiological response to occur before you are conscious of any emotional change. In other words sometimes your physiology (heart rate, skin sweat) changes first, and only after a few seconds you suddenly become conscious of, or think about something that seems to produce, the resulting emotion.

Emotion detection is based on the concept of valence (how positive/happy an emotion is) and arousal (how exciting an emotion is). For example a peaceful, warm, relaxation is high

valence and low arousal. A happy excitement is high valence and high arousal. Sadness is low valence and low arousal.

Arousal is commonly determined using skin conductance and/or average heart rate, but there is no agreed upon method of determining valence using physiological measurements. Alive's valence is a proprietary new way of estimating emotional positivity and when combined with arousal can be used to display estimated emotional states.

This emotion quadrant display can be very interesting to train with as it uses more commonly understood concepts such as happiness, alertness, fear, etc. which helps people more easily understand and identify with the feedback. Emotional feedback can help people become more aware of their emotional states, to learn to shift between emotional states, and possibly to gain access to emotional states that are hard for them to achieve.



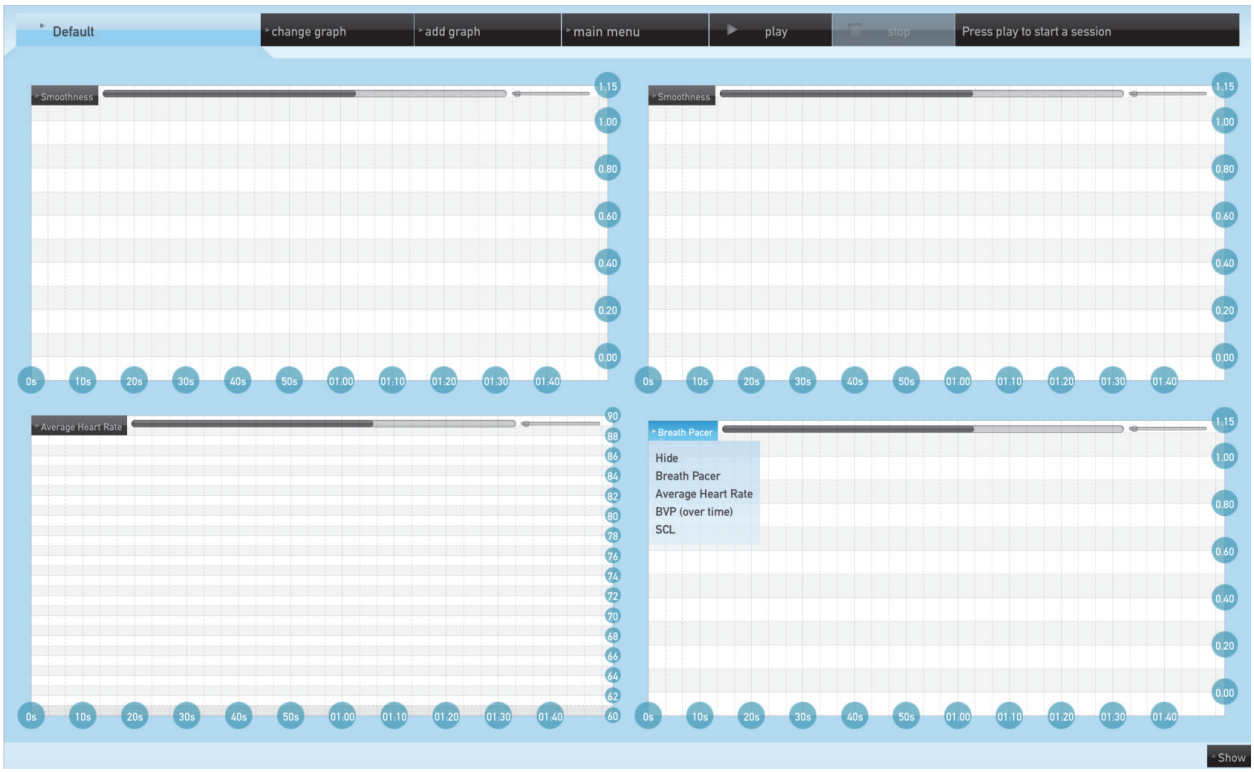
Full Monitoring Graphs

This series of 8 graphs shows a wide variety of information at the same time.

You can use this graph to help decide which measurements are most useful for training, when you are looking to see which measurement reacts to a stimulus, or any time you need to see the most possible information on a single screen.

If you have two sets of Wild Divine or BioSignals sensors attached, or are using a GP8 Amp with an iFeel sensor, this set of graphs can also plot two individual's measurements on each graph. This can be useful when looking for correlations in state changes between two people.

Custom Graphs



You can use Custom Graphs to display 4 line graphs of choice.

You can see the graph measurement in the upper left corner of each graph. Rollover that graph measurement to see a list of graphs.

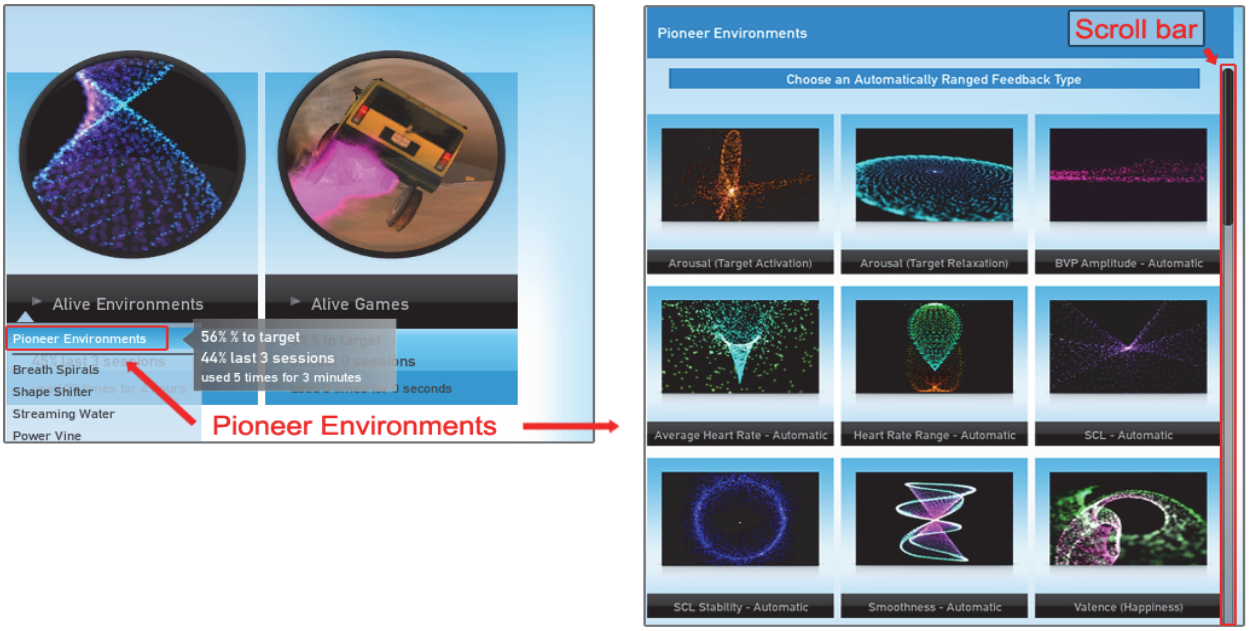
To avoid overloading the CPU, each graph has a limited number of measurements it can be switched to, so look around at the choices for each graph.

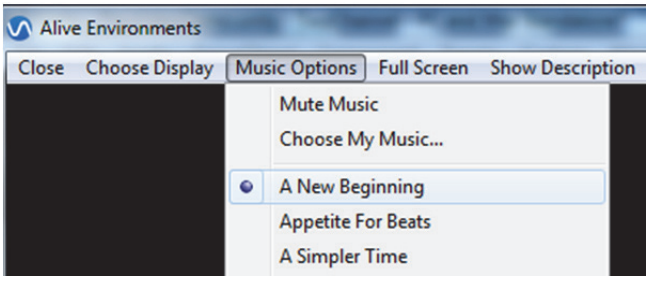
If you wish to display fewer graphs, rollover the graph measurement and choose Hide.

To show all graphs click the Show Hidden Graphs button that appears after you hide any graphs.

Pioneer Environments

Alive Pioneer includes new environments dedicated to training specific Pioneer Feedback measurements. Scroll down using the scroll bar next to the Pioneer Environments list to see the full set of available environments. Hold your mouse over each thumbnail to read about how to use that environment.





After you open any environment you can go to Music Options and select which music you would like to hear. Your music selection will be remembered for that environment.

Most Pioneer Environments use a specific Pioneer feedback type (such as Arousal). For these environments it doesn't matter what feedback you have selected on the Alive Main Menu.

Pioneer Environments are separated into the following categories:

Automatically Ranged Feedback

Choose one of these environments to train with feedback that is automatically ranged. You don’t need to set starting and target values, and you don’t need to use the secondary graphing screen.

Manually Ranged Feedback

Choose one of these environments to train with feedback which you can manually range. You can set starting and target values using the secondary graphing screen. Using a computer with two screens is recommended so you can put the environment window on one screen and the graph window on the other screen. If you don’t have two screens you can switch back and forth, or resize both windows and place them side by side.

Feedback Selected in Main Menu Combined

Choose one of these environments to train two types of feedback at the same time. Select a manual or automatic feedback type from the Alive Main Menu, then select one of these Pioneer Environments to begin. If the measurement selected on the Alive Main Menu is low the environment’s shape disappears, otherwise the feedback is similar to the Automatically Ranged or Manually Ranged Feedback environments.

Complex Feedback

The Complex environment represents almost all Pioneer feedback measurements at the same time. This creates interesting patterns that can be used for fun exploration, relaxation, or a less focused training period. The Valence and Arousal environment shows Valence and Arousal at the same time.

Custom Image Sets

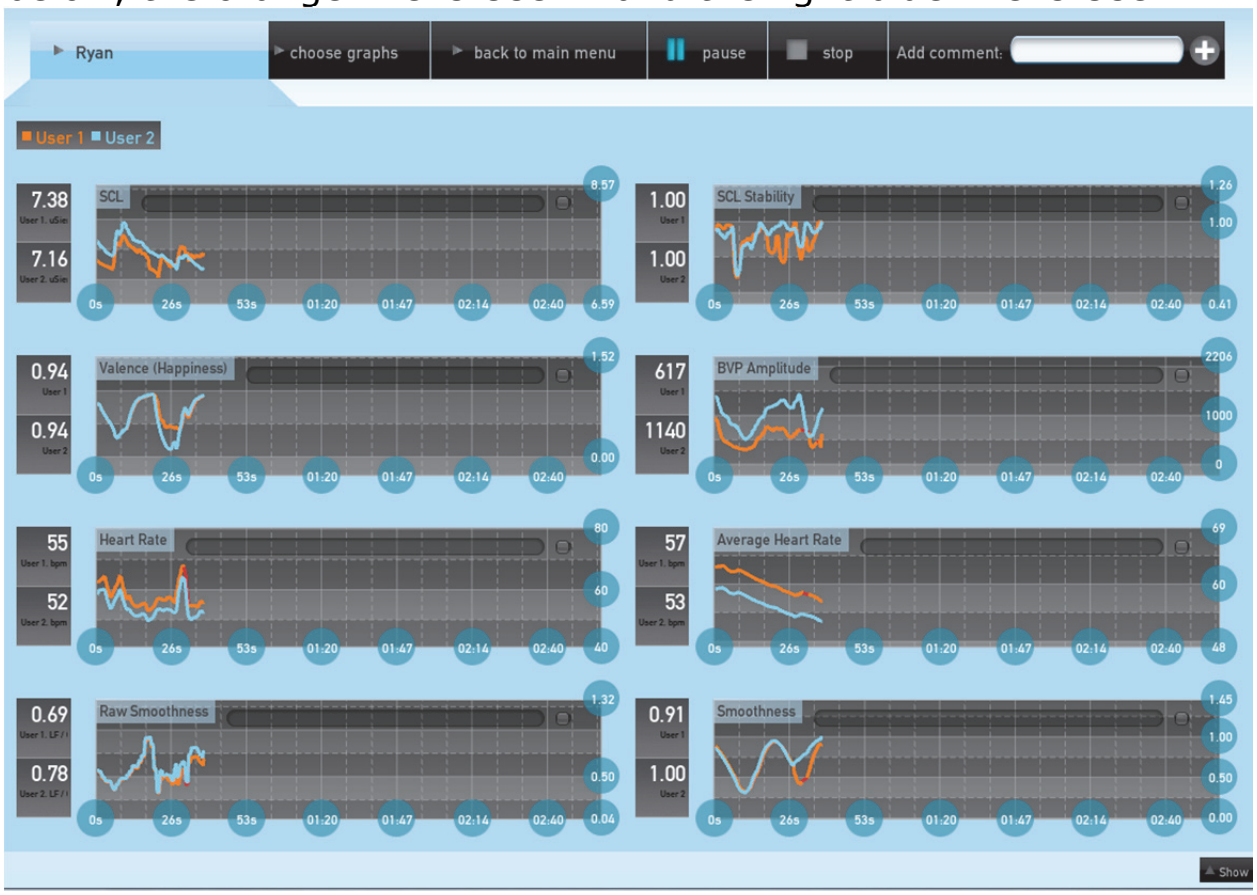
Shows the sequence of images placed in the Alive

Sessions/Custom Images folders. Images are less effective than movies for eliciting emotions, but have more discrete starting times and can therefore be useful for research. A comment marker is added to the session each time a new image is displayed. Some example images are provided in each folder, add your own images to suit your desired training.

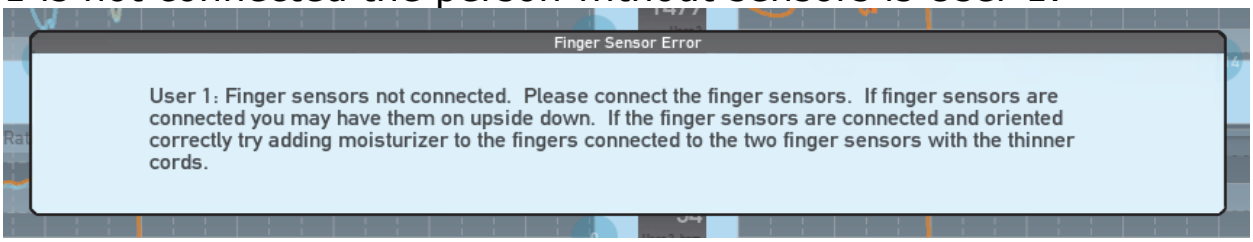
Two User Training

If you connect two Wild Divine or BioSignals devices, you can train two users together. Using a GP8 Amp you can train Smoothness from two users (or any heart rate measurement) by selecting a secondary heart rate source.

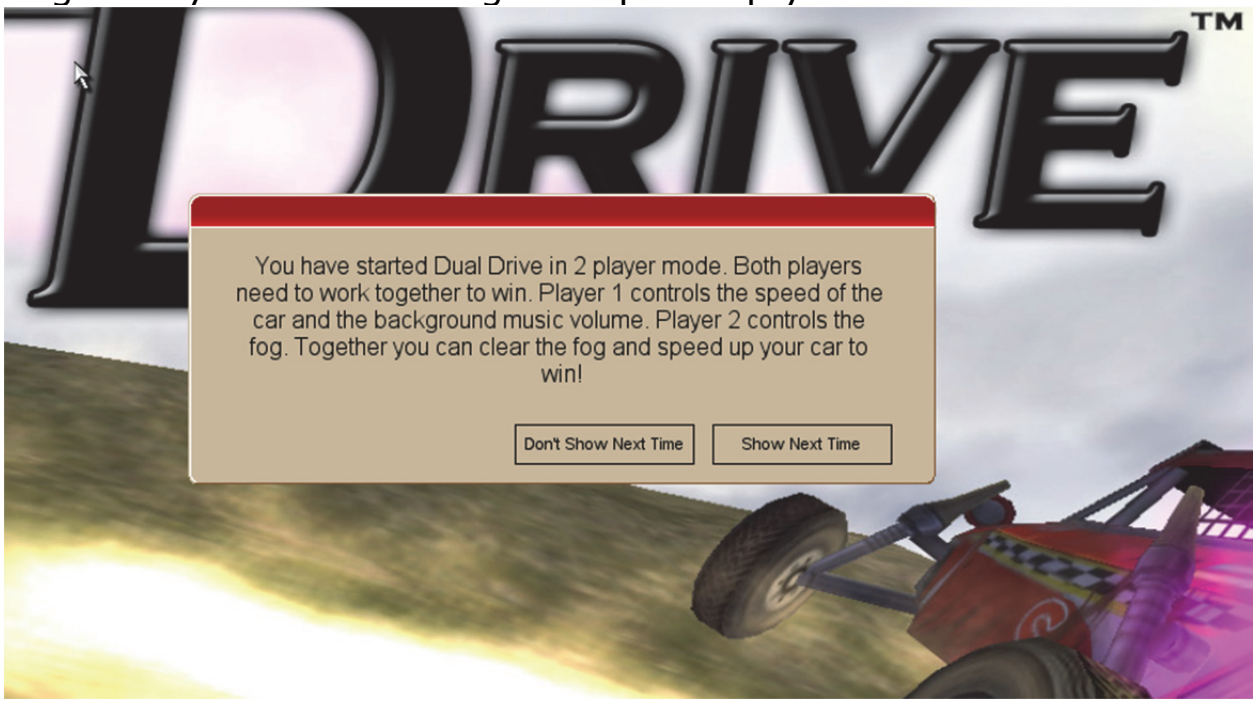
All of the Pioneer graphs, as well as some other Alive graphs, can show two user's measurements at the same time. In the graph below, the orange line is User 1 and the light blue line is User 2.



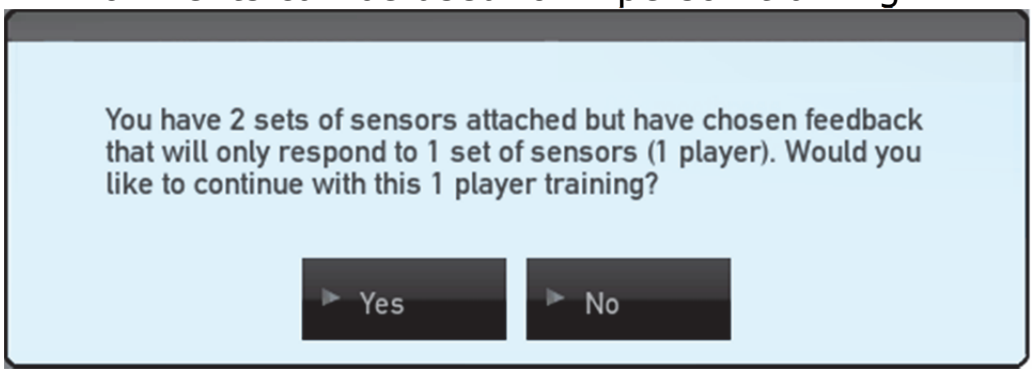
To find out who is User 1 and who is User 2, have one person remove their finger sensors. If the error message shows that User 1 is not connected the person without sensors is User 1.



You can train in Dual Drive with 2 users at the same time. You both work together to win. One person controls the speed of the car and the music volume, the other person controls the fog. Together you clear the fog and speed up your car to win!



Many Alive environments and games are not adapted for 2 person training. Only the graphs, Dual Drive, and the Pioneer Environments can be used for 2 person training.

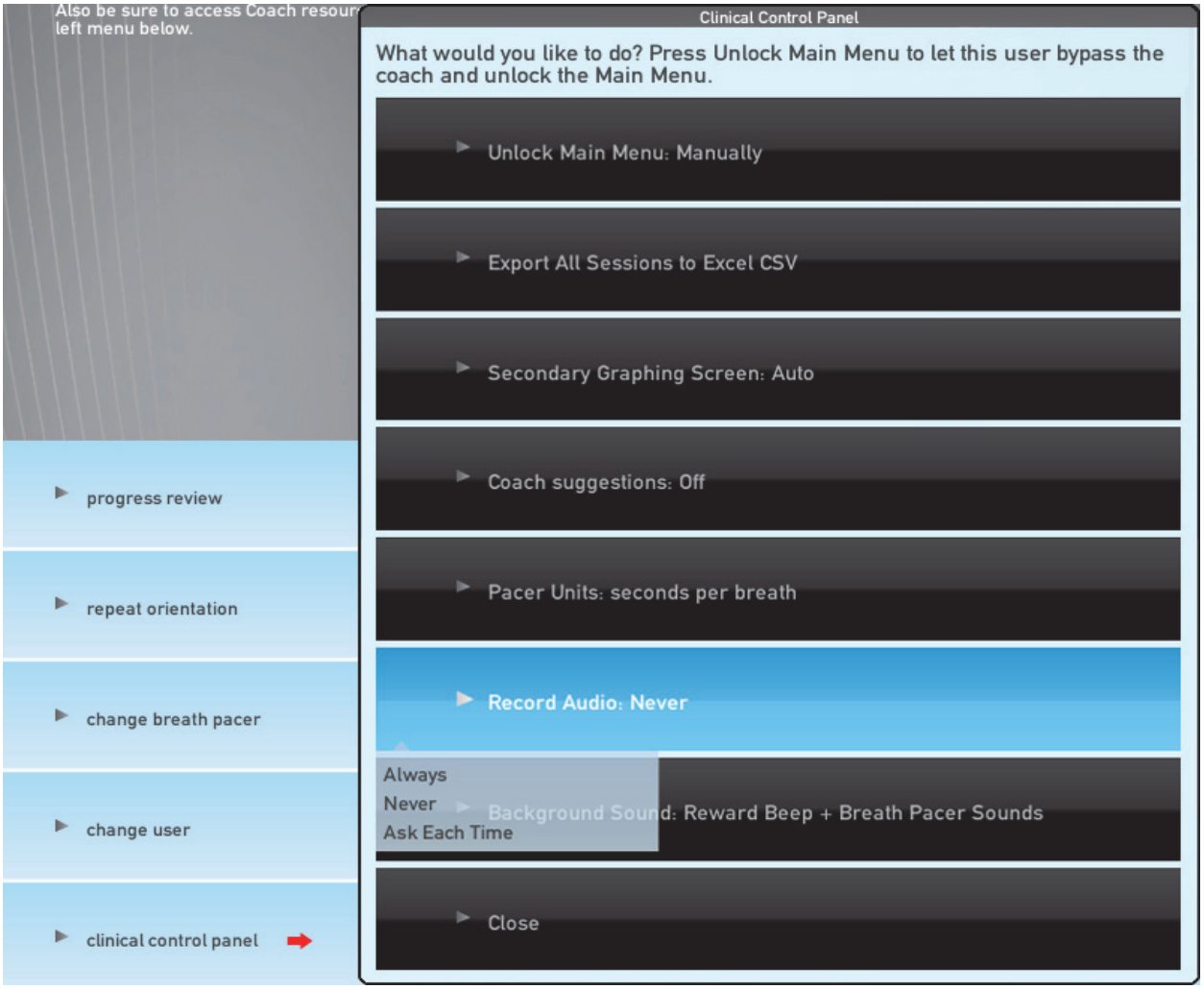


Recording Session Audio

In Alive Pioneer you can record sound for your session using a microphone.

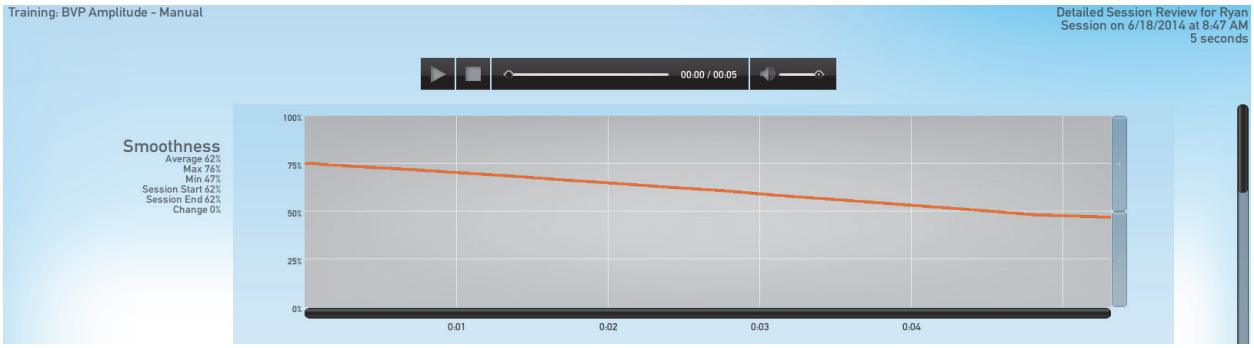
This can allow you to review the dialog for an entire session, take verbal notes, or review only what triggered major changes. For example, if you see a large SCL spike in session review you can immediately listen to what was said that may have triggered the spike.

To record audio open the Pioneer Control Panel (in control panels) and change the Record Audio option to Always or Ask Each Time.



If Record Audio is set to Ask Each Time, a separate window will appear every time you start a session, asking if you want to record this session. This window may appear on a secondary screen if you have two screens.

If you record audio for a session you can review the session audio in the single session clinical view. From the Main Menu click Progress Review, click the session that has recorded audio then press Clinical View. If audio was successfully recorded, at the top of the clinical view you will see an audio playback control.



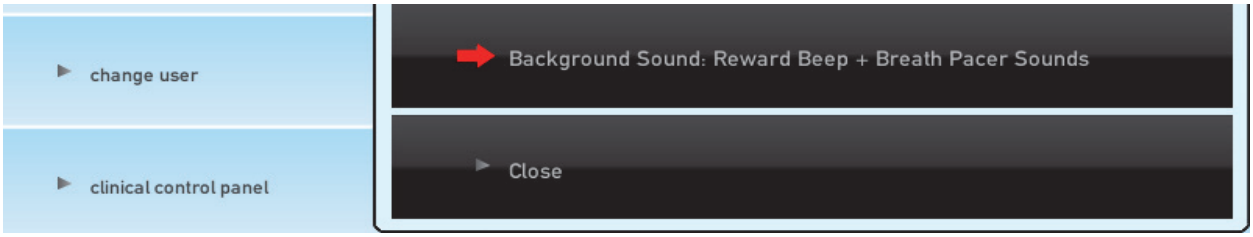
To jump to a particular part of the session and listen to the audio in that part, first click the triangle play button, then drag the black dot to the right of the stop button. You will see a red vertical line in all graphs showing the location of the audio playback.

If Alive was set to record audio for a session, but in the clinical session review you don’t see this audio control, your audio recording device is not configured properly. Make sure your microphone is plugged in and working properly in other audio recording programs. You may need to set the default audio recording device in the sound control panel, or otherwise configure your sound options through your operating system.

Breath Pacer Sounds + Reward Beep

Alive Pioneer can be set to play background sounds during session recording. You can hear sounds that indicate your training success (Reward Beep) and hear sounds that help you pace your breathing (Breath Pacer Sounds).

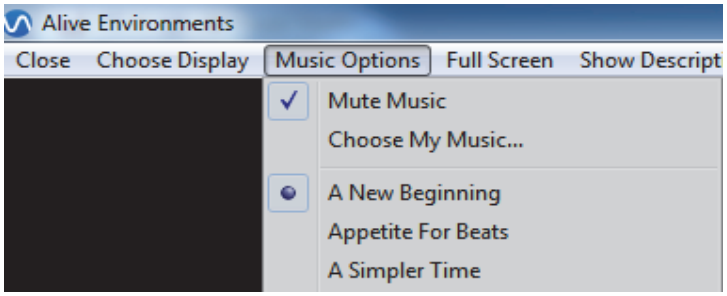
In the Pioneer Control Panel (in control panels) change the Background Sound option to select Reward Beep and/or one of a few possible breath pacer sounds.



If you choose to hear a reward beep, whenever your feedback measurement is above 80% you hear a sound. For example, if you are training smoothness and the smoothness slider is above 80%, you hear a pleasant ding every few seconds (indicating your continued success).

If you choose any sort of Pacer Sounds you will hear a low pitched sound to indicate when you should breathe out, and a slightly higher pitched sound to indicate when you should breathe in. Each time you hear the lower pitched sound, gently breathe out. Breathe in when you hear the higher pitched sound.

When training with background sounds using Alive Environments or Mini-Games you may wish to turn off the normal background music by selecting the Mute Music option.



Choosing a Feedback Measurement – Step 1

SMOOTHNESS (HRV)

Achieve balance in the autonomic nervous system to stabilize emotions.

Develop a clear mind, improve attention, concentration, and planning.

Facilitate acceptance, openness and a positive emotional state.

Create and maintain a sense of harmony and wellbeing.

BVP AMPLITUDE

BVP Amplitude shows cardiovascular, physical and mental stress, whereas SCL shows primarily nervous system / mental stress.

Helps differentiate “bad stress” from healthy stress. Bad stress is shown by a rise in heart rate with a constantly low BVP Amplitude.

Monitor and improve deep relaxation skills.

Monitor anticipation anxiety.

Monitor ongoing arousal and vigilance.

Use BVP Amplitude as an indicator of changes in peripheral temperature (BVP Amplitude increases precede peripheral temperature increases).

If BVP Amplitude is initially low and doesn’t rise (locked), including BVP Amplitude as part of a course of training is highly recommended.

SKIN CONDUCTANCE (SCL)

Quick and easy introduction to how thoughts effect body and performance.

Identify anticipation and performance anxiety.

Monitor physiological relaxation.

Learn to relax or energize and boost arousal level on demand.

Improve attentional focus.

AVERAGE HEART RATE (AVERAGE HR)

Improve cardiovascular flexibility (*Alive is not intended to treat cardiovascular problems).

For people who see significant changes in heart rate when stressed (especially if SCL is not responsive).

Relaxation training to lower heart rate. Lower average heart rate is a sign of deep relaxation.

Lowering Average HR is a deeper experience of “letting go” then lowering SCL. Lowering SCL is more of an experience of quieting thoughts.

Easy to understand. Practice raising and lowering average heart rate as an introduction for people new to Alive.

EMOTION (AROUSAL AND/OR VALENCE)

Can more accurately measure excitement vs. relaxation, or happiness vs. sadness, by using a variety of heart rate and skin sweat measurements.

For people who want a more intuitive type of training, or are working with their emotions.

To help teach people to shift emotional states, and train them to access emotions that are hard to achieve. Improve access to positive emotional states and start to train a habit of experiencing positive emotions.

Facilitating emotional flexibility by practicing shifting into a negative state, then shifting out (playing a scary or sad movie clip may help create a negative state which can then be shifted out of).

Choosing a feedback measurement consists of 3 steps, choosing a category of measurement, choosing a specific measurement and choosing a display.

In Step 1 you selected a category of feedback measurements (Smoothness, SCL, BVP Amplitude, Average Heart Rate or Emotion).

In Step 2 you need to select the exact feedback measurement you will train with, for example the automatic version of SCL, or the manual version.

In Step 3 you will choose a graph, environment or game that can be used with the feedback measurement you select.

Choosing a Feedback Measurement – Step 2

SMOOTHNESS (HRV)

Smoothness - The standard Alive Smoothness. Fine-tuned for optimal training feedback. Choose a difficulty from Easy to Extreme. Fastest Smoothness feedback.

Smoothness – Manual - Manually set a low and high to create a custom Smoothness difficulty, or to dynamically change the difficulty during a session.

Smoothness – Auto - Automatically adapts difficulty as you train.

BVP AMPLITUDE

BVP Amplitude – Manual - Manually set starting and target BVP Amplitude values. Higher BVP Amplitude indicates relaxation. BVP Amplitude changes very quickly.

BVP Amplitude – Auto - Automatically train with BVP Amplitude. Alive adjusts the starting and target states continuously to show moment to moment changes in BVP Amplitude, so you can see as you become more or less relaxed within your own personal range. To train for major increases in BVP Amplitude beyond your starting amplitude use BVP Amplitude – Manual.

AVERAGE HEART RATE

HR Average – Manual - Manually set a target average heart rate to achieve. You can train towards relaxation by setting a target average heart rate 5-10 beats lower than your starting value. Train towards not becoming anxious by setting the target at or near your starting value. Train towards excitement, activation or increased energy by setting the target heart rate 10 beats or more above the starting value (and setting the starting value to the baseline or below).

HR Average – Auto - Automatically train towards relaxation with a target of lowering your average heart rate. This is continuously recalibrated to show changes in relaxation. To train for large shifts use a fixed target heart rate with HR Average – Manual. Also if you want to train for excitement or more energy you must use HR Average – Manual.

SKIN CONDUCTANCE (SCL)

Skin Conductance Level – Manual - The original Alive SCL training. Manually set starting and target SCL values. Default target is lower SCL (more relaxed) but can be used to train an increase in SCL (excitement, energizing) by setting the target higher than the starting value.

SCL – Auto - Automatically and continuously sets SCL starting and target values so you can see moment to moment changes in SCL. When SCL spikes this measurement drops to 0. When you relax and SCL shows a steady decline or long flat line this measurement goes to 100%. This is calibrated to show momentary relaxation. To train for long term relaxation with major SCL decrease use SCL – Manual. Also if you want to train SCL increase you must use SCL – Manual.

SCL Stability – Manual - A quicker changing SCL feedback. Relaxation is increased SCL Stability. SCL Stability decreases during SCL spikes, as SCL moves very quickly when spiking. For people with very small SCL changes using a manually ranged SCL stability may be an easy way to train maintaining a relaxed state and avoiding SCL spikes. You can also train for excitement or increased energy by targeting a low SCL Stability, but it is not possible to keep SCL Stability low for long periods of time, as your body cannot continuously produce SCL spikes. Leaving this on its maximum range (from 0 to 1.0) will work for people who have medium to large SCL changes.

SCL Stability – Auto - Automatically and continuously set SCL Stability target values. A very easy way to get started training for people new to Alive who have sufficient SCL changes. If you find SCL does not change much, either try manually ranging the SCL or SCL Stability, or switch to BVP Amplitude when training for relaxation.

EMOTION (AROUSAL AND/OR VALENCE)

Arousal – Target Activation - Determines relaxation / activation using SCL and Average Heart Rate combined. Trains towards excitement / activation / energy.

Arousal – Target Relaxation - Determines relaxation / activation using SCL and Average Heart Rate combined. Trains towards relaxation.

Valence - Determines emotional positivity using a variety of heart rate and skin conductance derived measurements. This measurement is experimental, but seems mostly accurate. This measurement increases during any sort of positive emotions (including both high arousal and low arousal emotional states). For example a peaceful, warm, relaxation as well as a very happy excitement both show as high valence (happy). Sadness, anger, and fear all show as low valence (unhappy). Working with valence (or arousal and valence together) can help teach people to shift emotional states or access emotions that are hard for them to achieve.

Facilitating emotional flexibility by practicing shifting into a negative state, then shifting out (playing a scary or sad movie clip may help create a negative state which can then be shifted out of).

Arousal and Valence - Combining arousal and valence you can approximate an emotional state. A peaceful relaxation is low arousal with high valence. Extreme happiness is a high arousal, high valence state, whereas anger or fear are high arousal, but low valence. Working with arousal and valence together is good for people who want a more intuitive type of training, or are working with their emotions. It is good to note that sometimes you can see an emotional state change in Alive before you feel the state shift, as sometimes your physiology (SCL and heart rate) changes first, and only after a few seconds you suddenly “feel” (become conscious of, or think about something that seems to produce) the resulting emotion.

Choosing a Measurement Display – Step 3

AUTO MEASUREMENT DISPLAYS

Each auto measurement has a Pioneer Environment dedicated to it in **Pioneer Environments -> Choose an Automatically Ranged Feedback Type**.

You can also train any auto measurement with any **Environment** or **Game**.

To view the manually ranged and automatically ranged version of your selected measurement at the same time in graph training, choose the **Pioneer Graph** with the same name as the feedback you chose (for example **Graph Training -> BVP Amplitude Graphs**).

You can also choose to view the automatic measurement in a larger graph in **Graph Training -> Automatic Measurement Graph** (select your measurement from the drop down on the right).

VALENCE OR AROUSAL DISPLAYS

If you wish to train either valence or arousal (but not at the same time) your training options are similar to the auto measurements, but without the dedicated manually ranged graph.

You can choose a **Pioneer Environment**, any **Environment** or **Game**, or view your measurement in the **Automatic Measurement Graph**.

MANUAL MEASUREMENT DISPLAYS

Each manual measurement has a graph dedicated to it in **Graph Training**, and an environment dedicated to it in **Pioneer Environments -> Choose a Manually Ranged Feedback Type**.

You can also train with any **Environment** or **Game**.

You will need to set the starting and target values (by dragging the graph lines) before you start training, and it will most likely be necessary to update them occasionally during training.

EMOTION TRAINING WITH AROUSAL & VALENCE

If you want to train with arousal & valence together you should probably train using **Graph Training -> Emotion Graphs**. This training converts arousal and valence into commonly used words such as “calm” or “happy”.

You can also choose to train with **Environments -> Pioneer Environments -> Complex Feedback -> Valence and Arousal**.

SHOULD I TRAIN WITH A GRAPH, ENVIRONMENT, OR GAME?

Graphs are good for displaying a lot of information. Choose a graph for people who need to see more information, are overwhelmed by **environments**, or for skeptics who have a hard time seeing the connection between their internal state and what is shown in Alive. **Graphs** are bad for people who fixate on them and get stress / performance anxiety specifically from graph training. These people may benefit from using an **environment** or **game** (while hiding the bottom graphs), so they can relax and not try too hard.

Environments are the most relaxing display for most people. If you are just starting training, or want a training that helps you relax now, choose an **environment**. Some kids may find environments boring, and have more success training with **games**. It’s generally a good idea to start new users with **environments**.

Mini-games are similar to **environments**, but they introduce an additional element of stress: if you are not doing well you lose your progress. For example the house that you were building gets taken apart.

Games introduce additional stressors such as competition, time pressure, as well as the optional challenge of manually steering. The additional challenges of **mini-games** and **games** allow people to practice staying relaxed under pressure, and ensure skills can be accessed in difficult life situations.

Clinical Training Guide - BVP Amplitude

*** This BVP Training Guide is based on 10 years of research and clinical work conducted by Dr. Yuval Oded.**

What is BVP Amplitude

To determine your heart rate Alive watches the changes in blood flow in your finger. These raw changes in blood flow are called blood volume pulse (BVP). Each time your heart beats there is a period of time where there is more blood in your finger, followed by a decrease in the amount of blood in your finger. This is used to determine your heart rate for each beat.

The overall change in amount of blood flow (the minimum amount compared to the maximum amount over a few seconds) is called your BVP Amplitude.

When you experience certain kinds of stress the blood flow to your hands and feet decreases, decreasing the BVP Amplitude measured in your finger.

The Science of Measuring BVP Amplitude

BVP is measured by a single optical sensor (Photoplethysmograph - PPG) which senses changes in the perfusion of the blood through the tissue underneath the sensor (Allen 2007) due to the amount of light transmitted, diffracted, and reflected through the skin.

These changes are influenced by a few factors:

- Vasodilation (widening of the blood vessels due to decreased sympathetic arousal and increased parasympathetic arousal as the person relaxes) or vasoconstriction (narrowing of the blood vessels due to increased sympathetic arousal).
- Changes in the elasticity of the vascular walls.
- Changes in blood pressure (Hlimonenko et al., 2003).

Ensuring a High Quality BVP Amplitude Signal

The PPG sensor and BVP signal are vulnerable to artifacts. In order for the calculation of the BVP Amplitude to be precise you must minimize movement, especially of the hand with the sensor attached. Complete, continuous, contact of the sensor with the finger must be ensured. If the fingers are small, thin, or narrow, such as in children or petite adults try recording from the thumb. Any movement of the sensor over the skin creates numerous artifacts. In most cases the movement artifacts appear as sharp changes in the raw signal. Alive tries to minimize the appearance of these artifacts.

Setting a comfortable room temperature is important as low external temperature will induce vasoconstriction; the amplitude of the blood volume pulse signal decreases when your fingers are colder.

Good readings also depend upon skin quality. Very thick outer skin or dirt on the skin will make it difficult for light to penetrate or be reflected.

BVP Amplitude is not an absolute measurement that can be compared between individuals. Changes over time for an individual, during or in some cases between sessions, are what is relevant.

Prior to training clients should avoid alcohol as it will increase vasodilation, and avoid nicotine which increases vasoconstriction.

Therapists should be aware that prescription drugs also have diverse effects on blood volume pulse amplitude (Peper et al. 2007).

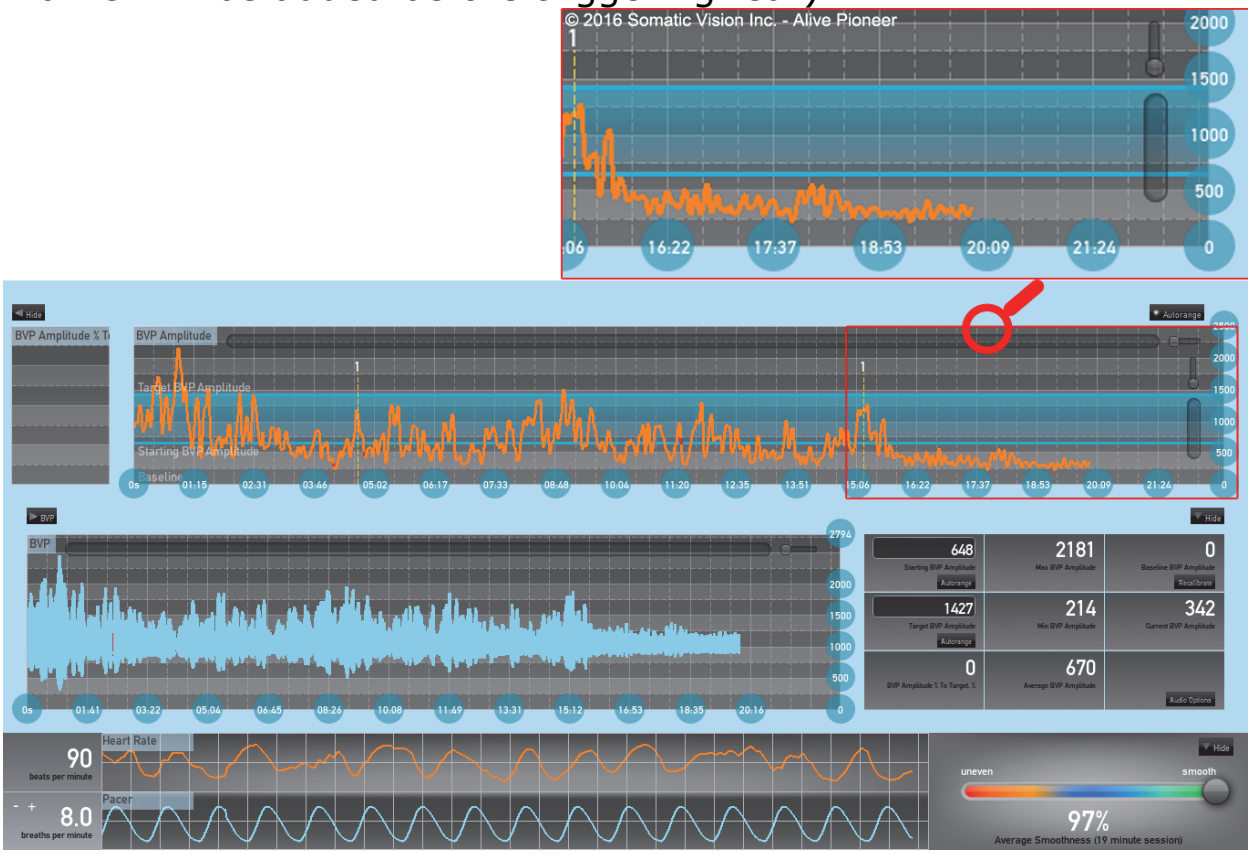
Possible Applications for BVP Amplitude Feedback

Often the constriction of peripheral blood vessels is related to old evolutionary defense mechanisms geared to protect our inner organs or prepare us to fight or flee.

Changes in BVP Amplitude can be slow or very rapid depending on the state of the client. Rapid changes may result from changes in arousal levels due to thoughts or emotions.

Longer BVP Amplitude recovery rates (low amplitude for a long time) may be an indication of being captured (stuck and absorbed) in an emotion or thought.

You can explore changes in blood flow as indicators of hyper-vigilance or deep relaxation. Fear may cause a sharp drop in BVP Amplitude as shown in the image below (the second comment marker 1 was added before triggering fear).



BVP Amplitude training can be used instead of finger temperature training when a finger temperature sensor is not available (such as in Alive).

Peripheral hand temperature serves as an indication of the level of autonomic arousal. A decrease in blood flow reaching the fingertips happens when there is sympathetic activation. So as you relax, your hands should warm and the BVP Amplitude should increase. BVP Amplitude changes more quickly than finger temperature, making it easier to see when stressful events start or detect when you begin to relax.

If you do hand warming using temperature feedback (with a different device) the process of warming the hands can be aided by also using BVP Amplitude training.

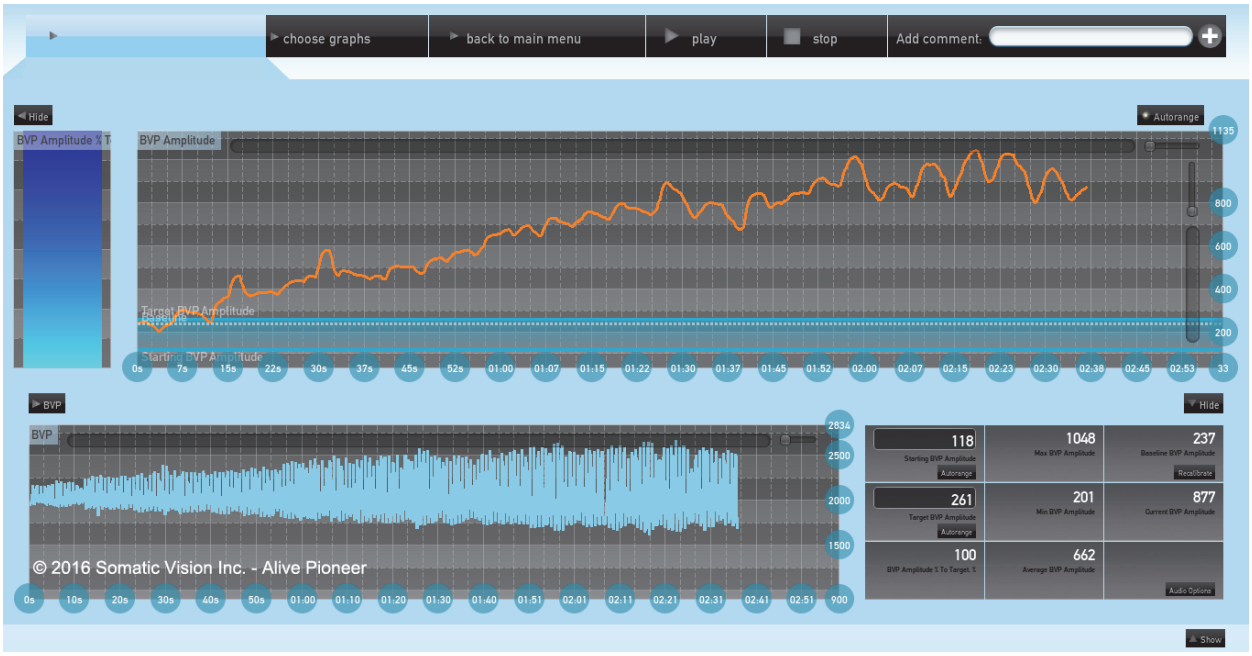
Learning to increase BVP Amplitude to improve circulation to the periphery and improve self-regulation may be done using the following steps (similar to traditional hand warming):

1. Begin by sitting comfortably on a chair and be sure that the room is comfortably warm. Find a safe environment and adopt an attitude of passive attention. Warming hands can't be done in an effortful manner. Let go. Relax your muscles.

2. Begin with three or four minutes of deep slow breathing, and let your muscles relax more and more. Then think back on your life remembering a very pleasant memory and imagine reliving that experience... Feel the warm sensations of your out-breath and focus on the warm sensation where the air leaves your body.

3. Bring your attention to your hands and allow more and more blood to move into them. Your hands are getting heavier and heavier... visualize your heart pumping more and more blood up your shoulders... down your arms...down the forearms and let this flow reach your fingertips... feel the pulsations...
Continue for a few more minutes and then review the changes in BVP Amplitude.

This image is a positive example of BVP Amplitude increasing over the course of the above exercise.

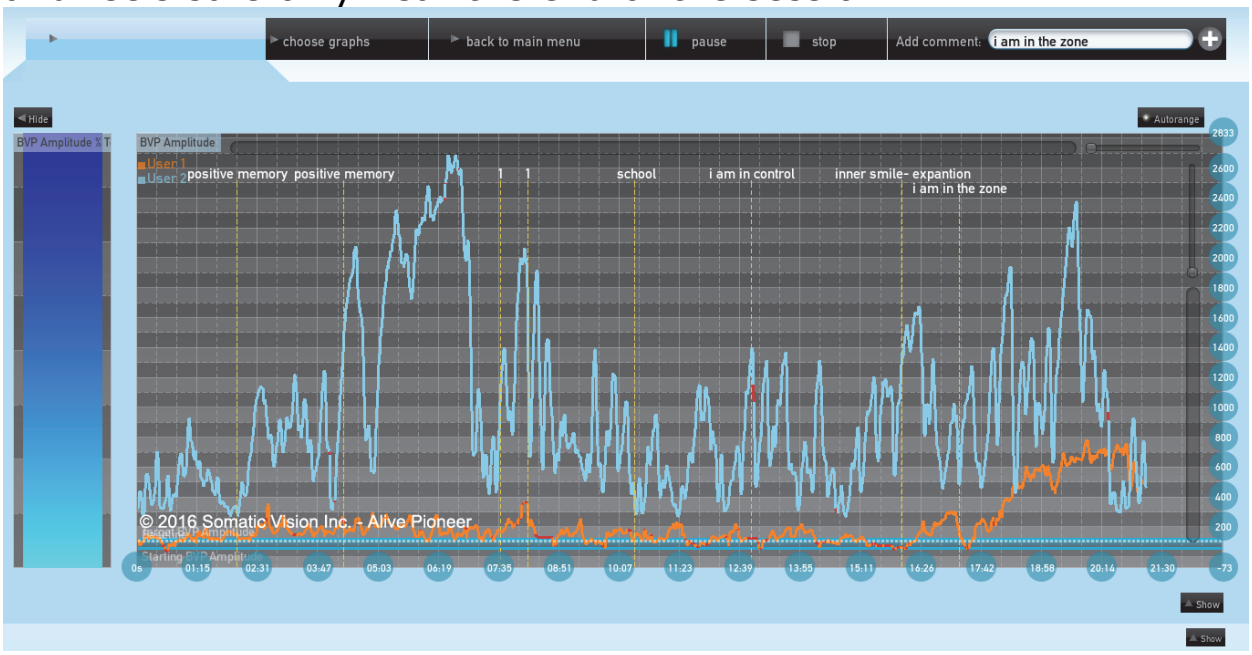


Since rapid changes in the BVP Amplitude may indicate an emotional response or a reaction to cognitive stimuli BVP monitoring is useful in psychotherapy.

This image shows the client's reaction to remembering a painful memory and expressing it aloud. Note the large drop in BVP Amplitude near the end of the session.

Using BVP Amplitude for dyadic (two user) biofeedback in therapy shows the interpersonal influences and may help the therapist "tune in" and be more empathic to the client.

In this example the therapist and client are both being measured during therapy. The therapist (higher blue line) relaxes as he listens to the patient's positive memory but the patient (lower orange line) is not emotionally engaged. He becomes engaged and feels safe only near the end of the session.



Allen, J.(2007) Photoplethysmography and its application in clinical physiological measurement *Physiol. Meas.* 281–39

Hlimonenko, I., Meigas, K., & Vahisalu, R. (2003). Waveform analysis of peripheral pulse wave detected in the fingertip with photoplethysmograph. *Meas. Sci. Rev., 3*(2), 49–52.

Peper, E., Harvey, R., Lin, I. M., Tylova, H., & Moss, D. (2007). Is there more to blood volume pulse than heart rate variability, respiratory sinus arrhythmia, and cardio-respiratory synchrony? Biofeedback, 35, 54–61.

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