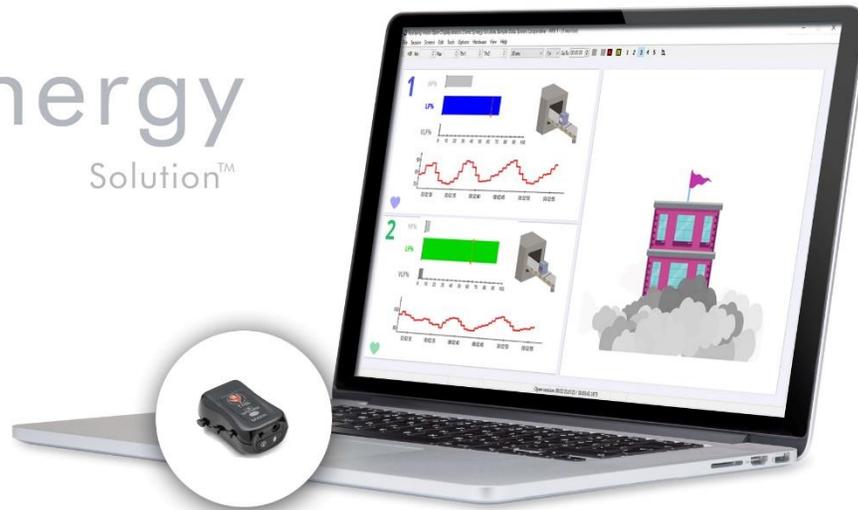


# Synergy Solution™



For use with  version 6.7 or later



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# Synergy Solution Reference Manual

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## Introduction

The Synergy Solution is a tool designed to measure and interpret your clients' stress markers in a group setting, as well as teach them stress management and resilience via biofeedback therapy. The goal of the Synergy Solution is to allow you, the therapist, to harness this approach even if you have had little or no prior experience with a stress measurement tool.

With this package, you will be able to:

- Monitor autonomic nervous system arousal levels related to group dynamics simultaneously.
- Teach self-regulation with biofeedback.
- Teach tension and anxiety reduction strategies with simple relaxation techniques.
- Employ the competitive and cooperative nature of group settings into the therapy, for greater engagement and entertainment.

The Synergy Solution works with two of Thought Technology's clinical grade physiological data acquisition device: the eVu-TPS finger sensors. The sensor measures arousal (skin conductance), temperature, and heart rate variability. Under specific conditions, the sensor can also extrapolate data on movement and breathing rhythms.

This manual provides an overview of the psychophysiological markers of stress that the TPS sensor measures, biofeedback and its relationship to stress management, and information about the hardware and software which are used with in the Synergy Solution.

**Note:** Before using the Synergy Solution, or the TPS, read the TPS Hardware Manual.

## About this manual

The manual is organized into chapters as follows.

**[First Time Run](#):** Explains how to start the BioGraph Infiniti software and verify its settings prior to using it for the first time.

**[Hardware Set-Up](#):** Provides general information about the sensor.

**[Using the Synergy Solution](#):** Describes biofeedback, explains the structural grouping of the modalities, and provides details about the Synergy Solution components, including screens and Quick Starts.

**[Hardware Specifications](#), [Warranty](#), [Technical Support and Contacts](#):** These sections provide specifications for the unit, and information about the warranty, contacting Thought Technology, and returning equipment for repair, if necessary.

## About the Synergy Solution

Biofeedback is a non-invasive therapeutic approach which has existed since the 1960s. It involves:

- Measuring physiological processes using specialized sensors.
- Showing a representation of the physiological change to the client.
- Helping the client understand the effects of thoughts and emotions on the physiology.
- Coaching the client to learn new mental strategies and optimize self-regulation responses.

The Synergy Solution packages a number of tools with which you can view, record and give feedback on the key physiological measures of arousal (also called skin conductance), peripheral temperature, and heart rate variability, which are directly associated with the stress response.

In the 1930s and 40s, Dr. Hans Selye (the father of stress) observed and documented the sequence of physiological changes which occur in a living organism when subjected to stress for long periods of time. Most people understand the perceived effects of stress on their own physiology, including increased heart rate, faster breathing, getting cold and clammy fingers, and having difficulty sleeping. The more insidious side effects of stress occur when a person is stressed for long periods without any time to recuperate. Although more evidence is required, there is a general understanding that prolonged exposure to stress can lead to anxiety, depression, heart disease, weight gain, and problems with memory, concentration, and performance (ref. AIS – American Institute of Stress).

Learning to properly manage one's stress is a key to living a happy, healthy, and productive life, and self-regulation with real time feedback is a very effective tool for teaching proper stress management skills to your clients. The Synergy Solution offers you an easy way to perform three tasks:

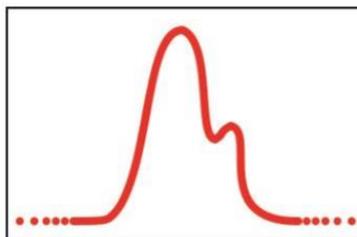
- Monitor your clients' stress response patterns related to group dynamics or couples' therapy.
- Teach your clients awareness and control of unconscious physiological processes by doing arousal, temperature, and/or heart rate variability biofeedback with entertaining themes of either:
  - Competition, where clients' self-regulation skills are ranked versus each other.
  - Cooperative, where client's self-regulation skills are teamed together for success.

### Physiological signals

One of the most important aspects of doing physiological monitoring and biofeedback is the ability to use your equipment correctly and understand what is happening when running a session and recording physiological data. If you are a novice at biofeedback, we recommend you spend some time learning about this technology. There are many books on the matter and workshops, organized by professional associations, where you can acquire the necessary knowledge:

- [www.aapb.org](http://www.aapb.org): Association for Applied Psychophysiology and Biofeedback.
- [www.bfe.org](http://www.bfe.org): Biofeedback Federation of Europe.
- [www.bcia.org](http://www.bcia.org): Biofeedback Certification Institute of America.

A physiological sensor is an electronic device designed to capture a specific body process, such as heart rate, breathing, sweating or finger temperature, and convert it to a measure that computer software can understand. Capture and conversion are done continuously, and produce a series of data points (or numbers). To help people understand what the data means, the software plots these numbers as a sequence of points on a graph. Because the sensor outputs many points per second, what we see is a line (signal) that moves up and down as it advances across a graph, moment by moment.



## A brief introduction to arousal (sweat response)

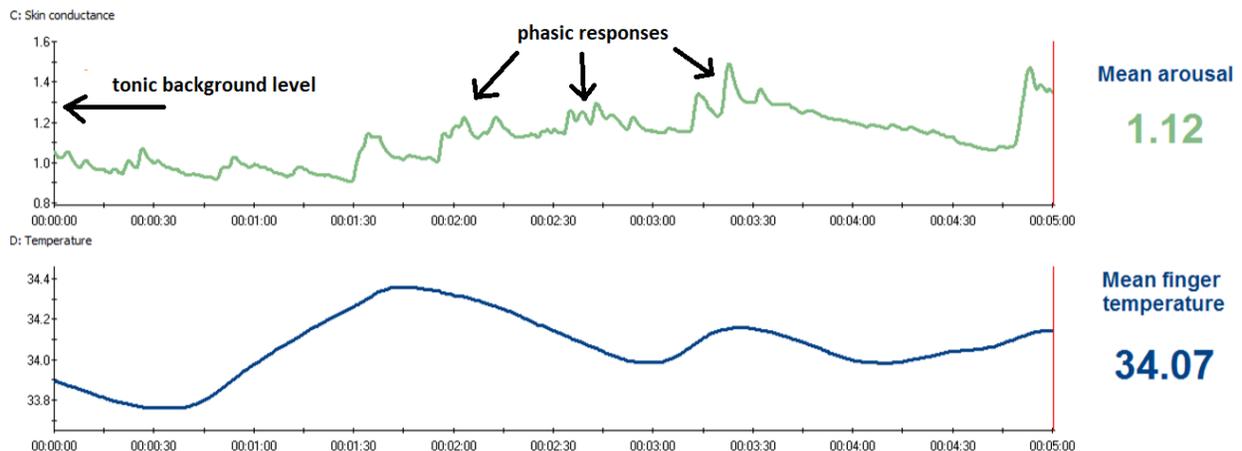
A sensor that measures arousal has two electrode pads which are touching the surface of the subject's skin and measure changes in sweatiness that are caused by increasing or decreasing stress levels (arousal). Skin conductance (SC) is measured in micro Siemens ( $\mu\text{S}$ ). Resting values are usually below 5  $\mu\text{S}$ . A stressed person can easily reach values of 10-20  $\mu\text{S}$  (***Biofeedback Mastery: An Experiential Teaching and Self-Training Manual***. Association for Applied Psychophysiology and Biofeedback. 2008-05-18. Peper et al. ISBN: 978-0984297900).

Two aspects of the arousal signal are of most interest: the tonic arousal, which is the point-by-point variation in  $\mu\text{S}$  values, and phasic changes (or responses), which is an arousal reaction to a stimulus. This reaction occurs each time the person feels a surge in emotion or change in interest, and appears as waves of varying amplitude along the arousal signal. The Synergy Solution provides a measure for both aspects. The value displayed for the tonic arousal is the mean (average) of all the arousal data points gathered over a period of time. The value displayed for the phasic changes (responses) is the number of amplitude surges counted over the same period of time.

## A brief introduction to finger temperature

A temperature sensor is sensitive to heat variations. It is attached to the fleshy part of a finger and picks up cooling down or warming up of the skin caused by decreases or increases in blood flow (vasoconstriction or vasodilation). Temperature is measured in degrees Celsius or Fahrenheit. Our body's core temperature is normally stable at 98.6 °F (37 °C). Temperature biofeedback is interested in peripheral temperature variations (i.e. from a finger or a toe) because they directly reflect increases and decreases in activation of the sympathetic nervous system.

Our peripheral body temperature is significantly lower than our core temperature. The fingers and toes of a person under stress can have a temperature as low as 18.3 °C, 65 °F (***Biofeedback Mastery: An Experiential Teaching and Self-Training Manual***. Association for Applied Psychophysiology and Biofeedback. 2008-05-18. Peper et al). The Synergy Solution shows a measure of temperature which is either point-by-point (signal) or a mean (average) of all the temperature data points gathered over a period of time.

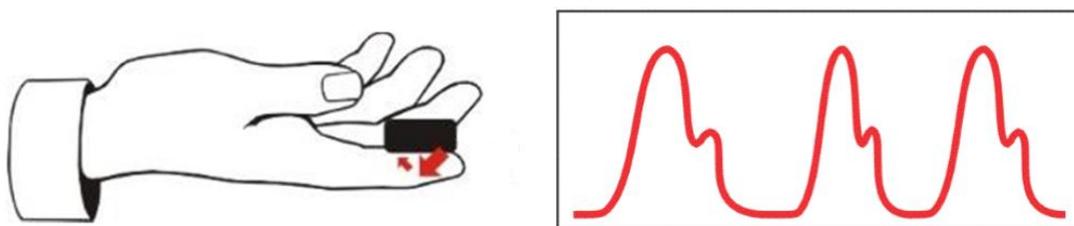


Whether you are recording an assessment or running a biofeedback session, you will be looking for changes in the signal's direction (going up or down), amplitude (in units of measure) and frequency (number of responses) to gather your clinical information.

## A brief introduction to heart rate variability (HRV)

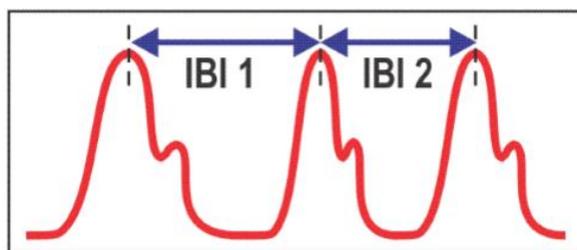
Heart rate variability biofeedback is a relatively new technique which monitors changes in the timing between heartbeats. Contrary to most people's intuition, a healthy heart doesn't beat regularly as clockwork. There are many physiological factors which influence the timing of heart beats, including respiration, blood pressure changes and the interplay between the sympathetic and parasympathetic nervous systems. HRV is an important physiological measure, because the loss of variability can be an indicator of serious cardiovascular health problems. The main objective of HRV biofeedback, therefore, is to exercise the cardiovascular system and try to maximize heart rate variability. How is this accomplished? Primarily by learning to breathe better. Because it involves dynamic relationships between multiple physiological processes, HRV can become very complicated to assess and understand. The Synergy Solution simplifies results down to key values that are easiest to comprehend.

A finger pulse sensor (also called blood volume pulse or BVP) is a little box that is strapped around the finger. The sensor has two little windows on one side. One of them has an LED (light emitting diode) shining infrared (IR) light through the finger's skin and the other has an infrared sensor detecting the amount of IR light that is reflected from the finger.



The amount of IR light that is reflected from the finger varies, depending on the amount of blood flowing through the flesh. Each time the heart contracts, a rush of blood is pushed through the body. When that wave reaches the finger, more IR light is reflected. As the rush of blood ebbs, the amount of IR light diminishes. This creates a characteristic wave pattern which goes up and down at each pulse, as shown in the illustration below.

The software automatically monitors these changes in blood flow to gather useful data: after the software detects the first wave of blood (a heart beat), it measures how much time passes until the next wave arrives. As soon a second beat is detected, it can calculate the time between the two beats, which is the interbeat interval (IBI, in milliseconds). It continues this process, collecting successive interbeat intervals (IBI 1, IBI 2, IBI 3, etc).



From those interbeat intervals, the software measures a client's heart rate (beats/min) and the variability of the heart as it speeds up and slows down.

One derived metric of heart rate variability is the frequency power (level of activity). The power of the heart's variability can be broken down into the groups: Very Low Frequency (VLF), Low Frequency (LF), and High Frequency (HF). There is a lot of discussion going on about how to interpret VLF, LF and HF, which this manual does not have the time to discuss. Very generally, all three are influenced by various aspects of autonomic nervous system function. VLF reflects activity of the slower sympathetic processes (thermoregulatory, renin-angiotensin). LF is generally seen to be influenced by both sympathetic and parasympathetic activity while HF tends to be influenced mostly by the parasympathetic nervous system.

This is, however, is an oversimplified breakdown. The underlying physiology is more complex, since all components of the autonomic nervous system are constantly active in regulating homeostasis. What changes is only the relative dominance of one system over the other. When doing HRV biofeedback, higher LF % power values represent greater variability, a more balanced autonomic nervous system, and a body that is more resilient to stress.

## **A brief introduction to respiration**

Beyond our body's obvious need to take in oxygen and release carbon dioxide, breathing also serves a key role in our nervous system's responses to stress. Interestingly enough, poor breathing or over-breathing is a contributor to many chronic conditions exacerbated by stress, including hypertension, headaches, panic disorder, and chronic pain to name a few (***The Clinical Handbook of Biofeedback. A Step-by-Step Guide for Training and Practice with Mindfulness.*** Wiley-Blackwell. 2013. Inna Z. Khazan. ISBN: 978-1-11999371-1). Learning proper diaphragmatic breathing can however decrease the symptoms and greatly improve an individual's well-being.

Although there are several ways of measuring respiration, an indirect method that the Synergy Solution uses is how the previously mentioned physiological measures are affected. Good breathing is the first stepping stone for good self-regulation.

## **Performing biofeedback**

Whereas physiological monitoring involves simply observing the physiological changes happening in your client during a specific intervention, biofeedback uses audio and visual cues to give information (feedback) about the direction of change of a given signal and whether or not it is in the desired state.

Most commonly, the clinician sets a threshold or a threshold is pre-set, which represents a clinical goal, and asks the client to make the signal in a line or bar graph (which represents the particular signal being monitored) move up or down and cross over or under the threshold in order to trigger the feedback. The client then tries various physical or mental strategies (coached by the clinician) until they notice a reaction in the signal. They then learn to adjust his strategy (posture, thoughts, visualization, affirmations, etc) until the signal starts changing in the desired direction. If he reaches the goal, the audio or visual "reward" acts as positive reinforcement, which helps him learn to accomplish this particular task.

It is important to understand that, as a clinical intervention, biofeedback doesn't affect a client permanently. Rather, it provides instantaneous self-knowledge which the client can use to learn a particular skill. As with any learning process, becoming proficient with self-regulation requires practice. Many practitioners suggest individual sessions of about 15-20 minutes each, frequent enough to allow retention between sessions, or at least twice a week.

The Synergy Solution includes a series of self-regulation session which you will use to train your clients to learn control over their arousal level, relaxation level (via peripheral temperature training), and calm breathing (via heart rate variability). The added benefit of running the sessions with 2 clients simultaneously allows for the addition of entertainment through competitive or cooperative training.

## First Time Run

### Starting the program

To start the program, double-click on the BioGraph Infiniti icon on the Desktop.

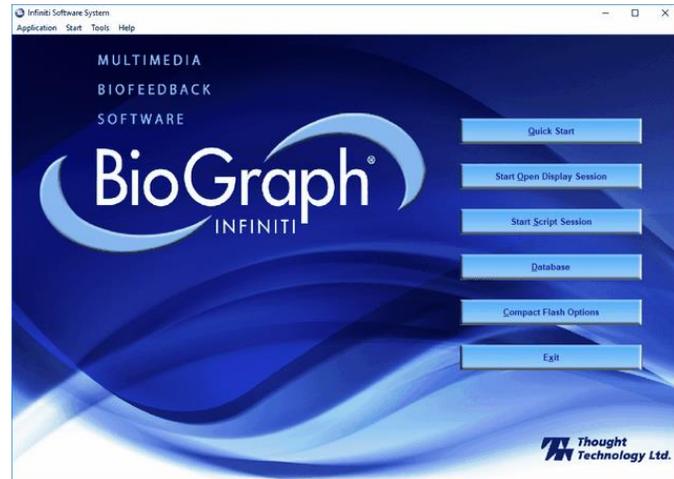
The program always starts by showing the Main Menu screen.



From here you can record sessions, replay or review recorded sessions, maintain session and client information,

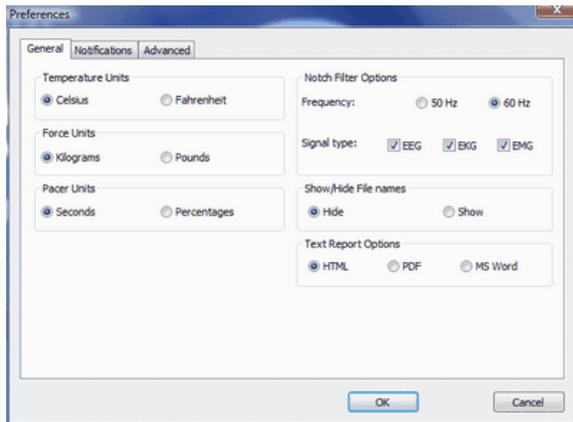
You can also set global settings that affect the performance of BioGraph Infiniti.

It takes only a few minutes to configure your system. This manual only discusses settings that are relevant to the Synergy Solution and the TPS sensor.



### Setting preferences

To manage global settings for your BioGraph Infiniti system, select **Preferences** from the **Tools** menu in the Main Menu Screen.



In the **General** tab you can select values for the following global settings. These settings affect all channel sets.

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**Note:** *Global settings remain in effect unless you change them.*

---

### Temperature Units

Check to make sure that your desired temperature unit is selected: **Celsius** or **Fahrenheit**. The default value for this setting is determined from your computer's Regional Settings at the time BioGraph Infiniti is run for the first time. If necessary, you can modify them; they are not automatically reset.

## Text report options

You can generate text reports in one of three different formats, **HTML**, **PDF**, or **Microsoft Word**. Select your preferred format here.

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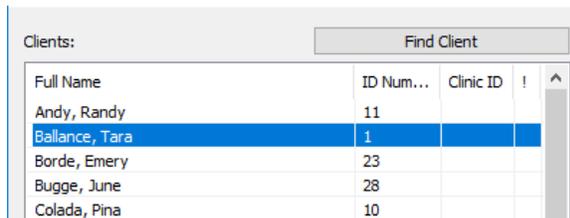
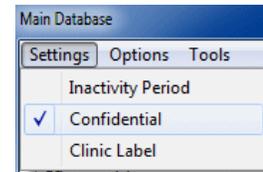
**Note:** *Microsoft Word, a PDF reader, and a web browser **must** be installed on your system for these functions to work. You print and save text reports using the **Print** and **Save** functions of the appropriate software.*

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## Confidential setting

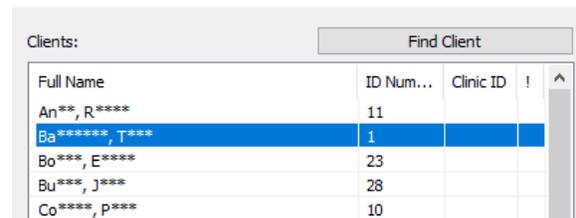
Optionally, enable the **Confidential** setting. This helps protect the privacy of your clients by masking their names in the client database.

- Click **Database** to open the Main Database window.
- From the **Settings** menu, select **Confidential**. The check mark indicates that the setting is enabled.
- If you need to disable the **Confidential** setting, repeat these steps to remove the check mark.

A screenshot of the 'Main Database' window showing a list of clients. The 'Full Name' column contains the actual names of the clients.

Full Name	ID Num...	Clinic ID	!	^
Andy, Randy	11			
Balance, Tara	1			
Borde, Emery	23			
Bugge, June	28			
Colada, Pina	10			

**With the Confidential setting disabled**

A screenshot of the 'Main Database' window showing a list of clients. The 'Full Name' column contains masked names with asterisks.

Full Name	ID Num...	Clinic ID	!	^
An**, R*****	11			
Ba*****, T***	1			
Bo***, E*****	23			
Bu***, J****	28			
Co*****, p****	10			

**With the Confidential setting enabled**

## Hardware Setup

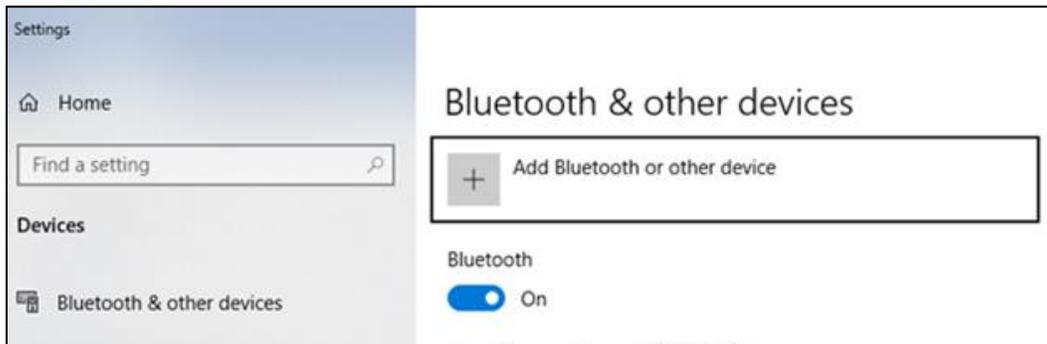
This section of the manual describes briefly how to connect the TPS sensor with your computer, and how to apply the sensor to the client. Since the Synergy Solution makes use of 2 TPS sensors, each sensor must be separately connected to the computer.

### Linking the TPS to your computer via Bluetooth

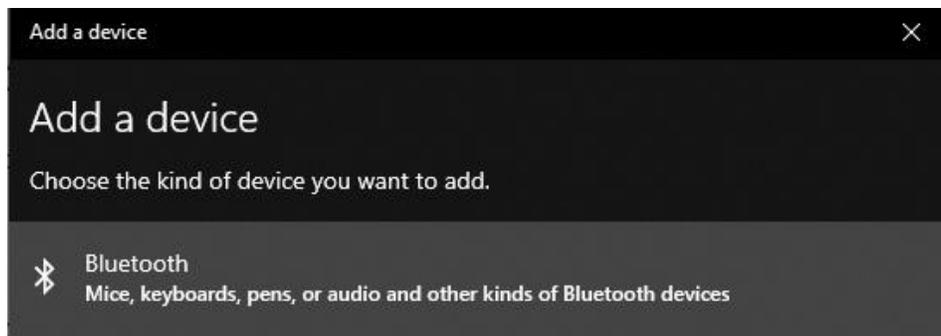
The TPS sensor is a Bluetooth-enabled device, which follows the same connection procedure as most other Bluetooth-enabled devices. If your computer does not support Bluetooth, a Bluetooth adapter must be purchased to provide your computer with this capability.

The below procedure will guide you through connecting the TPS to your computer via Bluetooth. Following the first connection, the TPS sensor will automatically re-link with the computer for all subsequent sessions. There is no need to repeat this procedure before each session on the same PC. Please take note that different computers may have slightly different Bluetooth-enabling procedures.

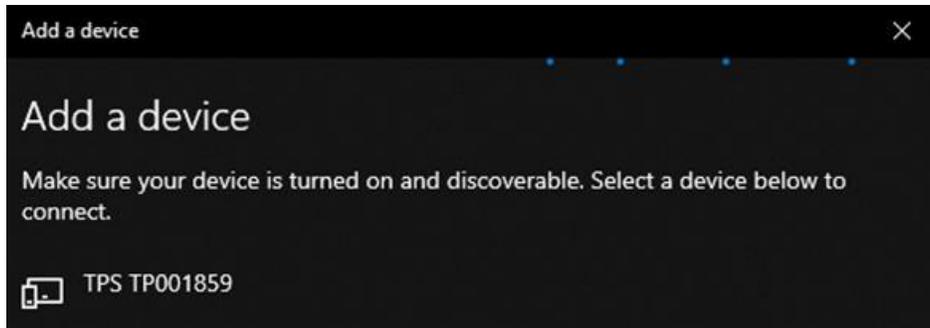
1. Turn on your TPS sensor. Once it is on, hold the power button down for 2-3 seconds until the blue light turns off, then turns back on and the blue light is flashing. The sensor will now be in Bluetooth pairing mode.
2. Go to your computer's **Start** menu, and select **Settings**. From the Settings window that will appear, select **Bluetooth & other devices**.



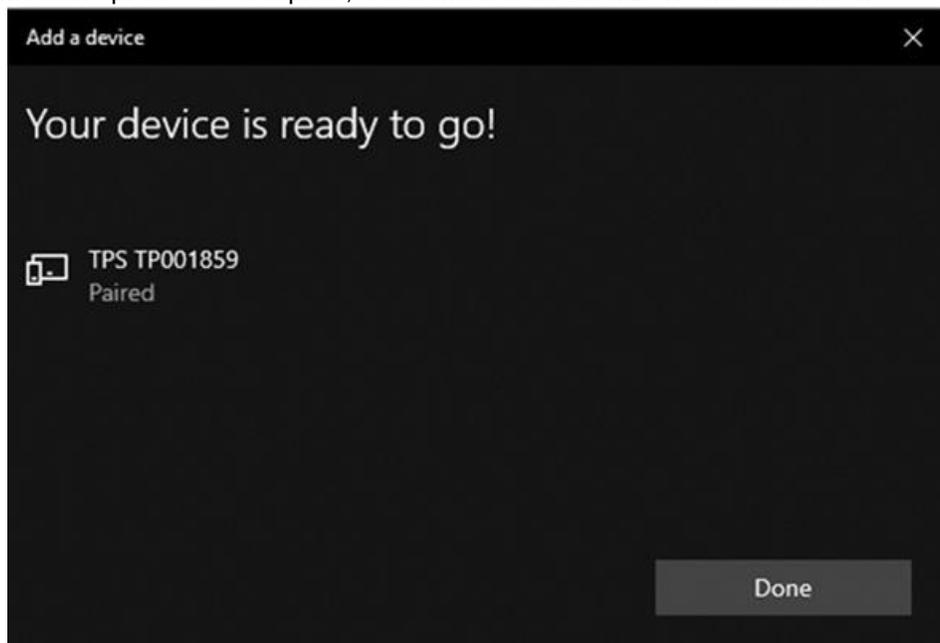
3. Click on **Add Bluetooth or other device**.
4. From the Add a device window, select the **Bluetooth: Mice, Keyboards, pens, or audio and other kinds of Bluetooth devices** heading.



5. Locate your TPS sensor in the list. In the below example, the located sensor is identified as **TPS TP001859**.



6. Select the TPS. The system will take a moment to connect to the device. The device will be listed as **Paired** when the process is complete, as shown below. Click **Done** when finished.



## TPS Sensor placement

Proper placement of the TPS sensor on the client's finger will ensure high-quality data collection.

1. Attach the TPS fabric strap to the TPS sensor by slipping the two loops at the one end of the strap onto the two outer hooks of the TPS sensor.



2. Place the TPS sensor on your finger so that the sensor label faces up and the ON button points toward your hand.

It does not matter upon which finger the sensor is placed, although wider fingers are better than skinnier fingers.



3. The sensor should be placed at the end of your finger. The two metal plates on the underside of the sensor rest against your skin as shown.



4. Secure the TPS sensor to your finger by wrapping the fabric strap around your finger and back over the TPS sensor. The fabric strap is perforated with loops. Slip an appropriately positioned loop onto the central hook of the sensor.

Do not choose a loop that holds the sensor too tight to your finger, such that it hurts. Similarly, do not choose a loop that holds the sensor too loosely to your finger, to prevent it from shifting position or falling off.

When properly fastened, the fabric strap covers the TPS sensor logo, but the sensor light remains visible when the sensor is turned on.



We advise to apply the sensor at least 2-3 minutes before recording a session. This is due to the temperature sensing component, which requires that time to “warm up” to the client’s current temperature.

## Entering key codes

The first time you start to record a session with Synergy Solution, the software will check for the key codes and ask you to enter them. You will also be asked to enter key codes if you have uninstalled and reinstalled the software, or if this is the first time you are using your TPS sensor with your existing installation. These key codes will have been provided on a form with your order.

The Synergy Solution is unique in how it requires the separate registration of each TPS sensor in use, and that one of the TPS sensors will be considered the primary sensor that requires both an encoder key code and an application. All other TPS sensors will only request an encoder key code.

1. Turn on the TPS sensors. (See [Sensor configuration](#), starting on page 8.)
2. Click **Quick Start**, select a name from the **Clients** list and a protocol from the **Favorites** list, and then click **OK** to open the **Encoder Key Codes** dialog box.
3. Click to highlight the primary TPS unit's serial number in the left table (in this example, TP002381; this is the same number as on the unit). The primary TPS unit is the one that has both an encoder key code and application key code provided to you.

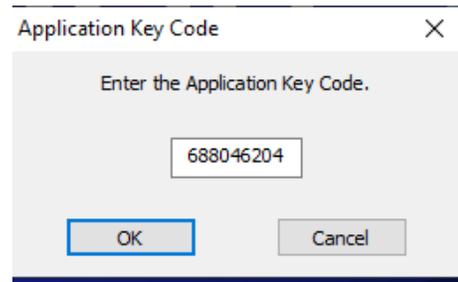
Encoder Input	Description	Sensor Type
1A	TPS-BVP - 1A	HR/BVP-Pro/Flex
1B	TPS-SC - 1B	SC-Pro/Flex
1C	TPS-Temp - 1C	Temp-Pro/Flex
1D	TPS-XYZ - 1D	TPS-XYZ
2A	TPS-BVP - 2A	HR/BVP-Pro/Flex
2B	TPS-SC - 2B	SC-Pro/Flex
2C	TPS-Temp - 2C	Temp-Pro/Flex
2D	TPS-XYZ - 2D	TPS-XYZ



In the above example, the serial number the system would request would be for TP002381

4. Enter the **Encoder Key Code** (provided to you on a form) in the **Key Code** text box.
5. Click  to move the serial number from the left table to the right table. The serial number should now appear in the **Configuration Table**.
6. Repeat steps 3 to 5 for all other TPS sensors.
7. When done, click **OK**.

8. Now the **Application Key Code** dialog box opens.
9. Enter the **Application Key Code** for the primary TPS sensor
10. When done, click **OK**.



If the key codes have been entered properly and there is no problem with your TPS sensor setup, the recording screen will open.

If you cannot locate the Encoder or Application key codes, contact Thought Technology or your local dealer.

Please note that all recording sessions will require the use of the primary TPS sensor. If you own more than two TPS sensors, one of the sensors uses with the Synergy Solution requires to be the primary TPS sensor otherwise the application will not continue.

## Software Help Function

The Synergy Manual is written to provide you with all the necessary information for getting the most out of this program. Some features of the software platform, BioGraph Infinity, are not explained in the manual due to them being outside of the scope of design. If you wish to explore these other features, the on-line help and the **Getting Started** manual contain detailed information.

To open the on-line help, press the F1 function key, on your keyboard, from any dialog box in the program. Because the on-line help manual is designed to provide contextual information, it will automatically open at the section that discusses the dialog box from which the help was called.



The **Getting Started** manual is found in the same location as this manual.

As an additional option for help with the software when running a session, and you want to know more about the chosen screen, go to the **Screen** menu and select **Screen Info**. A document will appear outlining the use of the screen.

## Synergy Solution Overview of Sessions

The Synergy Solution offers three session choices for the group recording, as well as a report of how the clients fared in relation to each other. Each session, and the available displays screens included in that session, are designed to focus on particular aspect(s) of the physiological markers of stress or self-regulation. This section of the manual will briefly outline each available session, before going into further detail about each individual screen available in a session.

The three choices of sessions are as follows:

- **Group Dynamics & Monitoring** consists of 5 screens observing changes in physiology of the clients. It is intended to be as numerically informative as possible, with line graphs and trends. This session is best for the therapist that wants to observe stress reactions, and provide their own interpretation and feedback to the participants. Uses of this include be simple data monitoring, observing group dynamics related to couples/group therapy, and research.
- **Biofeedback Cooperative** consists of 5 screens that encourage self-regulation through feedback. All the clients must achieve their individual feedback goals in order for the group to receive the positive feedback reward. This session exemplifies group training by encourages success as a group.
- **Biofeedback Competitive** consists of 4 screens that encourage self-regulation through feedback. All the clients are competing to achieve their individual feedback goals and rewards. This session exemplifies group training through competitiveness.

As stated earlier, each session consists of multiple recording screens. Each screen will focus on different set of physiological signals: arousal, temperature, and/or heart rate variability. The utility of these physiological signals can be generally divided as the following:

- **Arousal** related to stress awareness, relaxation, and thought control.
- **Heart Rate Variability** relates to breath control, encouraging cardiovascular health and a balance autonomic nervous system. This session choice also includes the use of the sensor for indirectly measuring breathing.
- **Temperature** relates to hand warming, deep relaxation, and recovery.

### *General concepts to keep in mind*

These sessions are designed to minimize clinician intervention by being pre-set to do many things automatically. As you record sessions with your clients, you should notice these features and, if necessary, explain what is happening so that they do not cause your clients distress or disturb the training session.

- *Clients as “Players” or “Users” with color coding:* when recording data from multiple individuals, the sheer amount of information can easily lead to confusion. Each client, or as we refer to them in the software “player” or “user”, will have a separate section of the computer monitor devoted to their data. This design effort is intentional, in order to minimize confusion. Similarly, each player is intentional marked by a specific recurring color coding:  
*Player 1 → Blue      Player 2 → Green*
- *Automatic scaling:* as a signal is plotted along a line graph, it moves up and down as the client is responding to your coaching and changes in his thoughts and emotions. If the signal reaches the top or the bottom of the graph, the software automatically scrolls the scale (vertical axis) up or down by a few units to keep the signal into view. Each time this happens, your clients may notice that the signal jumps a bit on the screen.
- *Automatic threshold:* You will see bar graphs that contain orange horizontal lines – these are thresholds that set the goal for when a value is considered good or bad. For example, the threshold on a temperature bar graph decides when the temperature is too low (below the

threshold) or when it's good (above the threshold). This ensures that feedback is given immediately when that goal is crossed.

There are many thresholds that will not be visible, because the software is pre-programmed with goals in mind. When in doubt: if you can see the orange horizontal threshold line, then you can change it. If you cannot see the threshold, then it's automatically set.

- **Music and animated feedback:** Different displays screens include different forms of feedback. Visual feedback can be a color change in a line graph, or the activation of an animation, or a video picture growing in size. Sound feedback can be music that turns on, or music that gets louder, or tones that slowly rise or fall. These sources of feedback are always connected to threshold goal, as a way to denote when a good value is achieved. Each screen contains embedded instructions to explain what will occur with the feedback. You also have the option to add you own music or videos, if you do not like the pre-selection or want to add further variety.

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**Note:** Sound feedback can be muted either by using the Mute function on your PC, or by opening the Options menu item on the Tool Bar and clicking on Sound to remove the check mark.

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- **Breathing pacer:** A few display screens makes use of a pacer for guiding breathing. The pacer is set to mimic a specific respiration rate, which the clients can follow with their own breathing. As the breath pacer's circle rises, the client should inhale. As the breath pacer's circle falls, the client should exhale.

Pacer Rate: 6.000



The pacer is an excellent tool for a new client learning the basics of diaphragmatic breathing. The pacer also allows for the shaping of breathing, since the rate it is representing can be modified by right-clicking on the instrument (before recording or during a session pause) and selecting **Edit Pacer Settings**. In the prompt that appears, change the **Target Rate** in order to alter the respiration rate speed that the pacer imitates.

- **Switching between displays:** each session is associated with a group of display screens, where self-regulation training can be conducted from any one of them. To switch from one screen to another, place the cursor over the desired screen number in the Tool Bar and click the left mouse button. Switching can be done at any time before or during recording.
- **Start / Stop / Session Duration:** Click the **Start** button to begin the recording session. Unlike other session types, the recording will continue until you press the **Stop** button. The session can last for as long or as short as you desire, although most sessions last from 10 – 30 minutes, with several Stops and Starts throughout. You can also click the **Pause** button to pause the session.



As you explore each session, you may find that certain displays work better for your therapeutic approach, or that your client responds preferentially to certain forms of feedback.

The procedure for initiating a session is as follows:

1. Turn on the TPS sensors. (See [Sensor configuration](#), starting on page 8.)
2. Place the sensors on the clients. (See [Sensor placement](#), starting on page 9.)
3. Click **Quick Start**.

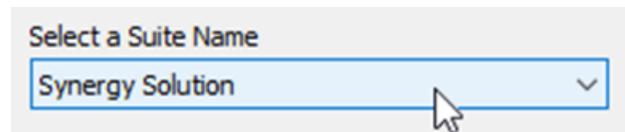


4. From **Clients**, select a name.

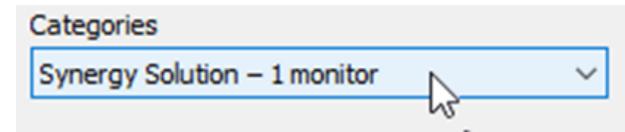
Clients:

Full Name	ID Number	Clinic ID
Shores, Lajolla	1	
Wood, Chuck	2	
Prince, Albert	3	

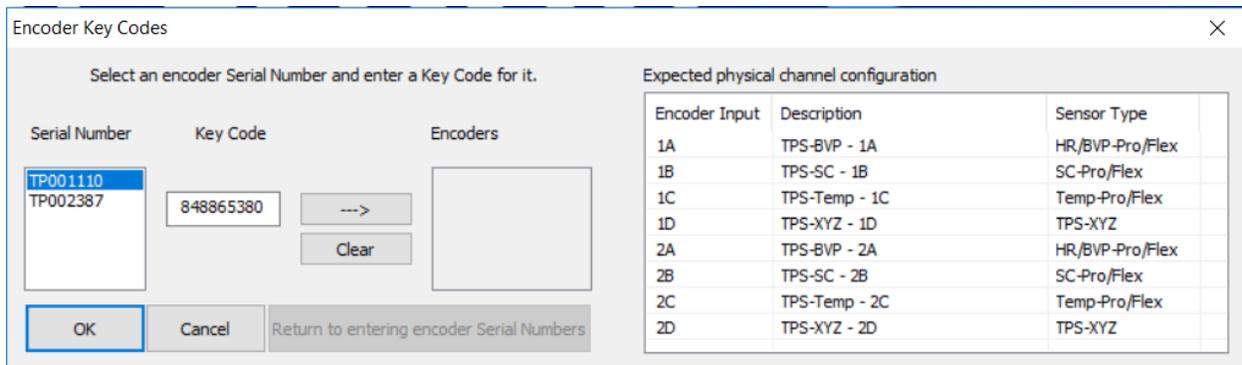
5. In the **Select a Suite Name** dropdown, select **Synergy Solution**.



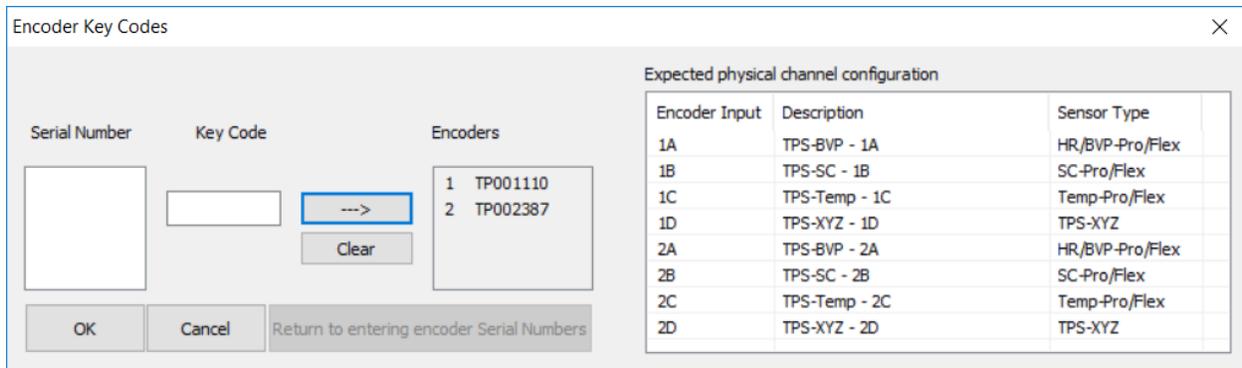
6. From **Categories** dropdown, select the **Synergy Solution - 1 monitor**.



7. Choose your desired session, and then click **OK**. This manual will describe each session, with all its training screens, in order. Since each session can be selected in a single monitor or dual-monitor format, we will describe the single monitor editions first.
8. After the software has connected to all the TPS sensors, a new window will appear for deciding the player order.



Select the order of the TPS sensors by choosing their appropriate serial number for the left-hand list, and click the -> button. The first TPS sensor that is selected should be the primary sensor. The client that uses this sensor will be Player 1, and the second TPS will be for Player 2.



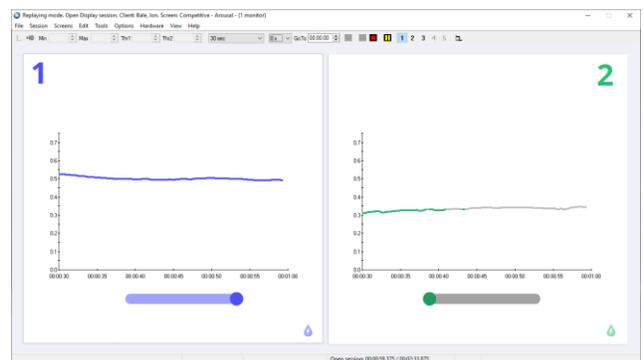
In the above example, Player 1 will be the user with TPS serial number TP00110. Player 2 will be the user with TPS serial number TP002387.

### ***Session: Biofeedback Competitive (2 Users / 2 TPS)***

#### ***Competitive – Arousal – (1 monitor)***

This screen is for training arousal in a competitive setting. It is for single monitor use.

Each player's section is dominated by their arousal line graph and feedback bar. The signal in the graph changes colors based on whether arousal is increasing (grey) or decreasing (player-specific color: blue for player 1; green for player 2). When a player's arousal is continuously decreasing or unchanging after having just decreased, a unique song will be heard loudly. When a player's arousal is increasing, the song will be play very softly. Each player has a unique song.



The horizontal feedback bar marks how long each player needs to maintain their decreased arousal in order to have their feedback song play loudly. The bar resets when the player's arousal increases. When reset, the bar is colored grey. When turned on, the bar is the player-specific color.

Use this screen to:

- Explore which thoughts and relaxation strategies cause the players' arousal to rise and fall.
- See which player can calm their arousal most consistently.

Each player wants to:

- Maintain a decreasing arousal or arousal that remains consistent after having decreased.
- See their respectively line graph and feedback bar turn to their respective color (Player 1 = blue; Player 2 = green)
- Hear their own feedback song play (both songs can also play simultaneously)

### Competitive – HRV 1 – (1 monitor)

This screen is for training heart rate variability in a competitive setting. It is for single monitor use.

Each player's section is dominated by heart rate variability data and a feedback animation. In terms of heart rate variability data, each player has a red line graph for monitoring heart rate (beats/min), and vertical bar graphs for the spectral frequency percent of power data.



The HRV spectral frequency graphs are color coded for the three rhythms of activity: Very Low Frequency (VLF; dark grey), Low Frequency (LF; black or the player-specific color), and High Frequency (HF; light grey). The Low Frequency graph also contains a feedback threshold that controls the player's feedback animation. This threshold is manually set.

When a player's LF bar rises above the bar graph threshold, the LF signal will change colors and the player's feedback animation will activate. The feedback reward is an avatar moving through a series of mazes. Each player also has a unique feedback song that will play louder when their LF signal rises above the threshold.

Use this screen to:

- Teach and encourage sustained slow, relaxed breathing that leads to the Low Frequency (LF) value to rise above its threshold. A greater LF value means greater heart rate variability.
- See which player can increase the HRV as high as possible and as consistently as possible.

Each player wants to:

- Raise their individual LF signal to rise above their bar graph's threshold, in order to get their avatar to move through their maze
- Completing more mazes than the other player.
- Hear their own feedback song play.

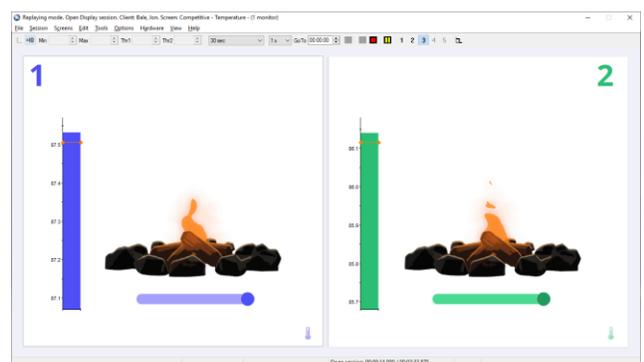
The thresholds of the LF bar graphs can be moved by clicking and dragging them to new levels. Setting the threshold to lower values makes the task easier for the players. Setting them to higher values makes the task more difficult.

*Note: 64-seconds need to pass before the HRV data and feedback begins.*

### Competitive – Temperature – (1 monitor)

This screen is for training temperature in a competitive setting. It is for single monitor use.

Each player's section is dominated by their temperature bar graph, feedback bar, and feedback flame. The bar graph signal changes colors based on whether temperature is increasing (player-specific color: blue for player 1; green for player 2) or decreasing (grey).



When a player's temperature is continuously increasing or unchanging after having just increased, a unique song will be heard loudly and the player's feedback flame will grow. When a player's temperature is decreasing, the song will be play very softly and the flame will shrink.

The horizontal feedback bar marks how long each player needs to maintain their increasing temperature in order to have their feedback song played louder and grow their flame. The bar resets when the player's temperature decreases significantly. When reset, the bar is colored grey. When turned on, the bar is the player-specific color.

Use this screen to:

- Explore which imagery and thoughts enable deep relaxation, leading to warming of the finger temperature.
- Which player is best able to consistent increase their finger temperature.

Each player wants to:

- Increase their finger temperature or maintain their temperature after it has increased.
- See their respective flame grow, and see their bar graph/feedback bar turn to their respective color and remain as large as possible. Feedback bar (Player 1 = blue; Player 2 = green).
- Hear their own feedback song play (both songs can also play simultaneously)

The feedback of the temperature bar graph is based on a threshold that is automatically moving to track change. It is possible to change the threshold to remain at a fixed value, or allow it to be manually move it on-the-fly. To set it to manual mode:

- Before clicking the Start Session button to record data, right-click on the bar graph and select **Edit Instrument Settings**.
- In the new window, change the threshold mode from **Lagged** to **Manual**. It may be necessary to set the initial starting threshold value as well. Click **OK** to return to the recording window. Repeat this for each graph.
- To toggle back to an automatic-moving threshold, reselect the **Lagged** threshold mode and include a **Lag Value** of 5.

Note: when in manual threshold mode, it may be necessary to change the Max/Min scale values of the bar graphs. Do so by left-clicking on the graph and then changing the **Max** and **Min** values in the appropriate boxes at the upper-left of the window.

### Monitoring – all signals (1 monitor)

Each player's section contains the following line graphs (from top to bottom): arousal, temperature, finger pulse, and heart rate (beats/min). Moment-to-moment numerical displays are adjacent to their respective line graphs.



Use this screen to:

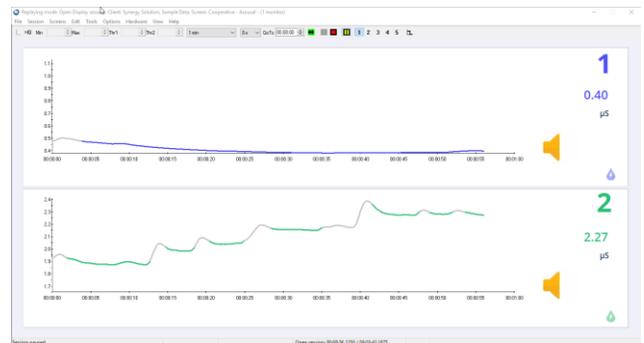
- Verify signal quality, to make sure the TPS sensors are correctly applied to each user.
- Monitor data when recording or training with clients, where no additional feedback is required beyond line graphs and statements from the therapist.

### Session: Biofeedback Cooperative (2 Users / 2 TPS)

#### Cooperative – Arousal – (1 monitor)

This screen is for training arousal in a cooperative setting. It is for single monitor use.

The majority of the screen is taken up by arousal line graphs; one for each player. The signal in the graph changes colors based on whether arousal is increasing (grey) or decreasing (player-specific color: blue for player 1; green for player 2).



When a player's arousal is continuously decreasing or unchanging after having just decreased, a unique song will be heard loudly. When a player's arousal is increasing, the song will be played very softly. Each player has a unique song and the goal is for both songs to play simultaneously.

Use this screen to:

- Explore which thoughts and relaxation strategies cause the players' arousal to rise and fall.
- Encourage both players to calm their arousal.

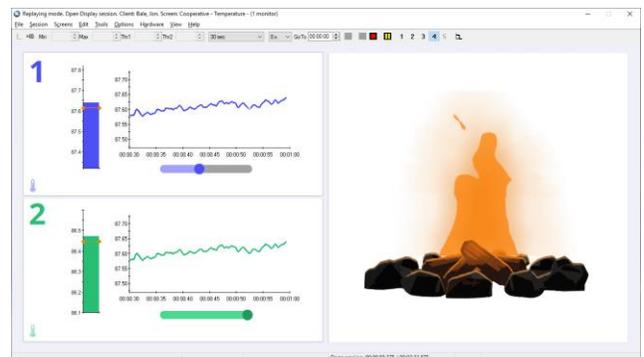
Each player wants to:

- Maintain a decreasing arousal or arousal that remains consistent after having decreased.
- See their respective line graph turn to their respective color (Player 1 = blue; Player 2 = green)
- Hear their both songs play simultaneously.

#### Cooperative – Temperature – (1 monitor)

This screen is for training temperature in a cooperative setting. It is for single monitor use.

Each player's section contains a temperature bar graph, line graph, and feedback bar. The bar graph and line graph signals change colors based on whether temperature is increasing (player-specific color: blue for player 1; green for player 2) or decreasing (grey).



The horizontal feedback bar marks how long each player needs to maintain their increasing temperature in order to hear their feedback song. The bar resets when the player's temperature decreases significantly. When reset, the bar is colored grey. When turned on, the bar is the player-specific color.

Unless the feedback bar is fully colored, the respective player's song will be played only softly.

The feedback flame, taking up half of the screen space, will grow when both players can effectively maintain an increase in temperature. The flame grows when both feedback bars are fully colored. If one feedback bar is partially grey, the flame will shrink.

Use this screen to:

- Explore which imagery and thoughts enable deep relaxation, leading to warming of the finger temperature.
- Encourage both players to increase their finger temperature to the highest and most consistent value.

Each player wants to:

- Increase their finger temperature or maintain their temperature after it has increased.
- See their respective bar graph/feedback bar turn to their respective color (Player 1 = blue; Player 2 = green).
- Hear their own feedback song play, but hear both songs played complimentary together.
- Grown the flame together.

The feedback of the temperature bar graph is based on a threshold that is automatically moving to track change. It is possible to change the threshold to remain at a fixed value, or allow it to be manually move it on-the-fly. To set it to manual mode:

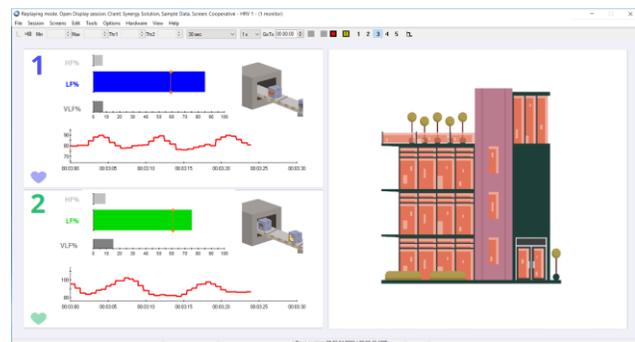
- Before clicking the Start Session button to record data, right-click on the bar graph and select **Edit Instrument Settings**.
- In the new window, change the threshold mode from **Lagged** to **Manual**. It may be necessary to set the initial starting threshold value as well. Click **OK** to return to the recording window. Repeat this for each graph.
- To toggle back to an automatic-moving threshold, reselect the **Lagged** threshold mode and include a **Lag Value** of 5.

Note: when in manual threshold mode, it may be necessary to change the Max/Min scale values of the bar graphs. Do so by left-clicking on the graph and then changing the **Max** and **Min** values in the appropriate boxes at the upper-left of the window.

### **Cooperative – HRV 1 – (1 monitor)**

This screen is for training heart rate variability in a cooperative setting. It is for single monitor use.

Each player's section contains a red line graph for monitoring heart rate (beats/min), horizontal bar graphs for the spectral frequency percent of power data, and player-specific conveyor belts for individualized feedback.



The HRV spectral frequency graphs are color coded for the three rhythms of activity: Very Low Frequency (VLF; dark grey), Low Frequency (LF; black or the player-specific color), and High Frequency (HF; light grey). The Low Frequency graph also contains a feedback threshold that dictates when feedback is provided. This threshold is manually set.

When a player's LF bar rises above the bar graph threshold, the LF signal will change colors and the player's conveyor belt animation activates. When both players' conveyor belts are activated, the cooperative feedback is provided in the form of different buildings being constructed. If one of the player's LF signals fall below its threshold, their respective conveyor of constructions supplies stops moving, and the building construction halts.

Use this screen to:

- Teach and encourage sustained slow, relaxed breathing that leads to the Low Frequency (LF) value to rise above its threshold. A greater LF value means greater heart rate variability.
- Encourage each player to increase the HRV as high as possible and as consistently as possible.

Each player wants to:

- Raise their individual LF signal to rise above their bar graph's threshold, in order to see their respective bar graph change color (Player 1 → blue; Player 2 → green) and activate their conveyor belt
- See all the conveyor belts activate in order to activate the building construction and assemble as many buildings as possible.

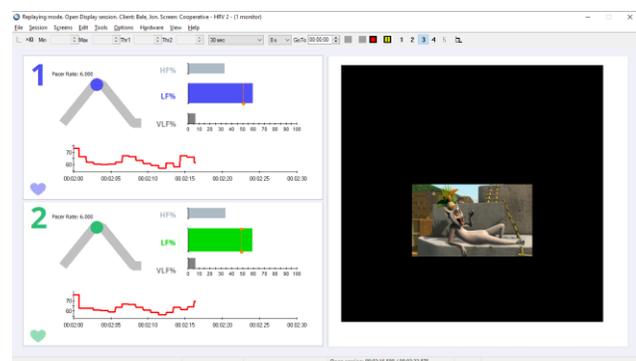
The thresholds of the LF bar graphs can be moved by clicking and dragging them to new levels. Setting the threshold to lower values makes the task easier for the players. Setting them to higher values makes the task more difficult.

*Note: 64-seconds need to pass before the HRV data and feedback begins.*

### Cooperative – HRV 2 – (1 monitor)

This screen is for training heart rate variability in a cooperative setting. It is for single monitor use.

Each player's section contains a red line graph for monitoring heart rate (beats/min), horizontal bar graphs for the spectral frequency percent of power data, and a breath pacer.



The HRV spectral frequency graphs are color coded for the three rhythms of activity: Very Low Frequency (VLF; dark grey), Low Frequency (LF; black or the player-specific color), and High Frequency (HF; light grey). The Low Frequency graph also contains a feedback threshold that dictates when feedback is provided. This threshold is manually set.

When a player's LF bar rises above the bar graph threshold, the LF signal will change colors. When both players' LF signals are above their respective thresholds, the cooperative video streaming feedback player enlarges in size until it is at its maximum size. If one of the player's LF signals fall

below its threshold, the video player window shrinks until it reaches its smallest size. The video streaming in the player window continues regardless of the success of the LF conditions.

Each player has a breath pacer that the therapist can set to a specific respiration rate that best fits that individual.

Use this screen to:

- Teach and encourage sustained slow, relaxed breathing that leads to the Low Frequency (LF) value to rise above its threshold. A greater LF value means greater heart rate variability.
- Use a breath pacer to shape each player's breathing.
- Encourage each player to increase the HRV as high as possible and as consistently as possible.

Each player wants to:

- Raise their individual LF signal to rise above their bar graph's threshold, in order to see their respective bar graph change color (Player 1 → blue; Player 2 → green)
- Follow their respective breath pacer, to increase their LF value.
- See the video player window grow as large as possible.

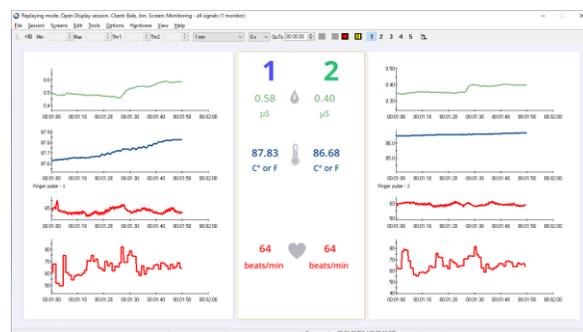
The thresholds of the LF bar graphs can be moved by clicking and dragging them to new levels. Setting the threshold to lower values makes the task easier for the players. Setting them to higher values makes the task more difficult.

The breath pacer setting can be modified by right-clicking on the pacer and selecting **Edit Pacer Settings**. This can only be done before the recording has begun or when the session is paused.

*Note: 64-seconds need to pass before the HRV data and feedback begins.*

### Monitoring – all signals (1 monitor)

Each player's section contains the following line graphs (from top to bottom): arousal, temperature, finger pulse, and heart rate (beats/min). Moment-to-moment numerical displays are adjacent to their respective line graphs.



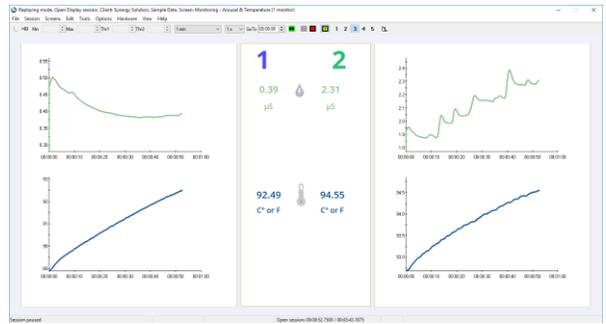
Use this screen to:

- Verify signal quality, to make sure the TPS sensors are correctly applied to each user.
- Monitor data when recording or training with clients, where no additional feedback is required beyond line graphs and statements from the therapist.

### Session: Group Dynamics & Monitoring (2 Users / 2 TPS)

### Monitoring – Arousal & Temperature (1 monitor)

Each player's section contains (from top to bottom) and arousal line graph and a temperature line graph. Moment-to-moment numerical displays are adjacent to their respective line graphs.

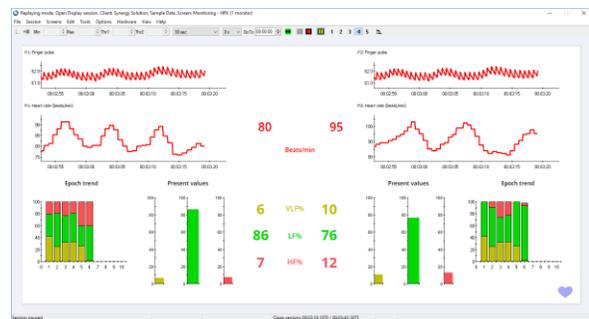


Use this screen to:

- Verify signal quality, to make sure the TPS sensors are correctly applied to each user.
- Monitor data when recording or training with clients, where no additional feedback is required beyond line graphs and statements from the therapist.

### Monitoring – HRV (1 monitor)

Each player's section contains the following graphs (from top to bottom): finger pulse, heart rate (beats/min), and spectral frequency trend and bar graphs. Moment-to-moment numerical displays are adjacent to their respective line graphs.



The HRV spectral frequency graphs are color coded for the three rhythms of activity: Very Low Frequency (VLF; yellow), Low Frequency (LF; green), and High Frequency (HF; pink).

Each trend data point is the average from the previous 20-second period.

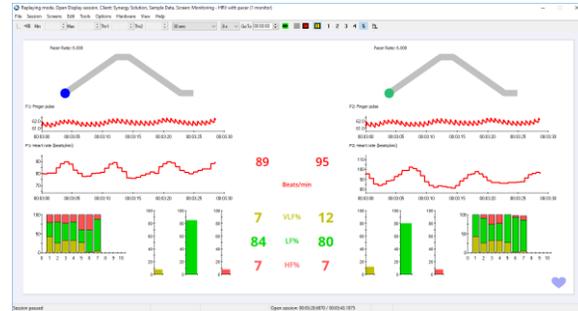
Use this screen to:

- Verify signal quality, to make sure the TPS sensors are correctly applied to each user.
- Monitor data when recording or training with clients, where no additional feedback is required beyond line graphs and statements from the therapist.

*Note: 64-seconds need to pass before the HRV data and feedback begins.*

### Monitoring – HRV with pacer (1 monitor)

Each player's section contains the following graphs (from top to bottom): breath pacer, finger pulse, heart rate (beats/min), and spectral frequency trend and bar graphs. Moment-to-moment numerical displays are adjacent to their respective line graphs.



The HRV spectral frequency graphs are color coded for the three rhythms of activity: Very Low Frequency (VLF; yellow), Low Frequency (LF; green), and High Frequency (HF; pink).

Each trend data point is the average from the previous 20-second period.

Use this screen to:

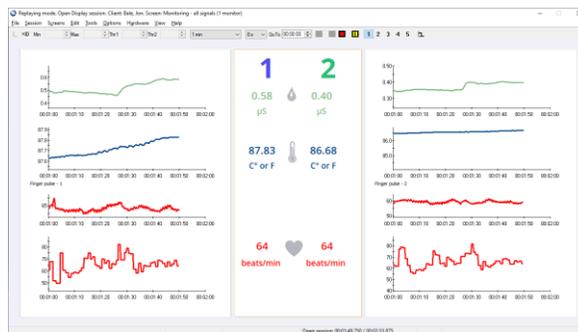
- Verify signal quality, to make sure the TPS sensors are correctly applied to each user.
- Monitor data when recording or training with clients, where no additional feedback is required beyond line graphs and statements from the therapist.

The breath pacer setting can be modified by right-clicking on the pacer and selecting **Edit Pacer Settings**. This can only be done before the recording has begun or when the session is paused.

*Note: 64-seconds need to pass before the HRV data and feedback begins.*

### Monitoring – all signals (1 monitor)

Each player's section contains the following line graphs (from top to bottom): arousal, temperature, finger pulse, and heart rate (beats/min). Moment-to-moment numerical displays are adjacent to their respective line graphs.



Use this screen to:

- Verify signal quality, to make sure the TPS sensors are correctly applied to each user.
- Monitor data when recording or training with clients, where no additional feedback is required beyond line graphs and statements from the therapist.

### Monitoring – all trends (1 monitor)

Each player's section contains the following trend graphs (from top to bottom): arousal & temperature, heart rate (beats/min), and spectral frequency percent of power data. Numerical displays for the current epoch values are adjacent to their respective line graphs.



The HRV spectral frequency graphs are color coded for the three rhythms of activity: Very Low Frequency (VLF; yellow), Low Frequency (LF; green), and High Frequency (HF; pink).

Each trend data point is the average from the previous 20-second period.

Use this screen to:

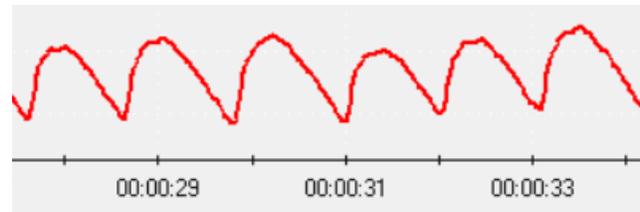
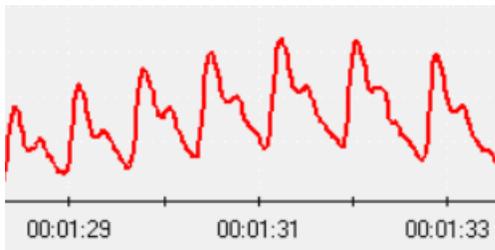
- Monitor general trends in data when recording or training with clients, where no additional feedback is required beyond line graphs and statements from the therapist.

*Note: 64-seconds need to pass before the HRV data and feedback begins.*

### Signal verification reminder

It remains a good idea to perform signal verification at the beginning of a recording in order to verify that the TPS sensors are correctly applied and that an adequate, clean signal is being collected. Take a moment to check that the waveforms to ensure they are valid physiological measures, in particular the finger pulse line graph. Otherwise, check that the sensor is placed on the client correctly to fix any waveform discrepancies.

Examples of acceptable finger pulse signal quality:



### End of session

To end the session recording, press Stop session button at the top of the window. 

A prompt will appear listing a variety of statistics. These statistics can be better examined in review mode. Click **OK** to continue. A prompt will now appear asking if you wish to **Save**. If you choose to not save the session, the recorded data will be immediately erased.

After saving the session you may proceed to review mode by selecting and print out the report and discuss the results with the client.

Assuming you choose to save the session, then the **Session Notes** pop-up appears where you can enter, if you want, a treatment code (CPT), a session description and some notes. Click **OK** to continue. Next, you are asked if you would like to review the session right away.

- If you choose to enter review mode, you will proceed to that mode.

- If you click **No**, the program asks if you want to record another session or return you to the Main Menu screen. You can always choose to enter review mode to generate the report at a later time, if you prefer to spend the immediate time completing other things with your client.

## Reviewing the session

After recording a session, you go into review mode to analyze the data and/or generate a report.

You can review the session immediately after recording it and saving the data, or you can enter review mode at a later time. Refer to the box dialogue on the next page for instructions on how to enter review mode at a later time.

In review mode, the system loads the review screens which show you session graphs and appropriate statistics. The default first screen will be for heart rate variability artifact rejection. It is important to remove any artifacts in HRV before we can generate representative statistic or a report. Refer to the next section on how to accomplish this.

The other screens, which can be toggled between by clicking the bolded numbers in the task bar, are trend and line graphs of the data. These are only of interest to advanced clinicians that wish to examine moment-to-moment changes in the data. The Stress Test Report otherwise provides an easy-to-understand synopsis of the results.

Entering review mode at a later time:

1. Select **Database** from the main screen.
2. In the **Main Database** window highlight the client, from the left-hand table, whose session you want to review.
3. Select the session from the right-hand table.
4. Click **Review/Report** to open the **Review/Replay Session Confirmation** window. Click **OK** in that new prompt. You will now be in review mode.

## Reviewing a training session and generating a report

If you save the recorded session, you can review it to look back at the players physiological trends as they performed their self-regulation and/or following your coaching suggestions. The software will automatically load 3-4 reviewing screens, depending on the session. A specialized report that ranks the players' performances can also be generated review mode.

Review mode can be entered immediately following saving the session, or at a later time.

To navigate between the screens, click the desired screen number in the Tool Bar and click the left mouse button. Switching can be done at any time



If you are looking for accurate heart rate variability statistics, you will have to perform artifact rejection. (Refer to [Dealing with artifacts](#) on p.29)

## Review screens

### Review 01 – Artifact rejection

This is the primary artifact rejection screen for this suite. Users review the finger pulse (red) and interbeat interval (orange) line graphs for evidence of readings not representative of real heart rate variability data. Artifact rejection occurs directly within the interbeat interval line graph. Refer to the text further below on how to accomplish the artifact rejection process.



Artifacts are patterns in the signal that are not created by the physiological process of interest. They happen when the signal gets distorted by movement or other sources of noise. Artifacts can cause errors in the signal processing calculations and make the data analysis unreliable. Prior to generating a report, it is always a good idea to review the recorded HRV data and correct it for artifacts. Doing this normalizes the data and ensures that the program generates correct statistics.

For further information about artifact rejection, please refer to the screen info document.

### Review 02 - Physiological trends & statistics

For reviewing the subject's psychophysiological profile based on trend data.

On the left, the histograms display the continuous periodic averages for player 1. On the right, the histograms display the continuous periodic averages for player 2. By installation default, each period (also called "epoch") is 20-seconds long.

In the middle section, statistic labels and the numerical values for the current period of focus are displayed.

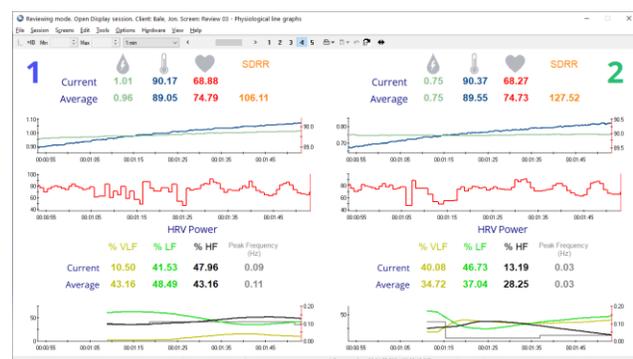


### Review 03 – Physiological line graphs

For reviewing the subject's psychophysiological profile based on moment-to-moment changes in data.

On the left, for player 1, line graphs display the moment-to-moment changes for the metrics. Statistic labels and numerical values for the current and average of each metrics are displayed.

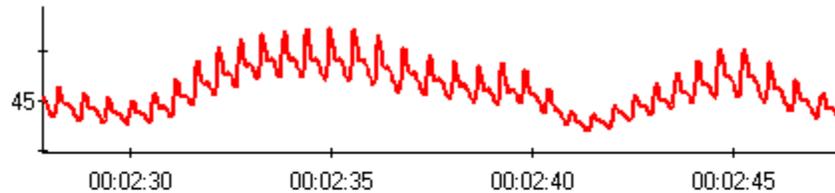
Same applies for player 2 on the right.



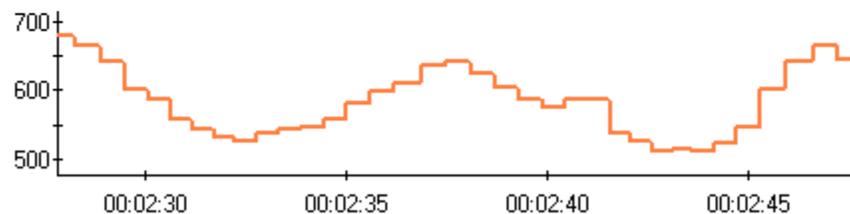
## Dealing with artifacts

Artifacts are patterns in the signal that are not created by the physiological process of interest. They happen when the signal gets distorted by movement or other sources of noise. Artifacts can cause errors in the signal processing calculations and make the data analysis unreliable. Prior to generating a report, it is always a good idea to review the recorded HRV data and correct it for artifacts. Doing this normalizes the data and ensures that the program generates correct statistics.

### Finger pulse

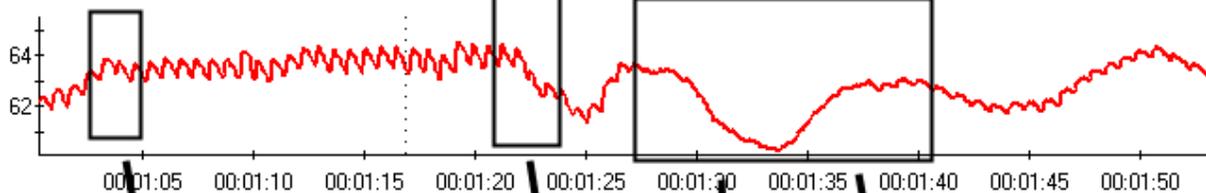


### Interbeat Intervals (ms)

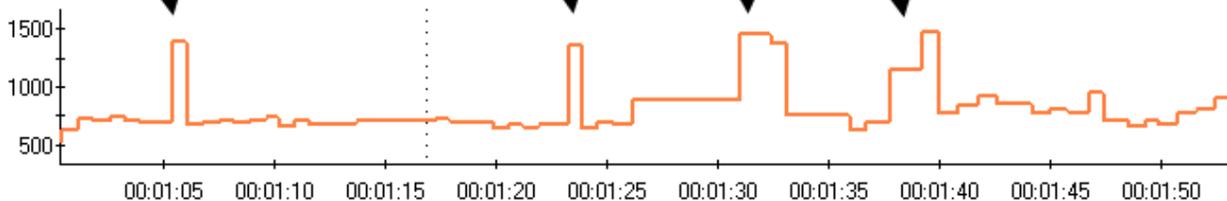


The Artifact Removal screen allows you to review a session and see how missed or extra beats in the finger pulse signal (red) distort the inter-beat interval (IBI) data (orange). The above image is clean data and the below image has artifacts identified. Notice that in the below image, some of the artifacts in the Finger Pulse line graph do not lead to any perceived artifact in the Interbeat Intervals line graph due to automatic filtering included in the software.

### Finger pulse



### Interbeat intervals (ms)



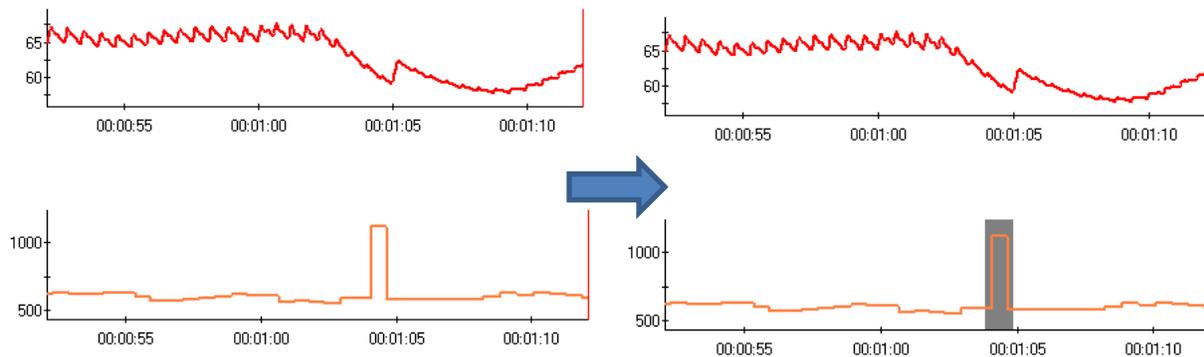
The easiest method for correcting artifacts is to visually review the interbeat interval signal and place artifact rejection segments over each artifact. To do this:

1. Scroll through the data, using the time scroller at the top of the window, to find an artifact.



Toggleing the Auto-Scale on/off may be helpful in the Finger Pulse and Interbeat Interval line graphs to accommodate the graph scaling or avoid scaling that hinders signal details. To toggle it on/off, right-click on the line graph and select that option.

2. Place the mouse cursor over the last normal interbeat interval value (in the orange Interbeat Intervals line graph), just to the left of the distorted section.
3. Press and hold the **[Control]** key on your keyboard, then click and hold down the left mouse button while sliding the mouse cursor toward the right until you reach the end of the distorted section.
4. Let go of the mouse button.
5. This places a grey segment over that artifact.



6. Do this over all section of signal which appear distorted in the Interbeat Interval line graph.

**Tips:**

- The classic artifact shows up as interbeat intervals (refer to orange graph) that have unusual low or high values in comparison to neighbouring interbeat intervals.
- Sometimes, a distortion in the Finger Pulse (red line graph) does not cause a distortion in the Interbeat Interval line graph. This means there is nothing to correct.
- If ever you are unsure whether an interbeat interval value is real or not, look at the equivalent time segment in the Finger Pulse (or up-to-1 second earlier). If there is no distortion in the finger pulse value, then there is no problem.
- If ever you make a mistake or want to undo a rejection highlight, right-click on that highlighted section and select **Undo Rejection Segment**.

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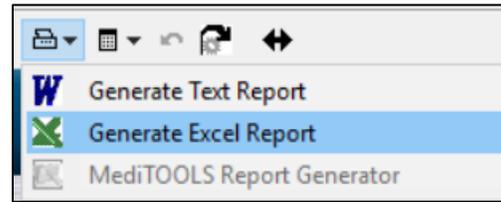
**Note:** For the purpose of the Synergy Solution, we are mostly interested in removing the most obvious artifacts. This quick method of artifact rejection is generally acceptable for simple recordings, but the requirements for normalizing interbeat interval data for HRV research are much more stringent.

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Artifact rejection must only be performed for the heart rate variability data. Arousal and finger temperature are not easily prone to artifacts.

## Group Self-Regulation Report

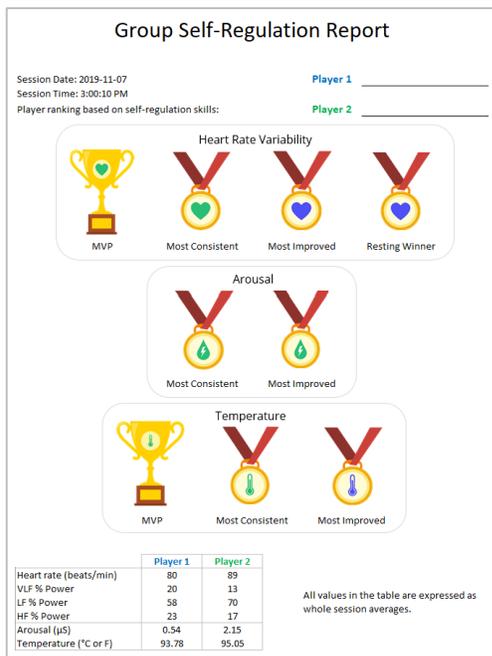
All session recordings can have their results reviewed in the Group Self-Regulation Report from within review mode, by clicking the **Session Report** icon in the tool bar and select **Generate Excel Report**.



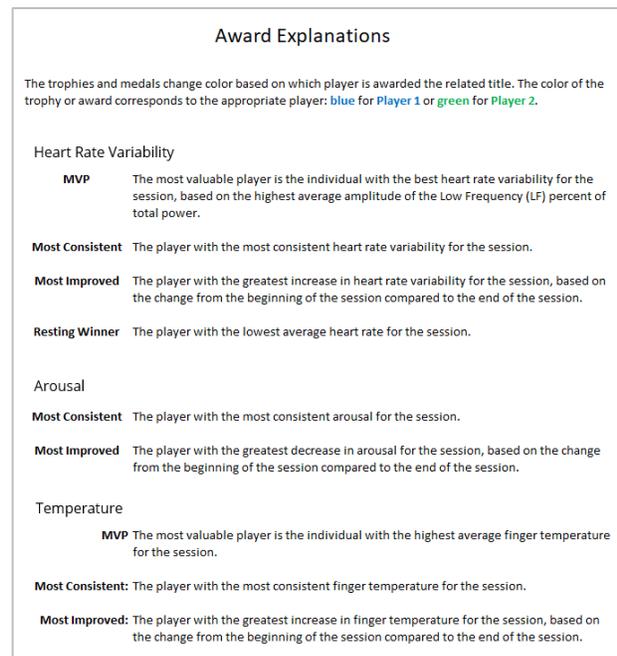
The computer requires to have Microsoft Excel installed on it, otherwise the option will be disabled. The **Generate Text Report** and **MediTOOLS Report Generator** are inapplicable.

The Group Self-Regulation Report will now appear. The report is a 2-page document that provides trend results of the session, in terms of how players fares in comparison to each other. The first page shows the player ranking, based on physiological qualifiers expresses as trophies and medals. The 2<sup>nd</sup> page explains the definition of each trophy and medal title. The report is typically more useful for therapists that want to include a competitive or entertainment aspect to the group training, although it can be generated from any session of the Synergy Solution.

Page 1



Page 2



Page 1 / the Clinician report shows:

- Ten trophies/awards based on physiological trends from the recording session, ranking the players in terms of self-regulation ability.
- Table of relevant whole session averages for arousal (µS), temperature (°C or F), heart rate (beats/min), and heart rate variability spectral frequency rhythms (percent power).

Page 2 / the Client report shows:

- The interpretation of what each trophy/medal represents.

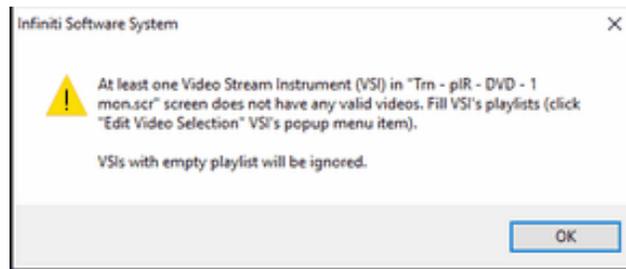
It is important for you as the therapist to also fill in the human element that the report cannot provide: asking the clients how they felt following the exercise, and asking them about their perspective of the interpretations. As an example, this is how you can link an indication that arousal is elevated to poor stress management at work, or low temperature readings with chronic discomfort in the home.

The report can be saved and/or printed. When saving, the system will require you to change the name of the file to avoid overwriting the original template.

## Video Stream Instrument: Adding your own videos

The Video Stream instrument allows the user to do feedback while playing a video streamed from certain web links (currently YouTube and Vimeo) or a local file folder.

When you record or replay a session using a screen that includes the Video Stream instrument, the system will warn you if the playlist doesn't contain a video associated with the instrument.

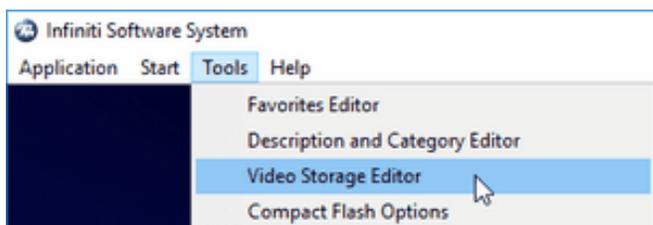


You can associate a video with the instrument or convert the Video Stream instrument to a DVD instrument.

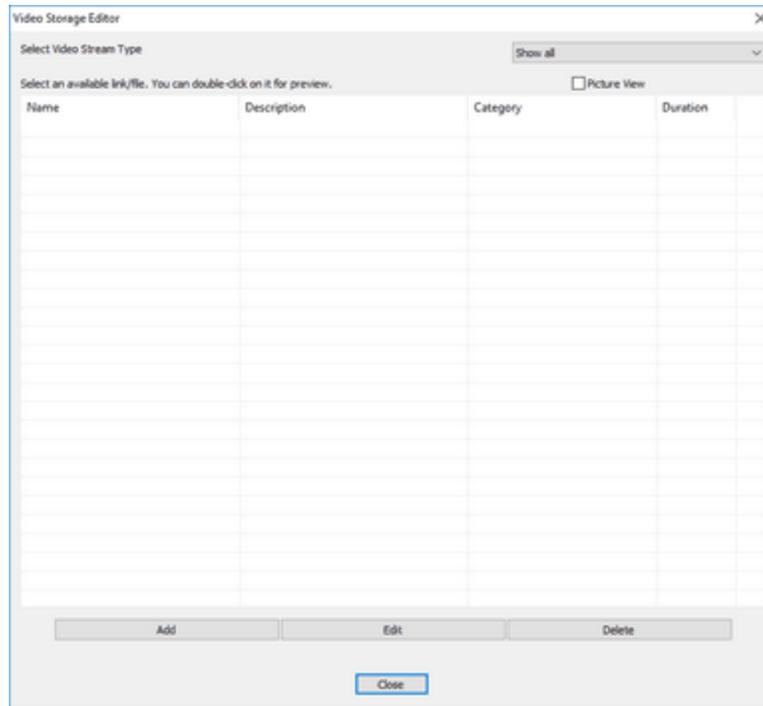
## Adding a streaming video to the playlist

This is done from the BioGraph Infiniti main menu screen.

1. From the **Tools** menu, select **Video Storage Editor**.

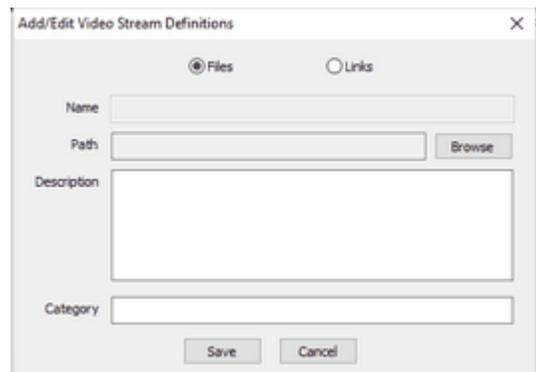


The Video Storage Editor opens.

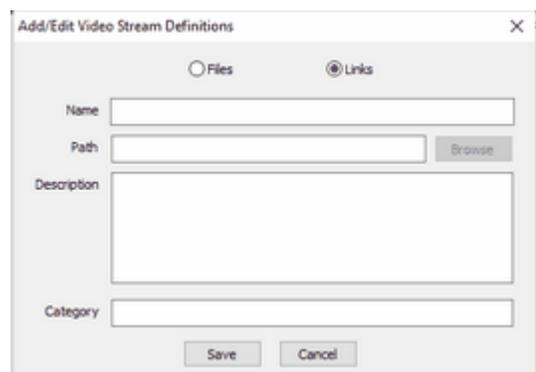


2. Click **Add**. This opens **Add/Edit Video Stream Definitions**.

- If your streaming video is a file on your computer:
  - a. Select **Files**.
  - b. Click the **Browse** button to locate the file.
  - c. In the browser window, select the file name and click **Open**.  
The file **Name** and **Path** to the file location are automatically entered in their respective fields.
  - d. Optionally, add a **Description** and **Category**.
  - e. Click **Save**.



- If your streaming video is from a link to a web site:
  - a. Select **Links**.
  - b. Enter a file **Name** and in **Path** enter the web address of the video.  
You can copy and paste the web address or type it in.
  - c. Optionally, add a **Description** and **Category**.
  - d. Click **Save**.

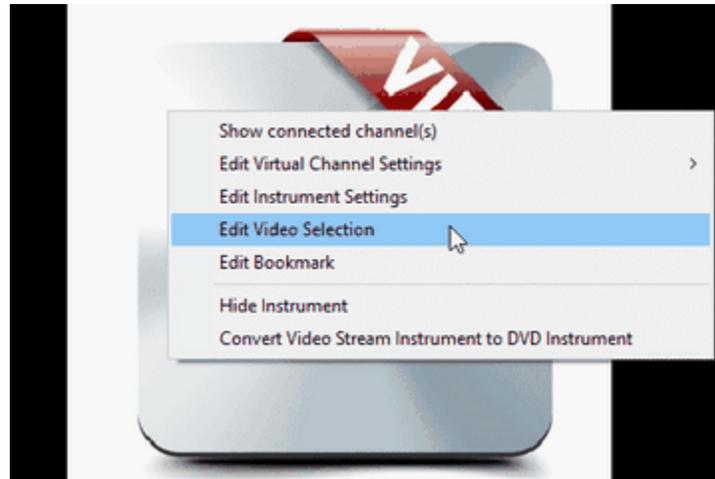


3. Click **Close** to exit the Video Storage Editor.

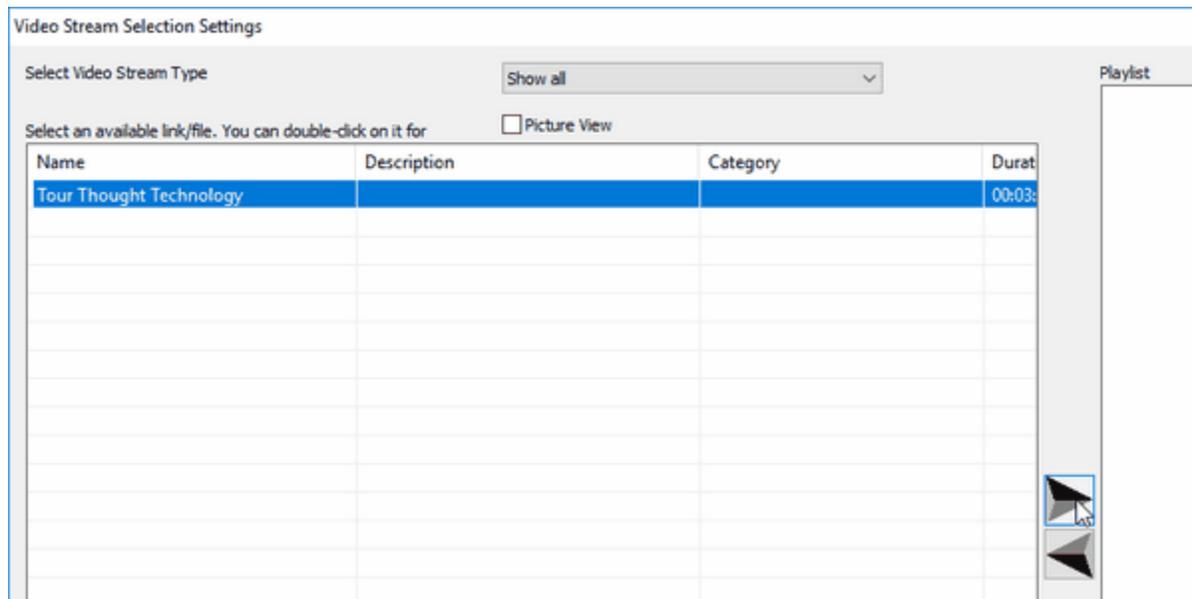
## Associating a streaming video with the Video Stream instrument

This is done from the recording screen before recording a session.

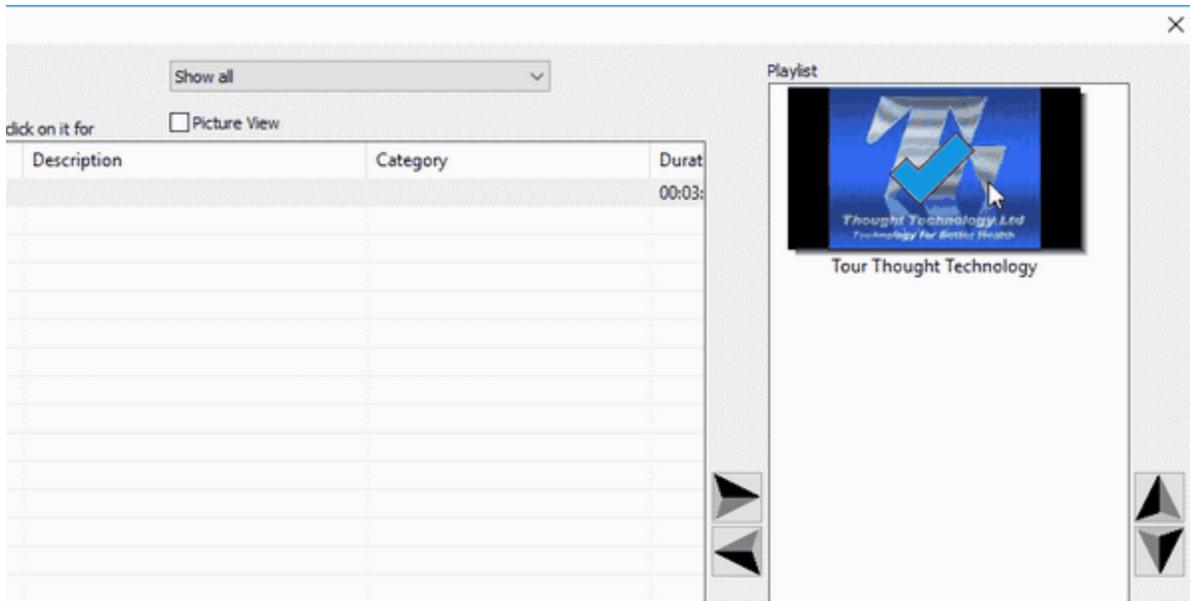
1. Place your cursor over the Video Stream instrument and click the right mouse button.



2. Select **Edit Video Selection**.
3. **Video Stream Selection Settings** opens, listing all streaming videos in the Video Stream Editor.



4. Select a streaming video and click the right arrow button to add it to the playlist.

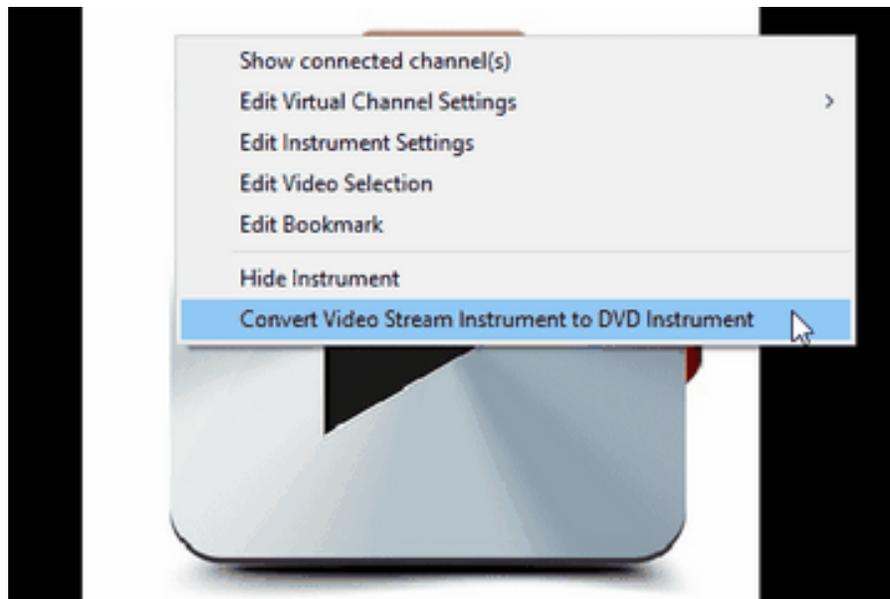


5. Click **OK** to return to the recording screen.

### Converting a Video Stream Instrument to a DVD Instrument

If you want to use a DVD for feedback in a video streaming screen, you can do that by making the following changes. Note: this is done from the recording screen before recording a session. There must also be a DVD in the computer's DVD drive in order for the DVD instrument to function.

1. Place your cursor over the Video Stream instrument and click the right mouse button.



2. Select **Convert Video Stream Instrument to DVD Instrument**.
3. At the confirmation prompt, click **Yes**.
4. When the system indicates that the instrument has been converted, click **OK** to return to the recording screen.

Detailed information about using the Video Stream instrument and the Video Storage Editor is provided in the BioGraph Infiniti on-line help.

## Sound Manager: Adding your own sound files

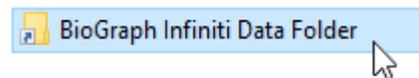
Audio feedback used in the Synergy Suite can be edited. It is a few simple steps to change and add your own audio files (.mp3) for examples,

To add a sound file:

1. From your desktop, double click **BioGraph Infiniti Docs & Editors**



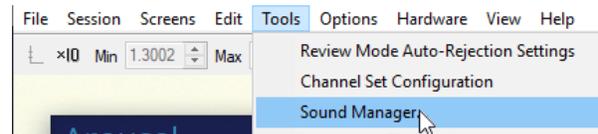
2. Double click BioGraph Infiniti Data Folder



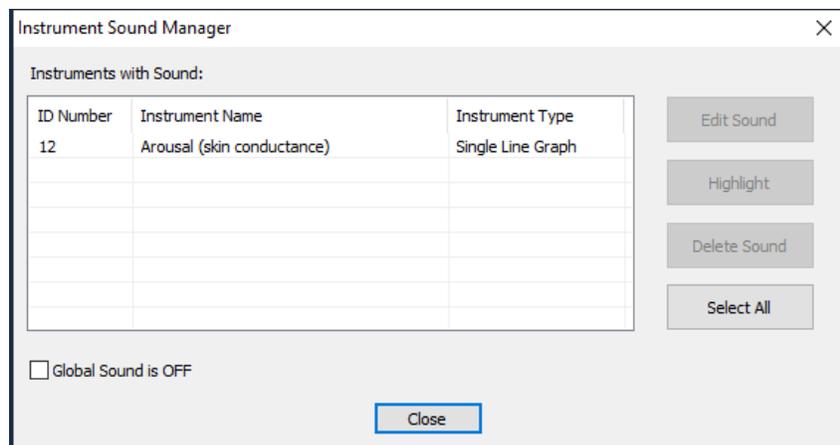
3. Select **Sounds** folder and place the new MP3 files there.

Now, From BioGraph Infiniti, load the desired **Learning Control** session. Before starting the session,

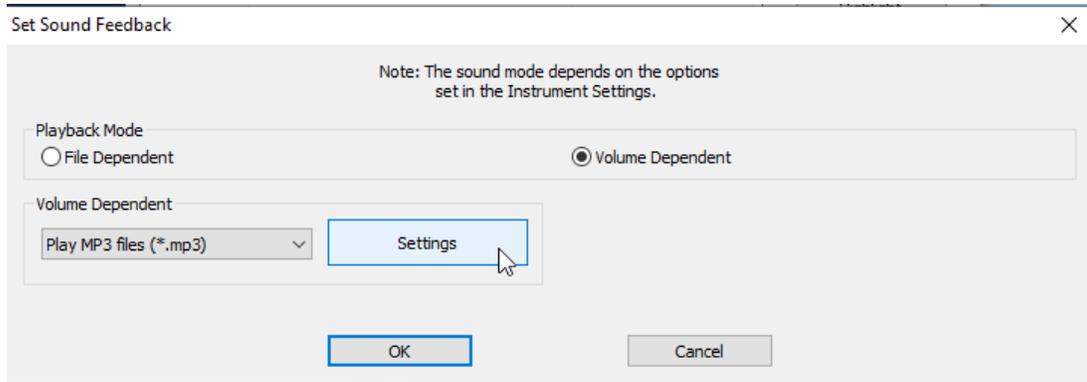
1. From **Tools**, select Sound Manager.



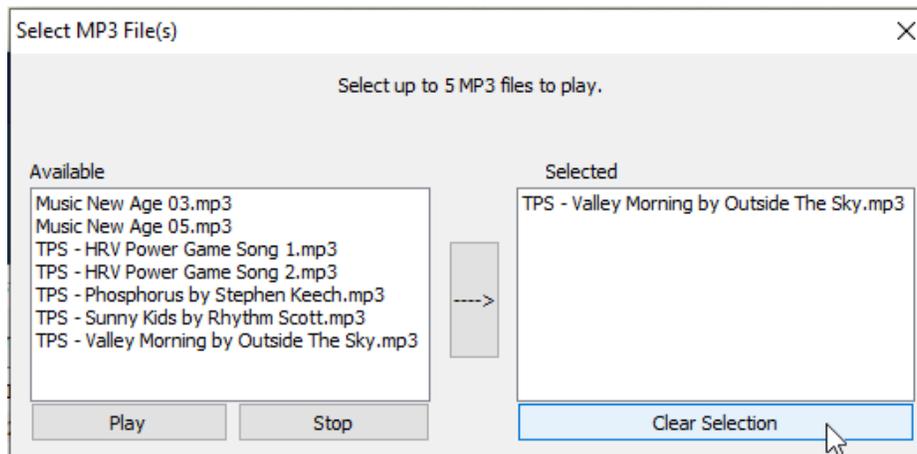
2. An **Instrument Sound Manager** dialog will open. All instruments that are linked to sound feedback will be listed.



3. To edit a feedback sound, click on the instrument(s) listed, and choose **Edit Sound**. Almost all training displays will only provide a single instrument option. The only exception is the HRV Power Game.
4. A **Set Sound feedback** dialogue will open. In this prompt, click on **Settings** to open the Settings window.



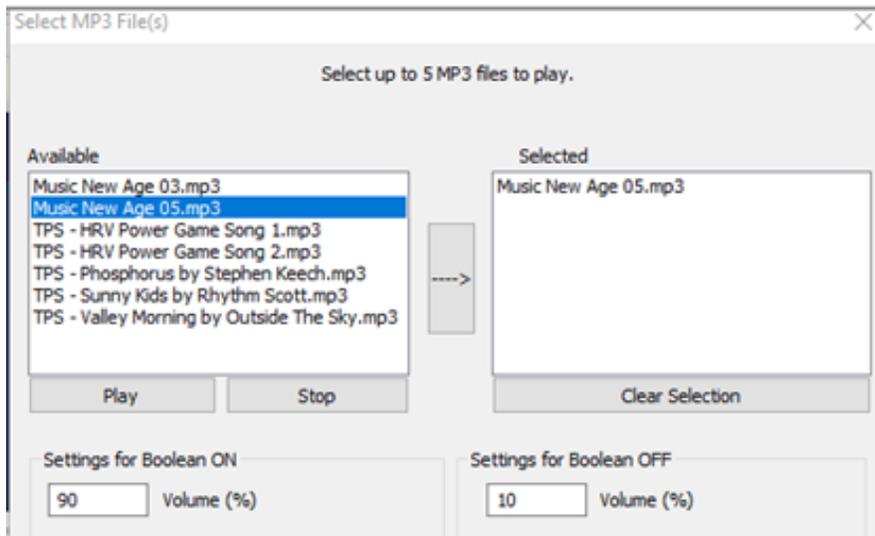
Here is where the choice of music file is made, as well as what volume level the music is played at.



- To remove the current selection, click **Clear Selection**. The Pre-selected audio file will be removed from the **Selected** listing.
- From the **Available** listing, select an MP3 of interest, then click the arrow button:



- The new MP3 will now be in the **Selected** listing. You may choose up to 5 audio files to add to this listing.
- Just below the Available and Selected listings, are two volume settings boxes. Here, the music volume is decided when the feedback condition is achieved (Boolean ON) and when it is not achieved (Boolean OFF).



- When done changing the music, click **OK/Close** to return back to the main recording window.

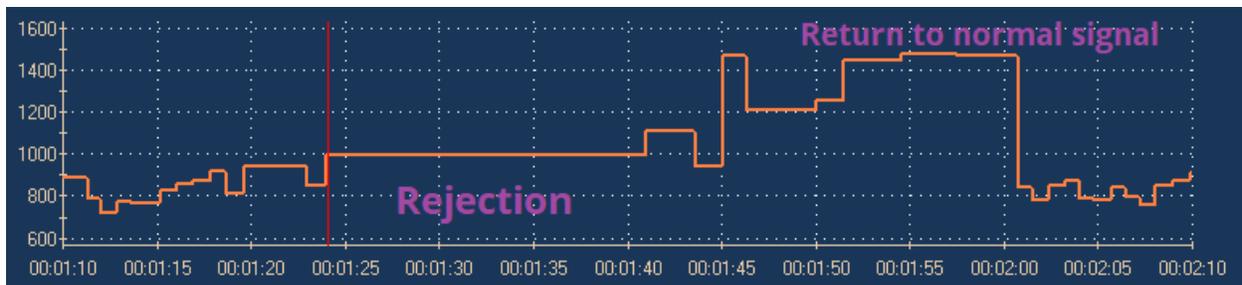
## Real-time artifact rejection

The Synergy Solution is built with real-time artifact rejection already pre-defined for interbeat interval derived channels. The feature is meant to assist, but not replace, the manual artifact rejection. (refer to [Dealing with artifacts](#) on p.29). By default, this feature is turned off to avoid confusion where users think this automated rejection replaces the manual rejection.

To enable this feature:

1. Click the **Pause** button during any session recording.
2. Select **Edit Virtual Channel Settings** from the **Edit** menu.
3. Scroll down the list of virtual channels and select virtual channel 30 **Artifacts: on/off**
4. Modify the **Input 2 Constant value** to “1” and click **Save Changes**. If you also choose to **Save All Changes to Original Channel Set**, the artifact rejection will remain on for all future sessions for all clients.
5. Click **Close** and resume the session.

While recording the session, if you look at the IBI signal that is being recorded, you will occasionally see the signal become a flat line:



The graph shows how the real-time artifact rejection function works. The raw signal is constantly monitored. If, at some point, the signal goes over the rejection threshold, the function is triggered and the signal becomes a flat line, which tells the software to halt all following calculations. This lasts until the signal returns to normal, at which point the calculations resume.

Although the real time artifact rejection function also works in review mode, the manual artifact rejection method is a more precise way to reject artifact, post-recording.



## Hardware Specifications

### TPS Sensor (SA4504)



Weight	Approx. 20g (without the Charger)	
TPS size	Approx. 50mm x 30mm x 20mm	
Li-ion Polymer Battery	Nominal voltage	3.7V
Skin conductance measurement	Range	0 – 30 $\mu$ S
Temperature measurement	Range	10 – 40 $^{\circ}$ C
Accelerometer	Number of Axes	3 (X, Y, Z)
Wireless communication	Bluetooth Classic	

## Warranty

The hardware (sensors) is guaranteed to be free from defects in material and workmanship for 1 year from the date of purchase.

In the unlikely event that repair is necessary, contact Thought Technology Ltd. to receive a Return Authorization number. Then send the unit back by a traceable method. Thought Technology will not be responsible for items not received. We will repair or replace your unit(s) that are still under warranty free of charge.

This warranty does not apply to damage incurred through accident, alteration, or abuse.

This warranty does not cover damage to the sensors caused by obvious mechanical mistreatment of the system.

# Technical Support and Contacts

## Placing orders

- Outside USA  
Tel: 1-514-489-8251  
Fax: 1-514-489-8255
- In USA Toll-Free  
Tel: 1-800-361-3651
- E-Mail: [mail@thoughttechnology.com](mailto:mail@thoughttechnology.com)

Or contact your local authorized distributor.

## Technical support

For technical support please refer to the Thought Technology Ltd. website at [www.thoughttechnology.com](http://www.thoughttechnology.com) for frequently asked questions. If your support issue is not covered please e-mail or telephone at the number below.

- Outside USA  
Tel: 1-514-489-8251  
Fax: 1-514-489-8255
- In USA Toll-Free  
Tel: 1-800-361-3651
- E-Mail: [techsupport@thoughttechnology.com](mailto:techsupport@thoughttechnology.com)

Or contact your local authorized distributor.

## Returning equipment

Be sure to call for an authorization number (RA) before returning any equipment!

Send the unit(s) postage prepaid and insured, with proof of purchase to one of the addresses below.

If you are shipping from outside Canada or the USA to Canada, mark the package **Goods to be repaired – Made in Canada** to avoid unnecessary customs charges.

All customs and duties charges will be billed to you if incurred by sending the unit to the wrong address.

Provide a detailed description of the problem you are experiencing, and your telephone/fax number and email (see form on the next page of this manual).

- **In the USA**, ship insured to:  
Thought Technology Ltd.  
Cimetra LLC  
8396 State Route 9  
West Chazy, New York  
12992, USA
- **In Canada and all other countries**, contact your dealer or ship insured to:  
Thought Technology Ltd.  
5250 rue Ferrier, Suite 812  
Montreal, Quebec  
Canada H4P 1L3  
**Broker: Livingston International – 133461**



**Repair return form**

**Name:** \_\_\_\_\_

**Company:** \_\_\_\_\_

**Address:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Telephone Number:** \_\_\_\_\_

**Fax Number:** \_\_\_\_\_

**Date Purchased:** \_\_\_\_\_

**From:** \_\_\_\_\_

**Model Name:** \_\_\_\_\_

**Serial Number:** \_\_\_\_\_

**Problem:** \_\_\_\_\_  
\_\_\_\_\_  
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