DeStress
Solution™

For use with BioGraph **version 6.6 or later**

CLASSIFICATION

- Type BF Equipment
- Internally powered equipment
- Continuous operation

- Read Instruction Manual

CAUTION

RxOnly
- US Federal Law restricts this device to sale by or on order of licensed health care practitioners.

WARNING

Intended use

- There are no user serviceable parts. Do not attempt to service or modify the equipment. If the equipment appears damaged, do not use; contact Technical Support at Thought Technology Ltd. or your local authorized distributor for replacement.
- Functionality is disabled during charging. To ensure safety, do not charge the device while wearing.
- Do not immerse in water.
- Do not connect to a patient undergoing MRI, electro-surgery or defibrillation.
- Do not use in the presence of a flammable anesthetic mixture with air or with Oxygen or Nitrous Oxide.
- Device might not meet its performance specifications if transported, stored or used outside the specified temperature and humidity ranges.
- Skin temperature readings are sensitive to air movement and incident radiation.
- Use of any equipment in a biofeedback context should be immediately terminated upon any sign of distress or discomfort.
- This device is not intended for diagnosis and it is not a substitute for proper medical advice and diagnostic testing. If you have any health concerns, consult your physician.

PRECAUTIONS

- The eVu TPS may be susceptible to electrostatic discharges (ESD) and radiated radio frequency (RF) fields. Electrostatic discharge is common in conditions of low humidity. Always discharge yourself by touching a grounded bare metal surface before touching the unit. Do not operate active sensors within 10 feet (3m) of a powerful radio interference producing sources such as arc welders, radio thermal treatment equipment, x-ray machines or any other equipment that produces electrical sparks.
- Bluetooth operation may be interrupted by presence of interfering devices in the 2.4 GHz IsM band.
- To avoid the risk of electrical shock, inspect the AC power adapter / Charger and AC power cord on a regular basis. Ensure they are not damaged. If you detect damage or excessive heating, remove from the wall outlet immediately and contact Technical Support at Thought Technology Ltd. or your local authorized distributor for replacement.
- Never position the AC power adapter / Charger near combustible materials. Ensure that the Charger remains accessible at all times and may be easily disconnected from the wall outlet.
- Do not expose to extreme weather conditions.
- To diminish the risk of spreading communicable diseases, always use good hygiene practices with electrode surfaces. In all cases, refer to your facility's infection control procedure.

WARNINGS:
Battery

- To ensure safety, use only the charging adapter provided with the device.
- Do not leave a battery on prolonged charge when not in use.
- Discard the device with built-in battery following your local waste management legislation and guidelines. The battery cannot be replaced.
- There are no user serviceable parts.

- Wipe sensor pads with a clean cloth after each use. Do not clean with alcohol or abrasive detergents. Do not immerse, soak or expose the sensor to disinfectants for periods of time that exceed manufacturer's specifications. Do not sterilize.
- If the device is not used for a long time, ensure the device is charged at minimum every 2-3 months.
- The battery can maintain the performance characteristics for a minimum of 300 charge cycles.
- After extended periods of storage, it may be necessary to charge and discharge the device several times to obtain maximum performance.

⚠️ To ensure safety, use only the charging adapter provided with the device.
Do not leave a battery on prolonged charge when not in use.
Discard the device with built-in battery following your local waste management legislation and guidelines.
The battery cannot be replaced.

INTENDED PURPOSE
- Biofeedback and relaxation.
- The device is not intended to measure quantitatively the value of physiological parameters; measurements are relative to each other, indicating short-term trends rather than absolute values.

CONTRAINDICATIONS
- None.

OPERATOR PROFILE
- This device is intended to be operated by adult patients only.
- Pediatric use only under supervision of adult / healthcare provider.

CAUTION
- US Federal Law restricts this device to sale by or on order of a licensed health care practitioner.

PRODUCT CONTENTS
- 1 x SA4500 TPS
- 1 x SA4505 Strap
- 1 x SA45XX Charger (Medical Grade Universal Power Supply / AC Power Adapter)
- 1 x MI1134 Carrying case, Black

Note:
- The usage of the device requires an Android app which can be found at the following link www.evutps.com. The app runs on an Android platform using Version 4.4 or above. The recommended tablet / phone screen size is from 4.5 to 9.7 inch.

TECHNICAL SPECIFICATIONS

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 uS
Temperature measurement	Range	10 – 40 ˚C
Accelerometer	Number of Axes	3 (X, Y, Z)
Wireless communication	Bluetooth Classic	

OPERATING ENVIRONMENTAL CONDITIONS

- Standard — EN/IEC 60601-1-11
- Temperature — +5˚C – +40˚C
- Relative humidity — 15% – 93% (non-condensing)
- Atmospheric pressure — 700 hPa – 1060 hPa

TRANSPORT AND STORAGE ENVIRONMENTAL CONDITIONS

- Standard — EN/IEC 60601-1-11
- Store in its original case.

- Temperature and relative humidity

  -25°C without relative humidity control
  +70°C at relative humidity up to 93%, non-condensing

- Atmospheric pressure

  700 hPa – 1060 hPa

ELECTRICAL SAFETY SPECIFICATIONS

- Standard

  EN/IEC 60601-1 and IEC60601-1-11

- Type of protection against electric shock

  Internally powered equipment
  CLASS II (when connected to Charger)

- Degree of protection against electric shock

  Type BF Applied Parts
  (TPS with built-in sensor)

- Mode of operation

  Continuous

- Degree of protection against ingress of water

  IPX0 (no protection)

- Protection against ignition of flammable anaesthetic mixtures

  EQUIPMENT NOT SUITABLE FOR USE IN THE PRESENCE OF FLAMMABLE ANAESTHETIC MIXTURE WITH AIR OR WITH OXYZEN OR NITROUS OXIDE

- Charger Power Rating (Medical Grade Universal Power Supply / AC Power Adapter)

  UL/IEC 60601-1
  Input: 100-240Vac, 60/50Hz, 0.6A
  Output: 5Vdc, 1.2A

ELECTROMAGNETIC COMPATIBILITY

- Standard

  EN/IEC 60601-1-2

Guidance and manufacturer's declaration – electromagnetic emissions		
The eVu TPS is intended f or use in the electromagnetic environment specified below. The customer or the user of the eVu TPS should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment – guidance**
RF emissions CISPR 11	Group 1	The eVu TPS uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The eVu TPS is suitable for use in all establishments, including domestic establishments and those directly connected to the public low -voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class B	
Voltage fluctuations flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration – electromagnetic immunity			
The eVu TPS is intended for use in the electromagnetic environment specified below. The customer or the user of the eVu TPS should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	± 8kV contact ±15 kV air	±8 kV contact ±15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
NOTE: U_T is the a.c. mains voltage prior to application of the test level.			

Contents

DeStress Solution Reference Manual

Introduction

The DeStress Solution is a tool designed to measure and interpret your client's stress markers, as well as teach them stress management and resilience via biofeedback therapy. The goal of the DeStress 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:

- Assess your client's physiological responses to stressful situations and become aware of any abnormal patterns when they recuperate from stress.

- Monitor autonomic nervous system arousal levels during therapy.

- Teach self-regulation with biofeedback.

- Teach tension and anxiety reduction strategies with simple relaxation techniques.

The DeStress Solution works with Thought Technology's clinical grade physiological data acquisition device: the eVu-TPS finger sensor. 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 DeStress Solution.

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 DeStress Solution: Describes biofeedback, explains the structural grouping of the modalities, and provides details about the DeStress 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 DeStress 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 DeStress 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. The system also indirectly measures breathing rhythms in specific contexts.

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 DeStress Solution offers you an easy way to perform three main tasks:

- Assess and document your client's stress response patterns by running the 5 activity stress test.
- Teach your clients awareness and control of unconscious physiological processes by doing arousal, temperature, heart rate variability, and/or breathing biofeedback.
- Train your clients in easy but effective relaxation methods for practicing one of two relaxation exercises.

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: Association for Applied Psychophysiology and Biofeedback.
- www.bfe.org: Biofeedback Federation of Europe.
- 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.
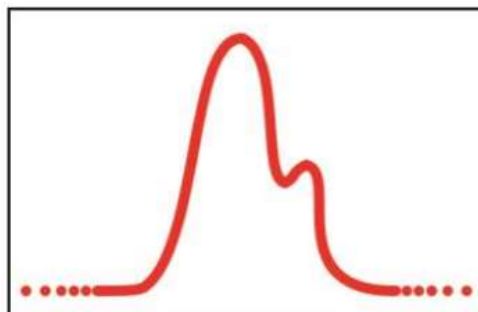
A brief introduction to arousal (sweat response)

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 (µS). Resting values are usually below 5 µS. A stressed person can easily reach values of 10-20 µS (***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 µS 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 DeStress 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 DeStress 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.
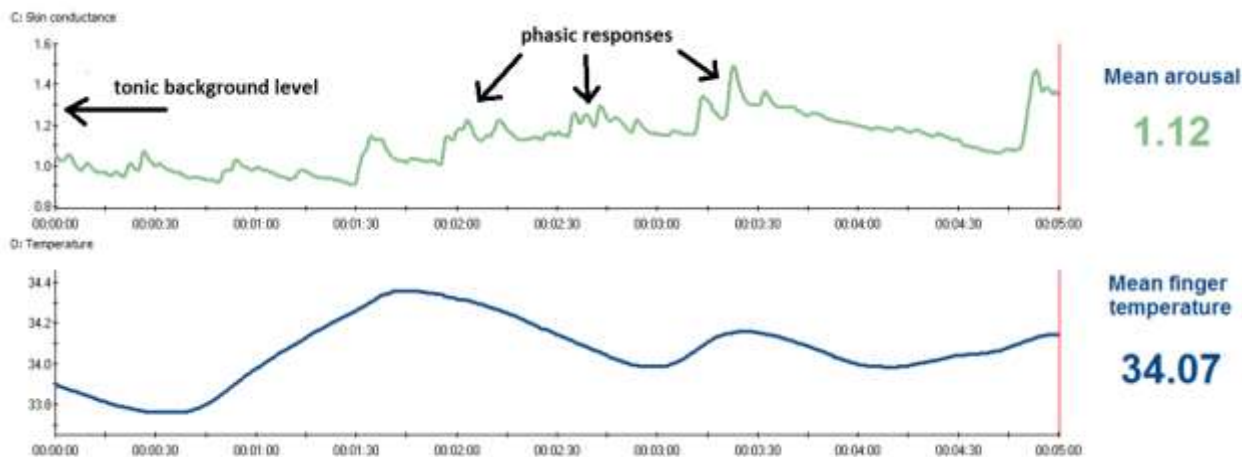
Whether you are recording an assessment or running a biofeedback session, you will be looking for changes in the signal's direction (going up or down), amplitude (in units of measure) and frequency (number of responses) to gather your clinical information.

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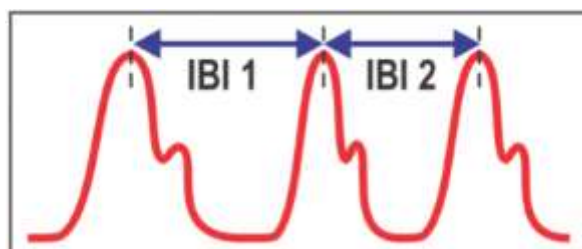
From those interbeat intervals, the software measures a client's heart rate (beats/min) and the variability of the heart as it speeds up and slows down.

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 DeStress Solution uses is to feel the movement of the belly as the individual inhales and exhales. From that, we can extrapolate their breathe cycle and provide feedback.

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 DeStress 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 respiration and heart rate variability). Before you start, though, it is important to assess your client's current physiological reactions to stress, which is the starting point for the DeStress Solution: the Stress Test.

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 DeStress Solution and the TPS sensor.
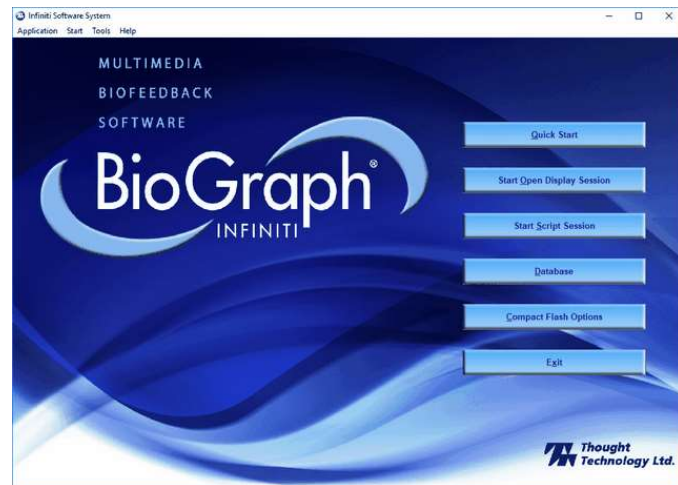
Setting preferences

To manage global settings for your BioGraph Infiniti system, select **Preferences** from the **Tools** menu in the Main Menu Screen.
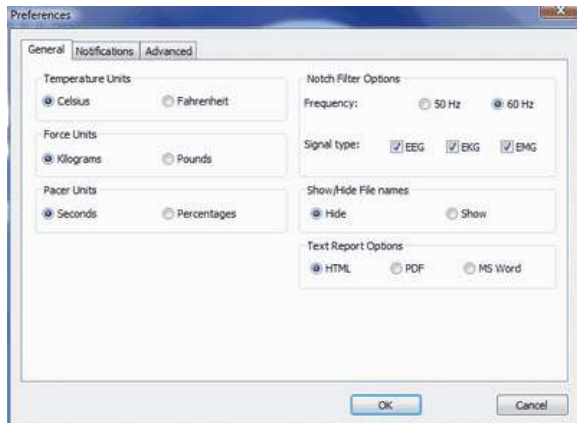
In the **General** tab you can select values for the following global settings. These settings affect all channel sets.

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.
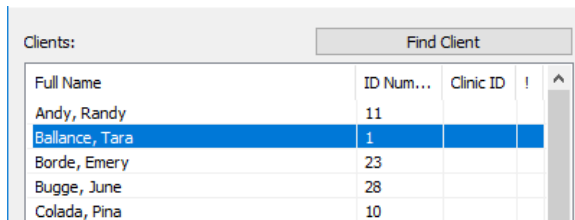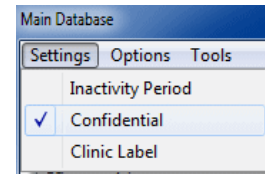
Text report options

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

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.*
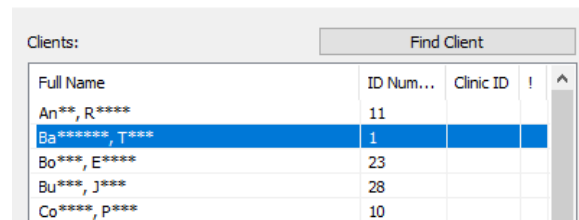

Confidential setting

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.

Main Database		
Settings	Options	Tools
	Inactivity Period	
✓	Confidential	
	Clinic Label	

Clients:					Find Client
Full Name		ID Num...	Clinic ID	!	^
Andy, Randy		11			
Ballance, Tara		1			
Borde, Emery		23			
Bugge, June		28			
Colada, Pina		10			

With the *Confidential* setting disabled

Clients:					Find Client
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

## 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**.
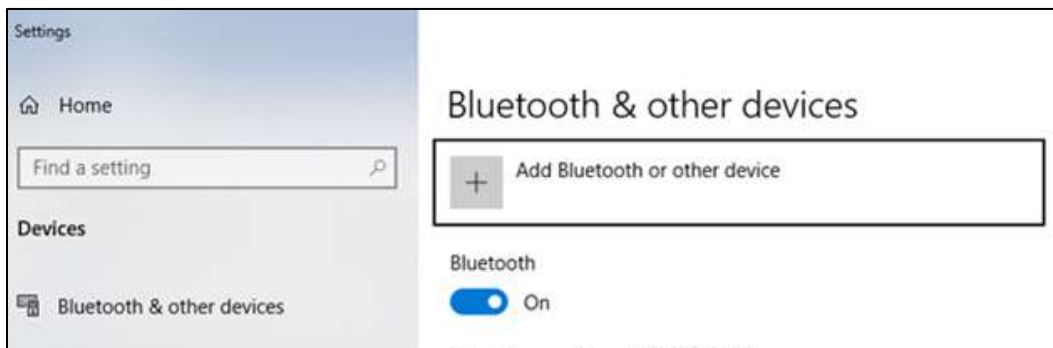

3. Click on **Add Bluetooth or other device.**

4. From the Add a device window, select the **Bluetooth: Mice, Keyboards, pens, or audio and other kinds of Bluetooth devices** heading.
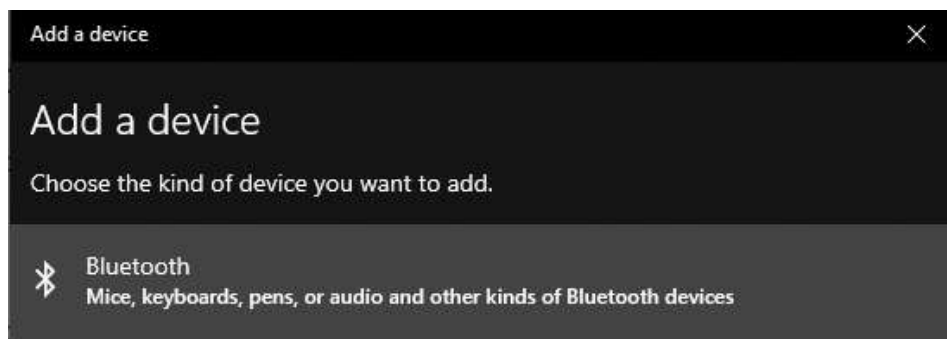
5. Locate your TPS sensor in the list. In the below example, the located sensor is identified as **TPS TP001859**.
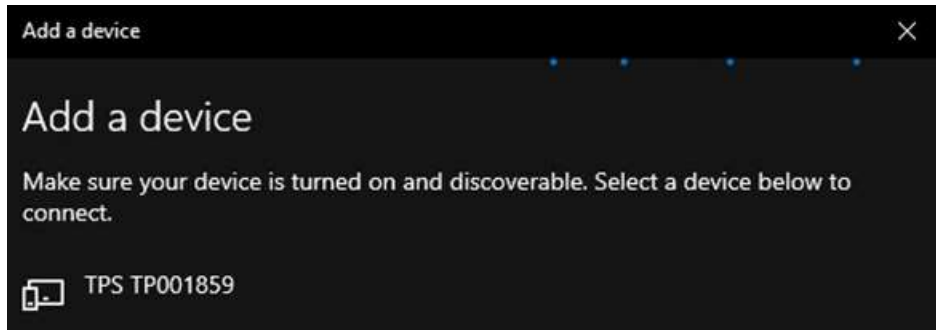
6. Select the TPS. The system will take a moment to connect to the device. The device will be listed as **Paired** when the process is complete, as shown below. Click **Done** when finished.
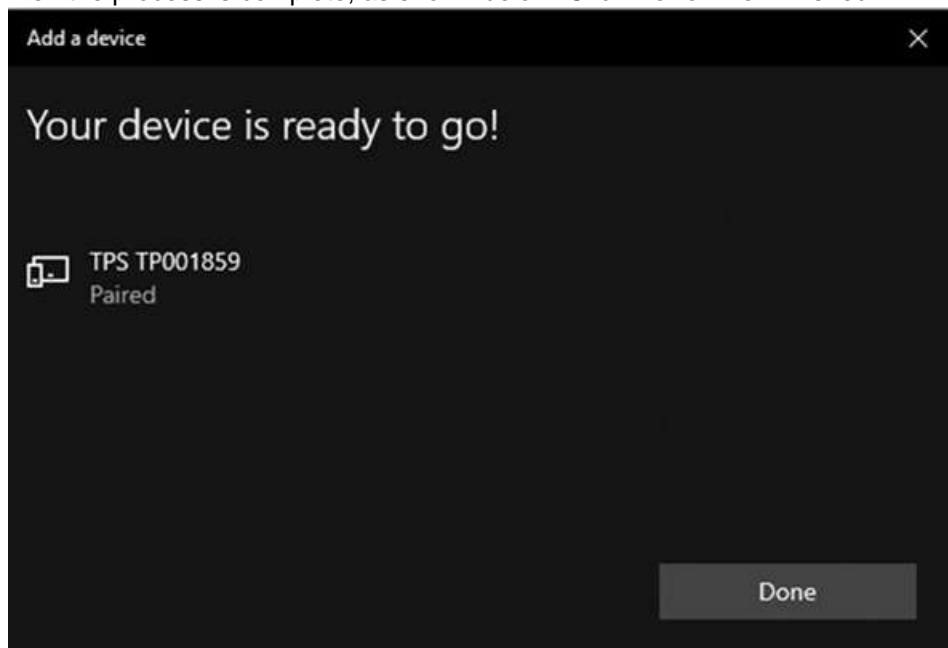
TPS Sensor placement

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.
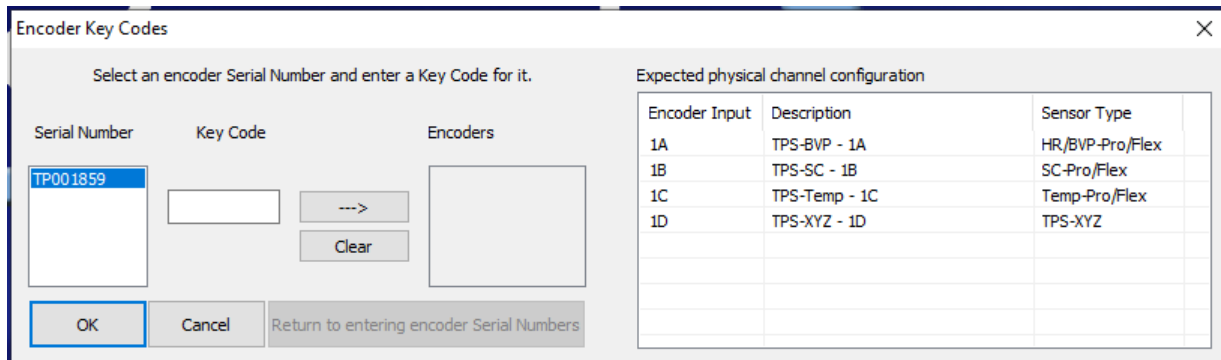

We advice to apply the sensor at least 2-3 minutes before recording a session. This is due to the temperature sensing component, which requires that time to "warm up" to the client's current temperature.

Entering key codes

The first time you start to record a session with DeStress 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 encoder with your existing installation. These key codes will have been provided on a form with your order.

1. Turn on the TPS sensor. (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 your unit's serial number in the left table (in this example, TP001859; this is the same number as on the unit).

In the above example, the serial number the system would request would be for TP001110.

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. When done, click **OK**.

7. Now the **Application Key Code** dialog box opens.

8. Enter the **Application Key Code**.

9. When done, click **OK**.

Application Key Code   ✕

Enter the Application Key Code.

688046204

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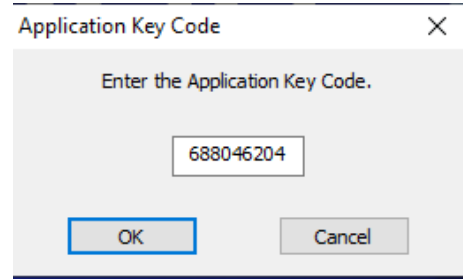
If the key codes have been entered properly and there is no problem with your encoder setup, the recording screen will open.

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

Software Help Function

The DeStress Manual is written to provide you will all the necessary information for getting the most out of this program. Some features of the software platform, BioGraph Infiniti, 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 **Learning Control** biofeedback 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.

DeStress Solution Overview of Sessions

The DeStress Solution divides the evaluation and interpretation of an individual's stress profile, as well as the teaching of self-regulation techniques, into different selectable sessions. Each session is designed to focus on a particular aspect of the physiological markers of stress. This section of the manual will briefly outline each available session, before going into further detail about each individual component.

- **Stress Test**: As the principal starting point for the DeStress Solution, this 10-minute assessment records how your client responds to alternating stress and rest periods. The measured stress markers are then analyzed and explained in a stress profile, identifying strengths and weaknesses in the client's responses. If the results suggest need for improvement, a choice of relaxation exercises and/or self-regulation sessions for learning control can be pursued.

For clients that would benefit from improving stress resilience, whether suggested by the Stress Test or other clinical perspectives, the DeStress Solution offers several sessions for teaching relaxation and self-regulation.

- **Relaxation Exercises**: The software guides the client into relaxation by either following paced breathing or guided induction. These sessions are best for therapists who are new to stress management or prefer-a hands-off approach with their client's learning. These sessions last 13 to 14 minutes.

- **Learning Control with Biofeedback**: These sessions focus on teaching self-regulation based on a particular facet of the physiological stress response, whether it be the arousal, finger temperature, heart rate variability, and/or breathing. Each session includes several ways of displaying the necessary data, and providing feedback in the form of sound, animations, videos, or games. The duration of these sessions is up to you and your client.


First step: 5 Activity Stress Test

The principal component of the DeStress Solution is the stress assessment. The 10-minute assessment takes your client through alternating periods of stress and rest, records the changes in arousal, temperature, and heart rate variability which occur in each stage of the test, and allows you to visualize these changes so you can understand how your client was able to deal with stress and return to restful state. Using the stress test, you can observe physiological reactions and identify possible problems. *Note: we do not examine breathing during the Stress Test.*

The "5 activity stress test" takes 15-20 minutes to administer (from applying the sensor to generating a report) and gives you and your client information about each stage of the test. For the test to be successful and generate useful clinical information, you have to instruct and guide your client along the way by following the instructions on the screen and prompting him at the right time. This way, you can make sure that the client stays as engaged as possible in the exercise.

Running the Stress Test

1. Turn on the TPS. (See Sensor configuration, starting on page 8.)

2. Place the sensors on the client. (See Sensor placement, starting on page 9.)

3. Click **Quick Start**.
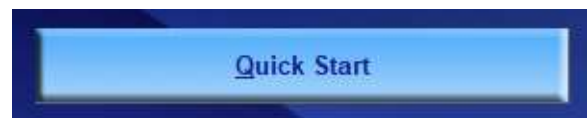
4. From **Clients**, select a name. If this is the first time you record a session for this client, instead do the following:

   - Click **Add New Client** to add their name to the listing.

   - Type in a **First Name** and **Last Name**. Click **OK** to create the client file. The new client's name is automatically selected.

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

6. From **Categories** dropdown, select the **DeStress Solution - 1 monitor (**or **2 monitors).**

The difference between the choice of 1 or 2 monitors is whether you are using a 1 or 2 monitor computer setup. A 2-monitor setup allows for the client to see limited information, such as instructions and display information, that is relevant to each task at hand. A 1-monitor setup requires you to occasionally turn the computer screen to the client so that they may understand the instructions or perform the relevant task.

7. From **Favorite**, select **5 Activity Stress Test - 1 monitor**

8. Click **OK.**

When you launch the assessment, after selecting a client and clicking OK, the **Stress Test** introduction screen appears, as shown to the right. Click the **Start** button when your client is ready to go.


Note that the Stress Test requires you to complete the full 10-minute recording. You can prematurely end the session by clicking the red **Stop** button. This will lead to none of the data being saved.

The first instructions screen will be the overview of the Stress Test. It provides the general breakdown of the whole evaluation, as well also describes the signal verification baseline recording steps that will begin soon. The client should be seated comfortable.

Take this moment to explain these steps your client, and when ready press a key on the keyboard to proceed.
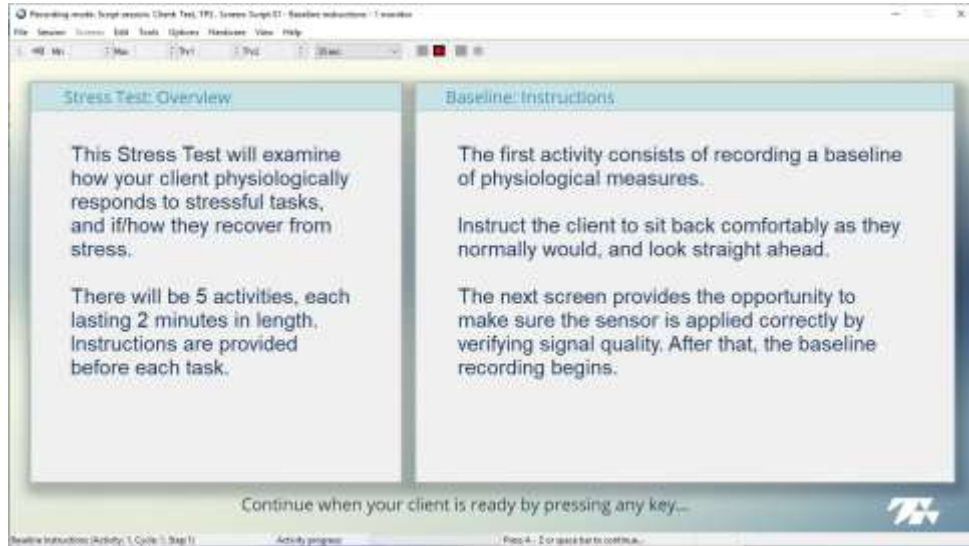

Instructions steps like this one are embedded throughout the recording. They will appear before each new task and explain what must be done. Advancing from an instruction step to the recording step is always done the same way: by pressing a key on the keyboard.

Signal verification

The signal verification step is you first exposure to the signal waveform that are being collected by the TPS sensor. The displayed signals are, in order from top-to-bottom: arousal, temperature, finger pulse, and heart rate. 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:
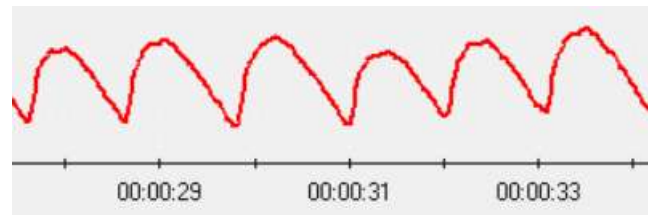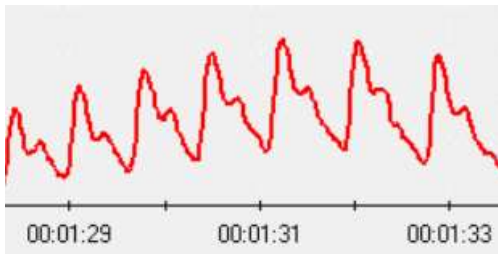
You may also use this time to coach the client on keeping their hand comfortably still, in order to avoid generating fake readings. Having a pillow in their lap can be helpful for keeping the hand immobile, and yet comfortable.

When ready, press a key on the keyboard to start the baseline recording. If it has not already been done, make sure the client is not able to see the monitor screen.

Baseline recording (2 minutes)

This activity records physiological data in the "initial" state. The recording screen will look exactly like the previous signal verification screen, and will reappear throughout the Stress Test for almost all recording steps.

The client should be seated relaxed and sitting comfortably in their chair. They should remain quiet and breathe normally for the 2-minute period. The screen will automatically display new instructions at the end of the period.

Color words (2 minutes) & Rest (2 minutes)

After the baseline, the Stress Test pauses for the Color Words instructions.

The client must perform a mentally challenging task under controlled pressure for 2 minutes. The Color Words test shows words, on the screen, written in different colors. The client has to say the color of the words but not read the actual word. The example below would require the client to say: "green, red, orange, blue, yellow".
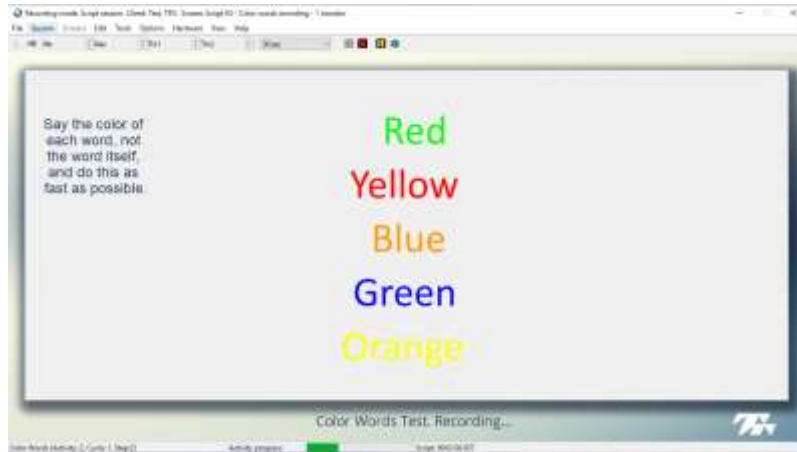
The words stay on the screen for varying amounts of time. The pace is fairly slow at the beginning but slowly accelerates to become more difficult. There will be a "ticking" sound that adds the sense of time pressure. To make the test more stressful, you may optionally follow your client's responses and comment assertively each time he makes a mistake. For example, you can say "Wrong!" at each error. You can also say "Next!" or prompt him to "Go faster!" if you notice fatigue or a slowdown in your client's pace.

Keep in mind that the idea of the stress activity is not to help your client get the answers right, it is to put him in a controlled stressful situation. For the test to work, there must be observable physiological responses, so you have to create enough pressure for this to happen.

At the end of the 2-minute Color Words test, the screen will automatically change and a Rest activity immediately begins. The Rest period also last for 2 minutes, and provides the client the opportunity to calm themselves. You may tell them to sit back, relax and breathe normally, but do not encourage them any further. This is a test to see how they naturally destress following a stressful event. If they wish to discuss the previous activity, encourage them to wait until the rest period is complete. If using a 1-monitor setup, the Color Words test is the only activity where the client needs to see the computer screen. Once the Rest period has begun, turn the monitor away from them. If using a 2-monitor setup, the software will automatically make the colored words visible to them on the 2nd monitor when it is necessary.

When ready, press any key on the keyboard to begin the Color Words stressor.

Math Test or Stressful Event Recall (2 minutes) & Rest (2 minutes)

Following the rest recording period, the software pauses for the next two activities' instructions. The next stressful task must be selected from the two following options: either a math test or stressful event recall. Only one may be performed by the client, and both last for 2 minutes.

Math Test	*Stressful Event Recall*
The math test is an impersonal stressor, that requires the client to quickly perform mental math. It is easy to set up and administer.	The stressful event recall is a personalized stressor that requires the client to recall a previously stressful event. It takes 30 to 60 seconds to prepare, however can be useful due to the individualized nature of the task.
If you choose the math task, provide the client with a number (such as 1081). Their job consists of subtracting 7 from that initial number, then verbally giving you the result, then subtracting 7 again from the results to provide a new result… And this continues for the entire period.	If you choose the stressful event recall task, give the client a moment to recall an event from nott oo long ago that made them feel uncomfortable or stressed. You can optionally have the client verbally describe the situation they are recalling. Only begin the recording when they have found their stressful event.
Example: 1081 – 7 = 1064; 1064 – 7 = 1057; 1057 – 7 = 1050; Etc.	
You have to provide them feedback with the words "right" or "wrong" as appropriately, and give them the correct number is they gave the wrong answer. Encourage them to keep up pace as well.	Encourage them to recall the event with as many senses as possible, and how it made them feel.
In this document's appendix, there are number sheets with each answer from 1081 to zero, based on serial 7 subtraction.	

Regardless of which stressful task was performed, at the end of that 2-minute period the screen will automatically change and a Rest activity immediately begins. The Rest period also last for 2 minutes, and provides the client the opportunity to calm themselves. You may tell them to sit back, relax and breathe normally, but do not encourage them any further. This is a test to see how they naturally destress following a stressful event. If they wish to discuss the previous activity, encourage them to wait until the rest period is complete.

When ready, press any key on the keyboard to begin the Color Words stressor.

End of session

Following the rest recording period, the software will briefly display the meesage: "The Stress Test is completed. Great job! Press a key to save the session...." To end the Stress Test, press any key on the keyboard. A prompt will 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 can proceed to generating the Stress Test Report.
- If you click **No**, the program asks if you want to record another Stress Test or returns 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 Stress Test, you go into review mode to generate a report and analyze the data.

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 the Stress test report. Refer to the next section on how to accomplish this.

The other two 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.

Review screens

Artifact rejection The screen purpose is to perform artifact rejection on interbeat intervals (IBI). IBIs (refer to orange graph) that have unusual low or high values in comparison to neighbouring IBIs have to be removed. The finger pulse (red graph) can also be an indication if the corresponding IBI needs to be removed.	
Signals trends The screen shows trend graphs of the arousal (SC), temperature, heart rate and HRV Power. Use this screen to look for tendencies in the signal directions and confirm that self-regulation training is generating the desired change in physiology.	
Line graphs and means The screen shows line graphs of arousal (SC), temperature, heart rate and HRV power. Use this screen to review the data that was recorded and the averages.	

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.
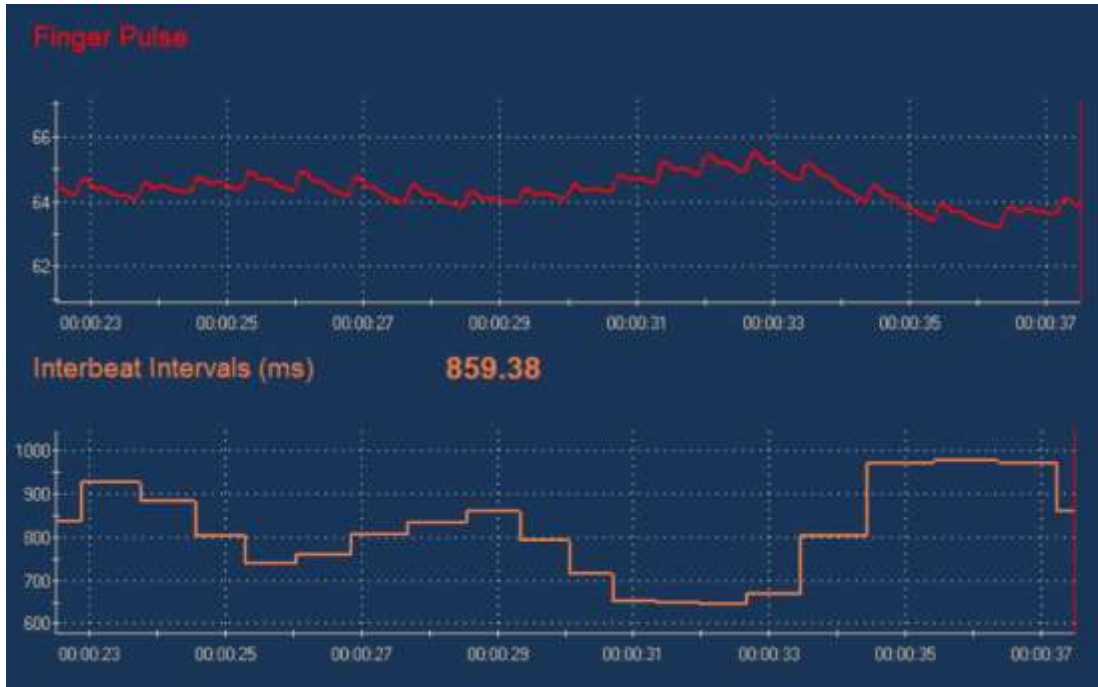
The Artifact Removal screen allows you to review a session and see how missed or extra beats in the finger pulse signal (red) distort the inter-beat interval (IBI) data (orange). The above image is clean data and the below image has artifacts identified. Notice that in the below image, some of the artifacts in the Finger Pulse line graph do not lead to any perceived artifact in the Interbeat Intervals line graph.
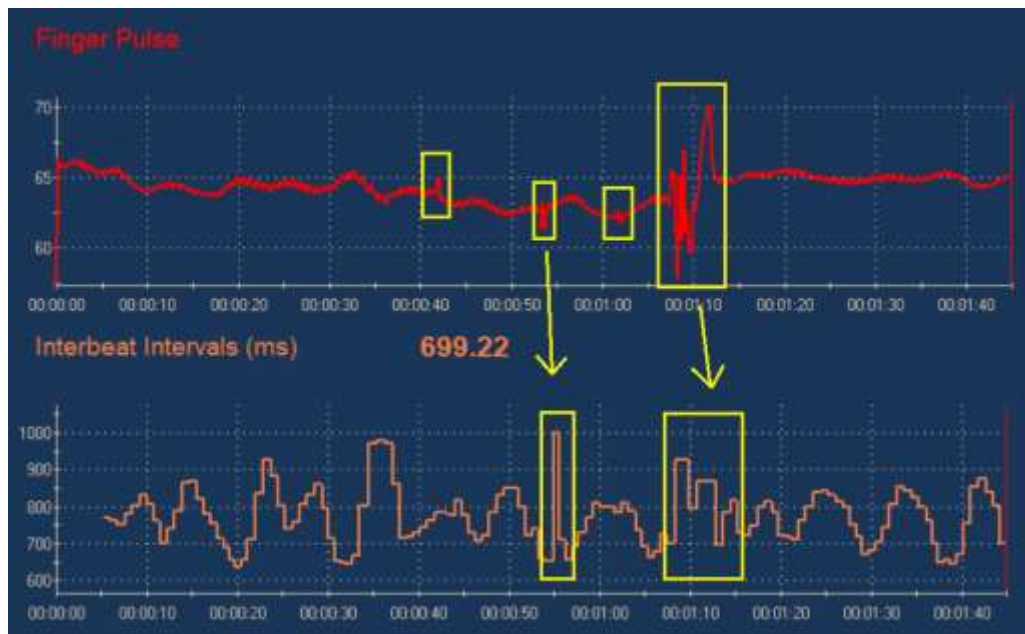
The easiest method for correcting artifacts is to visually review the interbeat interval signal and place artifact rejection segments over each artifact. To do this:

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

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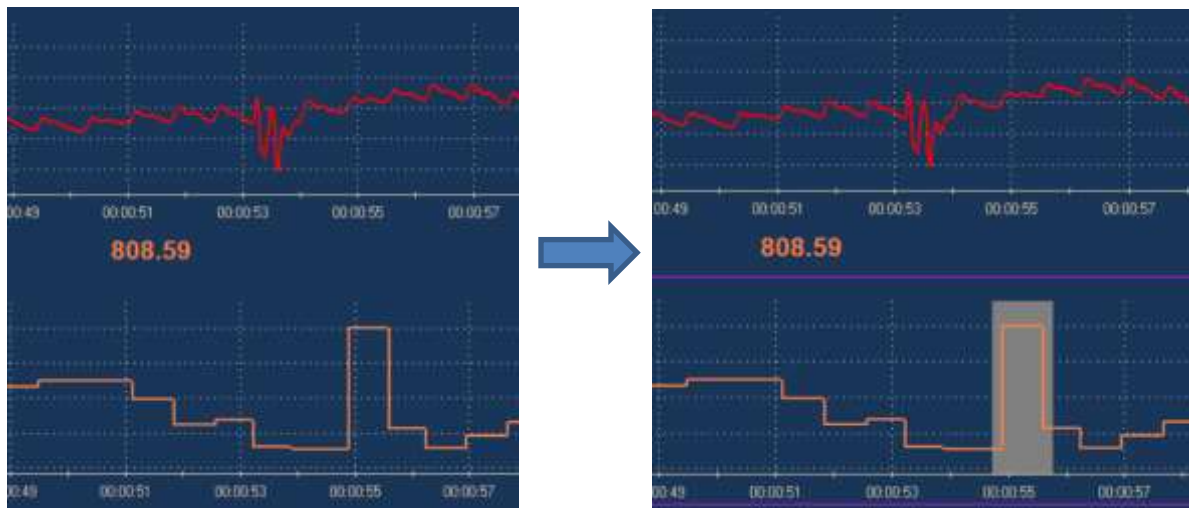
6. Do this over all section of signal which appear distorted in the Interbeat Interval line graph.

    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**.

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

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

Stress Test Report

Generate the Stress Test 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.
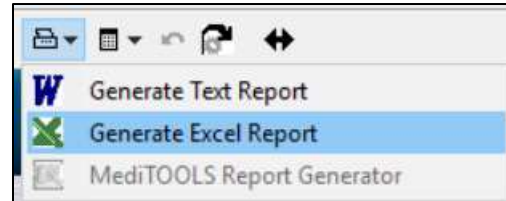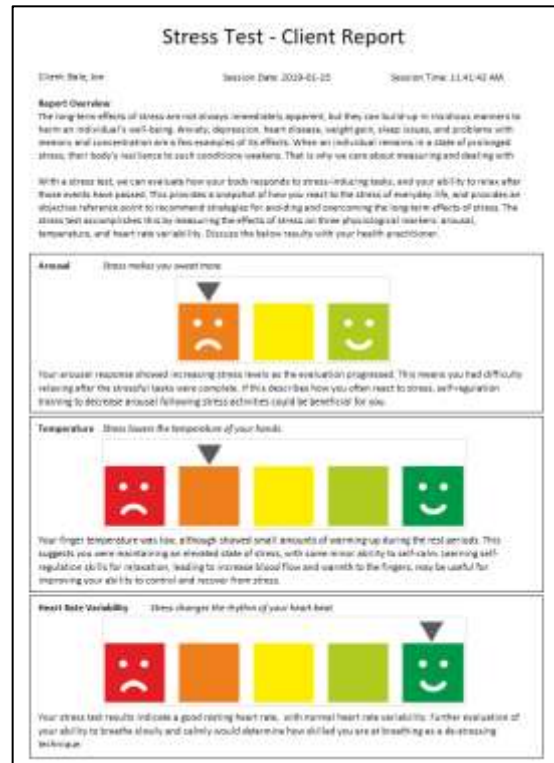

The Stress Test Report will now appear. The report is a 2-page document that outlines and provides basic interpretation on the results of the Stress Test. The first page is designed for you, the therapist. The 2nd page is simplified report designed for your client.

Page 1 – Clinician Report   Page 2 - Client Report

Page 1 / the Clinician report shows:

- Four trend graphs of relevant metrics, ordered by activity of the Stress Test. The graphs represent, from top to bottom, arousal (µS), temperature (°C or F), heart rate (beats/min), and heart rate variability spectral frequency rhythms (percent power).

- Interpretations of each trend are found directly adjacent to the related graph.

- Additional displays for percent change from baseline to stressors for arousal and temperature, as well as a table of heart rate variability SDRR values.

Page 2 / the Client report shows:

- General overview of why measuring stress and this Stress Test are useful.

- Simplified interpretation of the client's results for the three general categories of stress marker metrics: arousal, temperature, and heart rate variability. Each section is accompanied by a colored rating marker that exemplifies the individual's scoring. Temperature and HRV have 5-point ratings from not desirable (red) to good (green), while arousal has a 3-point rating from 'less desirable' (orange) to 'likely good' (light green).

Results on the Clinician's report may be too complex for your client to comprehend, which is why the Client report is simplified. It is your decision if you want to go into the details of the Clinician report data with your client or not.

It is important for you as the therapist to also fill in the human element that the report cannot provide: asking the client how they felt following each activity, 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.

Understanding the Basis for the Report Interpretations

When a person suddenly faces a demanding situation, the stress response (fight or flight) causes an increase in hand sweatiness and a decrease in blood flow to the hands and feet. Hand sweatiness increase translates into an increase is arousal while reduced blood flow translates into cooling down of the fingers. This reaction is directed by the sympathetic nervous system.

- During the Color Word and Math test activities, you should normally see an upward trend in the arousal average and a downward trend in the temperature average.

When the stressful demand stops and the person can start relaxing, the parasympathetic nervous system takes over and the person's physiology can return to normal. Arousal should decrease and temperature should start increasing.

- During the Baseline, Rest activities, you should expect opposite trends: Arousal should be going down and temperature up. The interpretation looks for these 'relaxation' trends and compares the values back to the measurements from the baseline and stressors.

The baseline activity shows you the initial state of your client's physiology. It may not represent his true "resting" state since having to do a test involving sensors and computers may not be completely without stress but, if you've explained the procedure and what is expected of him prior to running the test, it should still be fairly representative of a "non-aroused" state. After each stress period, during the rest period, you should see a tendency in both signals to return toward the resting values.

- You may notice plateauing. This occurs when signals do not fully return to baseline values but stabilize somewhere in between, and the signals stabilize at a higher value during the 2nd Rest compared to the 1st Rest. This is a pattern worth noticing because it may be a sign that this person builds up stress levels over time and has a hard time relaxing.

The complexity of heart rate variability does not allow for it to be easily summed up in terms of sympathetic vs parasympathetic engagement, however we do see equivalent trends in the data. Heart rate variability can be described as the hearts ability to oscillate from a low heart rate, to a higher heart rate, and back to a low one during a single breath. Stress decreases heart rate variability because the nervous system's fight-or-flight response is pushing for the heart rate to remain at an elevated speed during each breath. This means:

- As stress increases, so does the average heart rate.

- As stress increases, heart rate variability goes down, which means the Low Frequency (LF%) and SDRR will both decrease.

- As an individual relaxes and breaths slower, average heart rate goes down while heart rate variability (LF% and SDRR) increases.

Clinical heart rate variability is less concerned with readings during stress challenges, and more concerned with readings when at rest. It is also worth noting that although the respiration rate is not being measured in this evaluation, rapid breathing is often the source for decreased HRV values.

You may notice atypical responses in one or all signals (such as arousal decreasing during a stressful activity or temperature decreasing during a resting period). These atypical patterns are worth noting since they may reflect various physical or mental responses.

If as a therapist you are already familiar with the metrics of stress and their interpretation, feel free to go into more elaborate details and discussions of the results. As always, asking questions is key to understanding why your client may have poor stress responses in their everyday life.

It is not within the scope of this manual to provide more detail about the clinical interpretation of physiological changes during stress test assessments. You can find an in-depth discussion of the subject in a number of books, such as *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.

Second step: Relaxation Exercise or Learning Control with Biofeedback

Following the results of the Stress Test, you may have identified in your client a poor physiological response to stressful situations. Based on that poor response, you can now offer a choice of sessions for teaching relaxation, stress management, and self-regulation to encourage a healthy autonomic nervous system response.

Depending on your or the client's preferences, there are two types of sessions available:

- **Relaxation exercises**: The software guides the client into relaxation with either paced breathing or guided induction. These sessions are a complimentary technique for teaching stress management. They are especially useful for therapists who are new to stress management or individuals that prefer a hands-off approach to learning. These sessions last 13 to 14 minutes.

- **Learning control**: These sessions focus on teaching self-regulation based on a particular facet of the physiological stress response, whether it be the arousal, finger temperature, heart rate variability, and/or breathing. Each session includes several ways of displaying the necessary data, and providing feedback in the forms of sound, videos, or games. The duration of these sessions is up to you and your client, as well as which display screen to use.

This section of the manual will first describe how to run a Relaxation Exercise, and then it will describe running a Learning Control with Biofeedback training session

We are aware that some therapists will forgo running a Stress Test, based on performing alternate evaluations, in favor of immediately pursuing an avenue for teaching self-regulation. The design of the DeStress Solution allows for a clinician to jump straight to training, if so desired.

Running a Relaxation Exercise

There are 2 choices of relaxation exercises to choose from:

- The **Paced Breathing Relaxation Exercise** has the client following a breath pacer with their breathing. At the beginning of the session, the pacer imitates 9 breathes per minute. Over the duration of the exercise, the pacer (and the client following along) descends to 6 breaths per minute. This exercise places a focus on breathing
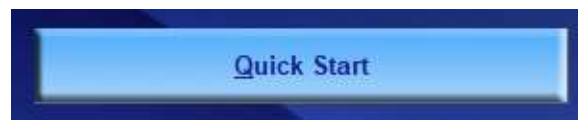
  Slow diaphragmatic breathing exercises are commonly taught in many stress management classes because they naturally promote relaxation. For this exercise to be done properly, you have to teach your client to breathe with their abdomen, instead of with their chest or shoulders. Have them place a hand, flat over his belly button, to feel the breathing movement and help him become aware of any chest expansion or shoulder movement. When teaching your client to breathe abdominally, pay particular attention to how deeply he is breathing. Breathing too deeply can lead to over breathing and make them feel dizzy. Have the client reduce the depth of their breathing until it becomes slightly uncomfortable and then increase the depth of their breaths just enough to be comfortable again. Have them practice breathing like this on their own before starting with the exercise.

- The **Guided Relaxation Exercise** has the client listening to a recording of instructions to teach them to pay attention to their body and consciously relax their muscles, going from their head to their toes. The session is composed of three stages. During the induction period (8 minutes), the speaker guides the client to go into deeper and deeper relaxation. The relaxation "integration" period (3 minutes) provides no verbal guidance but allows the client to develop awareness of the state of relaxation. During the third period (2 minutes), the speaker guides the client to return to full awareness using positive affirmations.

  This session is best suited for use in a quiet environment, or for use in conjunction with a headset to block out other noises.

The procedure for initiating either sessions is almost the same:

1. Turn on the TPS. (See Sensor configuration, starting on page 8.)

2. Place the sensors on the client. (See Sensor placement, starting on page 9.)

3. Click **Quick Start**.

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

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

6. From **Categories** dropdown, select the **DeStress Solution - 1 monitor (**or **2 monitors).**

The difference between the choice of 1 or 2 monitors is whether you are using a 1 or 2 monitor computer setup. A 2-monitor setup allows for the client to see limited information, such as instructions and display information, that is relevant to each task at hand. A 1-monitor setup requires you to occasionally turn the computer screen to the client so that they may understand the instructions or perform the relevant task.

7. From **Favorite**, select the appropriate **Relaxation Exercise: Guided** or **Paced Breathing**

8. Click **OK.**

The appropriate relaxation exercise introduction screen appears, as shown on the next page. Click the **Start** button when your client is ready to go.

You can prematurely end the session by clicking the red **Stop** button, as show below, however this will lead to none of the data being saved.


Relaxation Exercise: Guide

The first instructions screen will be the overview of the exercise. Instruct your client to listen to the speaker's voice and follow her instruction. There will be moments of silence, where your client should continue to maintain relaxation. The client can perform this task with eyes open or closed, although we suggest eyes closed.

Take this moment to explain these steps your client, and when ready press a key on the keyboard to proceed.

The display screen will remain the same for the entire recording: an arousal line graph, with displays for starting arousal levels and heart rate variability.

Following the end of relaxation exercise, save the session and enter review mode (See Reviewing the session, starting on page 8). The review mode display will identify the trends for all relevant metrics of stress.
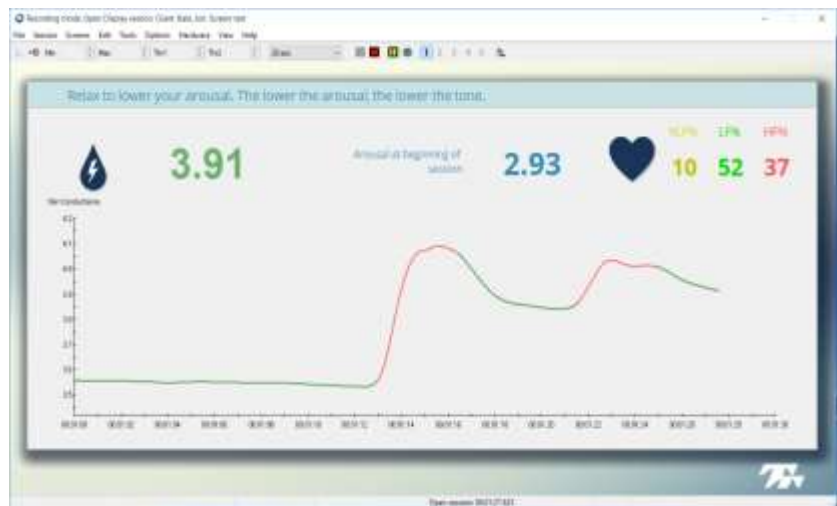
Ideally, we want to see the following trends as the session progresses from induction and into the relaxation stages:

- A decrease in the arousal
- An increase in the temperature

Although not required, it would be good if the heart rate (beats/min) showed a decreasing trend, and to see an increasing trend in the LF% green band for heart rate variability.

Relaxation Exercise: Paced Breathing

The first instructions screen will be the overview of the exercise. Before the actual paced breathing begins, there is a 2-minute baseline.

Once the baseline is complete, the paced breathing instructions appear. The exercise requires the subject to see the computer screen to follow a breathing pacer. As the circle rises, they should inhale. As the circle falls, they should exhale. There will also be sounds that play for the inhale and exhale, if your client prefers to perform the exercise with eyes closed.

Take this moment to explain these steps your client, and allows them to practice with the on-screen practice pacer. When ready press a key on the keyboard to proceed.

The display screen will remain the same for the paced breathing task: a breath pacer will ball that rises and fall, as well as line graphs for arousal, temperature, and heart rate.

Following the end of relaxation exercise, save the session and enter review mode
(See Reviewing the session, on page 19, for a review of these instructions). The review mode display will identify the trends for all relevant metrics of stress.
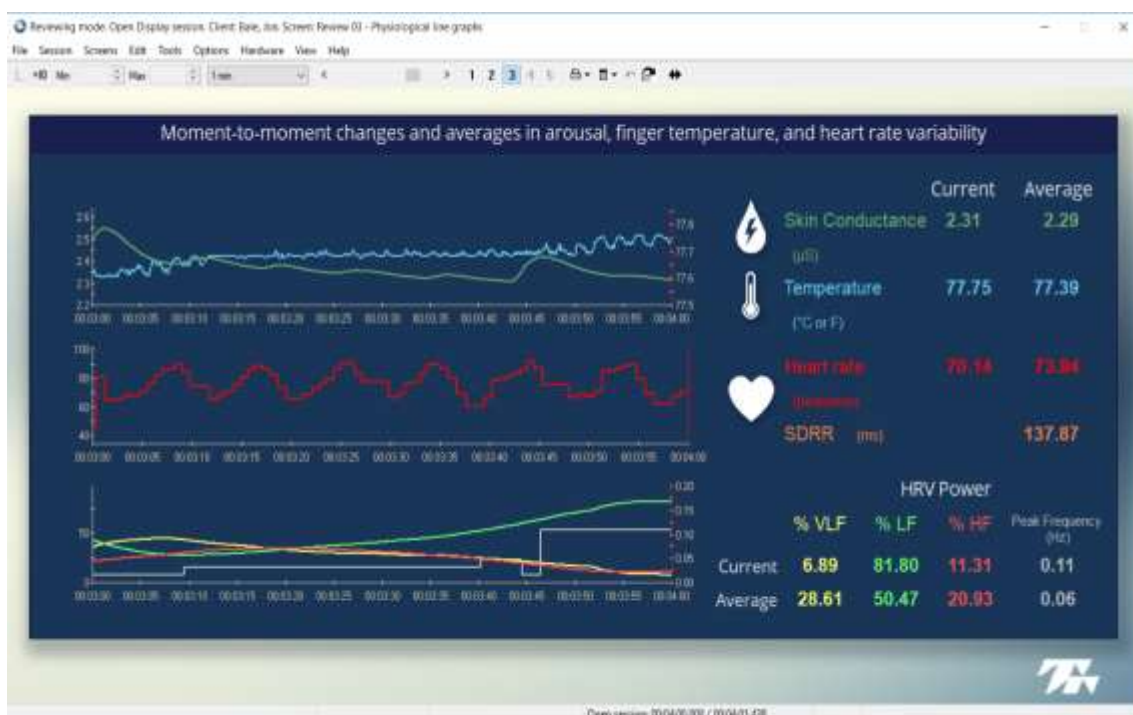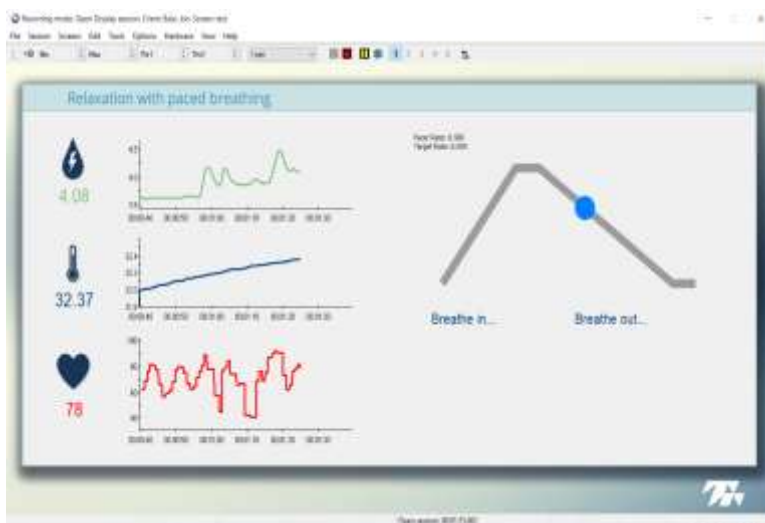
Ideally, we want to see the following trends as the session progresses:

- Rhythmic increases and decreases in the heart rate (red) line graph, as your client followed the pacer.
- An increase in the LF% band (green) for heart rate variability as the pacer rate decreased in speed towards 6 breaths per minute.

If arousal shows increasing values, it can denote the amount of focus the client is giving to the task or their discomfort. If the arousal were decreasing, it means they were easing into the task.

Running a Learning Control with Biofeedback session

There are 4 choices of Learning Control sessions from which to choose. Their names make it clear that they differ based on which stress metric they focus on for self-regulation training. As you explore each session, you will realize that they are each designed to present data and feedback based on how clinical success is best achieved with that metric.

- **Learning Control: Arousal** consists of a collection of four displays for teaching arousal control for stress awareness, relaxation, and thought control.

- **Learning Control: Heart Rate Variability & Breathing** consists of a collection of five displays for teaching calm diaphragmatic breathing to increase heart rate variability, teaching 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.

- **Learning Control: Temperature** consists of a collection of four displays for teaching temperature control for hand warming, deep relaxation, and recovery.

- **Learning Control: Zukor Feedback Games** is a unique session option that utilize elaborate feedback games, created by a 3rd-party. Not all therapists will have this option available. Refer to p.51 to learn more.


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 feedback sessions with your clients, you should notice these features and explain what is happening so that they do not cause your client distress or disturb the training session.

- *Automatic scaling*: as the signal is plotted along the line graph, it also 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 client 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.

  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.*

- *Breathing pacer*: A few display screen makes use of a pacer for guiding breathing. The pacer is set to mimic a specific respiration rate, which the client 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
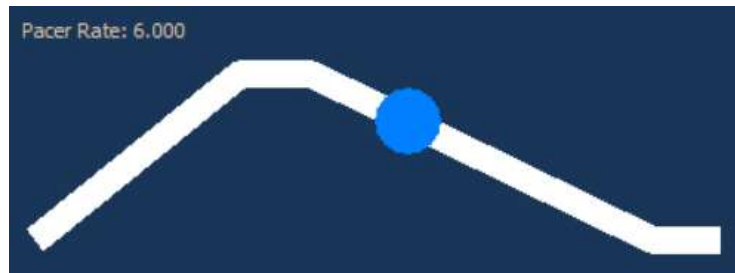
The pacer is an excellent tool for a new client learning the basics of diaphragmatic breathing. The pacer also allows for the shaping of breathing, since the rate it is representing can be modified by right-clicking on the instrument (before recording or during a session pause) and selecting **Edit Pacer Settings**. In the prompt that appears, change the **Target Rate** in order to alter the respiration rate speed that the pacer imitates.
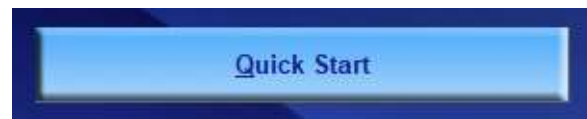
- *Switching between displays*: each session is associated with a group of display screens, where self-regulation training can be conducted from any one of them. To switch from one screen to another, place the cursor over the desired screen number in the Tool Bar and click the left mouse button. Switching 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.
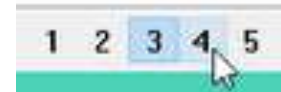
As you explore each session, you may find that certain displays work better for your therapeutic approach, or that your client responds preferentially to certain forms of feedback or games.

The procedure for initiating a Learning Control session remains similar to other sessions:
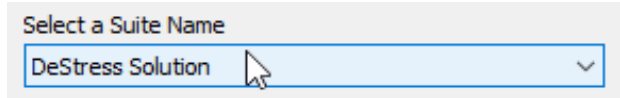
1. Turn on the TPS. (See Sensor configuration, starting on page 8.)

2. Place the sensors on the client. (See Sensor placement, starting on page 9.)
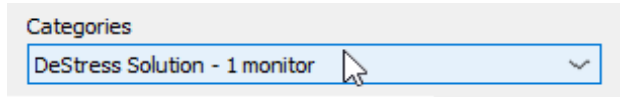
3. Click **Quick Start**.

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

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

Select a Suite Name

DeStress Solution

6. From **Categories** dropdown, select the **DeStress Solution - 1 monitor (**or **2 monitors).**

Categories

DeStress Solution - 1 monitor

The difference between the choice of 1 or 2 monitors is whether you are using a 1 or 2 monitor computer setup. A 2-monitor setup allows for the client to see limited information, such as instructions and display information, that is relevant to each task at hand. A 1-monitor setup requires you to occasionally turn the computer screen to the client so that they may understand the instructions or perform the relevant task.

7. Choose your desired **Learning Control** session. 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.

Learning Control: Arousal

Training 01 - Arousal line graph This screen is monitoring and training of arousal. It is for single monitor use. The screen is dominated by the arousal line graph. The signal changes colors based on whether arousal is increasing (pink) or decreasing (blue). An arousal response counter is found on the right, and it indicates the number of times that arousal has changed directions.	
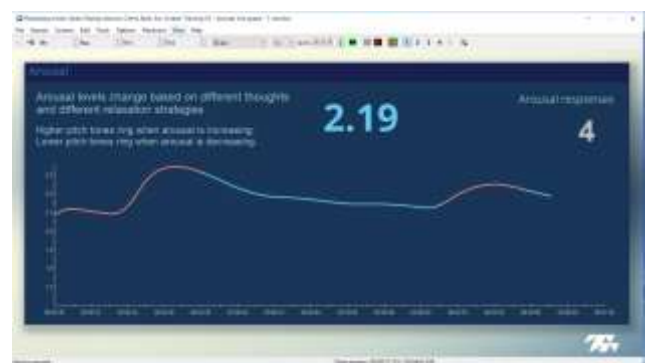
Feedback for the screen consist of the signal's color change and audio tones. The tone rings according to whether arousal is increasing (higher tone) or falling (lower tone).

Use this screen to explore which thoughts and relaxation strategies cause the subject's arousal to rise and fall.

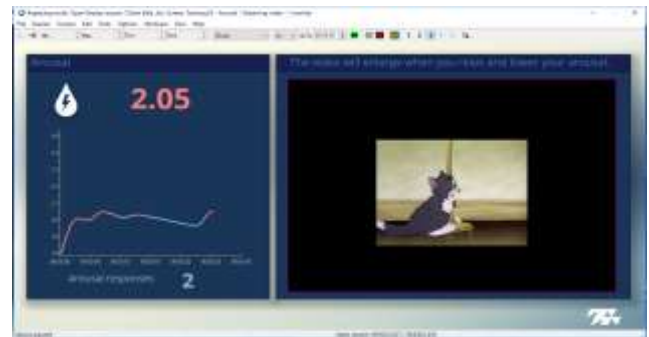|	
Training 02 - Arousal - Animation This screen is for monitoring and training arousal. It is for single monitor use. The left side of the screen has the arousal line graph. The signal changes colors based on whether arousal is increasing (pink) or decreasing (blue). An arousal response counter is also found on the right, and it	

indicates the number of times that arousal has changed directions.

The right side of the screen has the feedback animation. When arousal is decreasing, the animation activates. When arousal is increasing, the animation pauses. Music feedback follows a similar activation pattern as the animation: when the animation is moving, the music is heard clearly; when the animation is not moving, the music is only barely audible.

Use this screen to directly train arousal levels with clear visual and audio feedback.
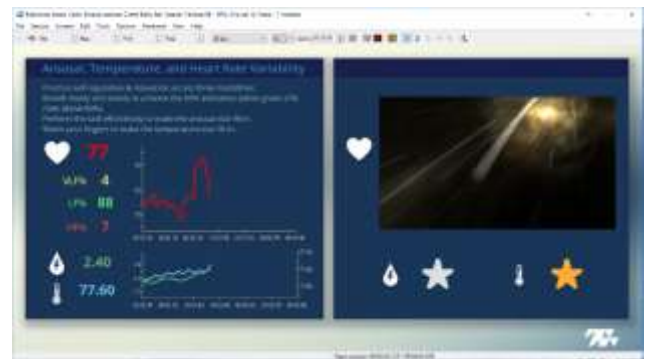
Training 03 - Arousal - Video Streaming

This screen works the same as the previous screen, however the animation & music is replaced with a Video Instrument. The video and sound play continuously, but when the arousal is increasing the picture shrinks, and when arousal is decreasing the picture enlarges.

Training 04 – HRV, Arousal, & Temp Power

This is the only screen in this selection of screens that monitors and trains all 3 metrics: arousal, temperature, and heart rate variability. It is for single monitor use.

The left side of the screen contains a line graph for monitoring heart rate (beats/min), displays for the spectral frequency percent of power data (VLF, LF, HF), and a multi-line graph for arousal and temperature.

On the right side of the screen are the sources of feedback. They are all pre-set:

- The animation is linked to the Low Frequency signal: the animation activates when LF% rises above 80%. When LF% is less than 80, the animation pauses. When the animation plays, music is also heard.
- One star animation is linked to the client's arousal: when arousal is increasing, the star remains grey and un-filled in. When the arousal is decreasing, the star fills in.
- The other star animation is linked to the client's temperature: when temperature is decreasing, the star remains grey and un-filled in. When temperature is increasing, the star fills in.

Use this screen to encourage your client to practice their general self-regulation. Training over multiple modalities is more difficult than a single modality, so this is not suitable for beginners. You can potentially place greater emphasis on the LF% component, while emphasizing the arousal/temperature star animations less.

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

Training 01 - Arousal line graph - 2m

This screen is monitoring and training of arousal. It is for dual-monitor use.

Both sides of the screen are dominated by identical arousal line graphs. The line graph signals changes colors based on whether arousal is increasing (pink) or decreasing (blue). An arousal response counter is found on the left side of the dual-monitor screen, and it indicates the number of times that arousal has changed directions.

Feedback for the screen consist of the signal's color change and audio tones. The tone rings according to whether arousal is increasing (higher tone) or falling (lower tone).

Use this screen to explore which thoughts and relaxation strategies cause the subject's arousal to rise and fall.
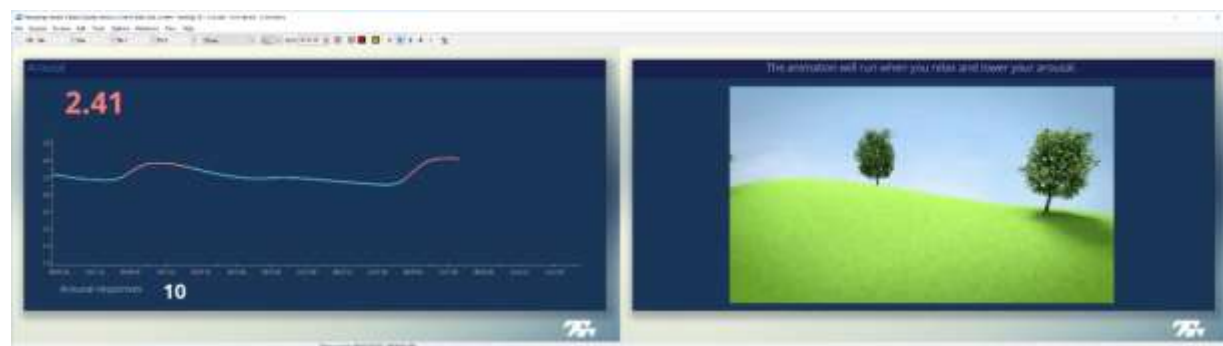

Training 02 - Arousal- Animation - 2m

This screen is for monitoring and training of arousal. It is for dual monitor use.

The Clinician's monitor (left) is dominated by the arousal line graph. The signal changes colors based on whether arousal is increasing (pink) or decreasing (blue). An arousal response counter is found below the line graph, and it indicates the number of times that arousal has changed directions.

The Client's monitor (right) contains the feedback animation. When arousal is decreasing, the animation activates. When arousal is increasing, the animation pauses. Music feedback follows a similar activation pattern as the animation: when the animation is moving, the music is heard clearly; when the animation is not moving, the music is only barely audible.

Use this screen to directly train arousal levels with clear visual and audio feedback.

Training 03 - Arousal - Video Streaming - 2m

This screen works the same as the previous screen, however the animation & music is replaced with a Video Instrument. The video and sound play continuously, but when the arousal is increasing the picture shrinks, and when arousal is decreasing the picture enlarges.

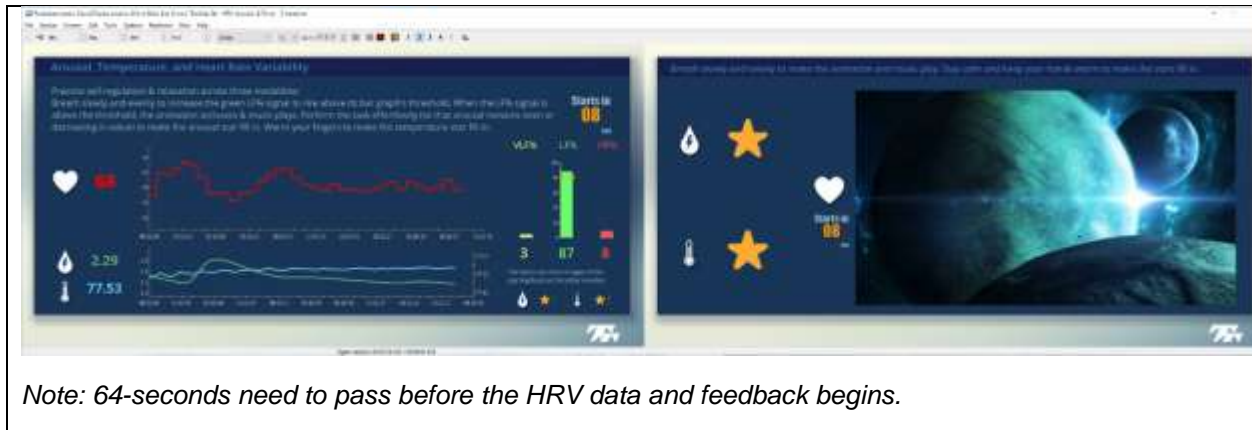*Training 04 – HRV, Arousal, & Temp Power – 2m*

This is the only screen in this selection grouping that monitors and trains all 3 metrics: arousal, temperature, and heart rate variability.

The Clinician's monitor (left) contains a line graph for monitoring heart rate (beats/min), vertical bar graphs for the spectral frequency percent of power data, and a multi-line graph for arousal and temperature. 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; orange). The Low Frequency graph also contains a feedback threshold that controls the large animation and music feedback of the screen. This threshold is manually set.

The Client's monitor (right) contains three sources of feedback animation:

- The animation is linked to the Low Frequency bar graph found on the Clinician's monitor. The feedback animation activates when the Low Frequency bar graph value rises above its threshold. When the animation plays, music is also heard. The threshold can be dragged to higher values (to make the task more difficult) or lower values (to make the task easier to achieve).
- One star animation is linked to the client's arousal: when arousal is increasing, the star remains grey and un-filled in. When the arousal is decreasing, the star fills in.
- The other star animation is linked to the client's temperature: when temperature is decreasing, the star remains grey and un-filled in. When temperature is increasing, the star fills in.

Use this screen to encourage your client to practice their general self-regulation. Training over multiple modalities is more difficult than a single modality, so this is not suitable for beginners. You can potentially place greater emphasis on the LF% component, while emphasizing the arousal/temperature star animations less.

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

Learning Control: Temperature

Training 01 - Temperature line graph

This screen is for monitoring and training of temperature. It is for single monitor use.

The screen is dominated by the temperature line graph. The signal changes colors based on whether temperature is increasing (blue) or decreasing (pink). On the right of the screen is a bar graph, that also represents the same temperature value and changes colors.

This bar graph contains a threshold, which is the basis for the color feedback: when temperature is above the threshold, features turn blue; when temperature falls below the threshold, features turn pink. By installation default, the threshold automatically follows the temperature value with a lag, in order to track change. If desired, the user can manually change the threshold to remain at a fixed value.

Feedback for the screen consist of the feature color change and audio tones. The tone rings according to whether temperature is increasing (higher tone) or falling (lower tone).

Use this screen to explore which imagery and thoughts enable deep relaxation, which lead to warming of the finger temperature.

Training 02 - Temperature - Animation

This screen is for monitoring and training temperature. It is for single monitor use.

The left side of the screen has the temperature line graph. The signal changes colors based on whether temperature is increasing (blue) or decreasing (pink). Adjacent to the line graph is a bar graph that also represents the same temperature value and color changes.

The bar graph contains a threshold, which is the basis for the color feedback: when temperature is above the threshold, bar and line graphs signal colors turn blue; when temperature falls below the threshold, bar and line graphs signal colors turn pink. By installation default, the threshold automatically follows the temperature value with a lag, in order to track change. If desired, the user can manually change the threshold to remain at a fixed value.
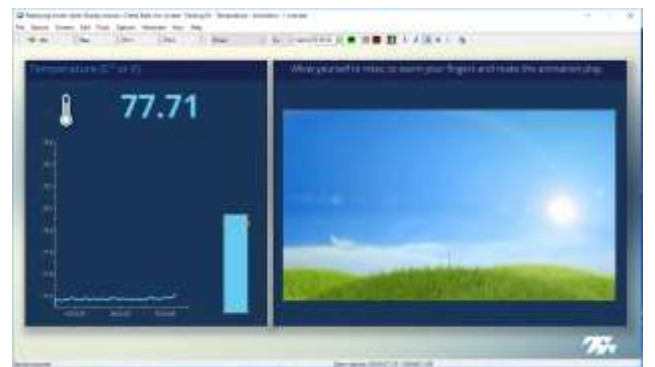
On the right side of the screen is the feedback animation. When temperature is increasing above the bar graph threshold, the animation activates by slowly playing. When temperature is decreasing below the bar graph threshold, the animation pauses. Music feedback follows a similar activation pattern as the animation: when the animation is moving, the music is heard clearly; when the animation is not moving, the music is only barely audible.

Use this screen to directly train finger warming with clear visual and audio feedback.

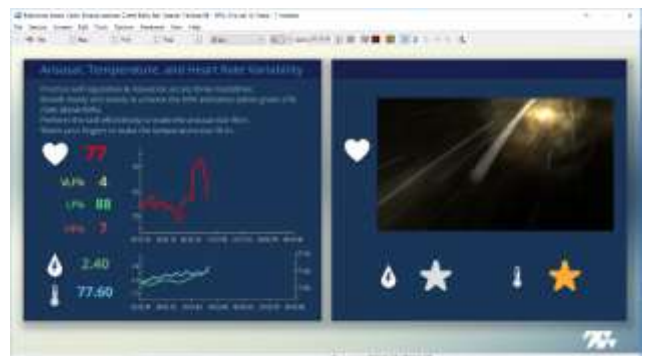### Training 03 - Temperature - Video Streaming

This screen works the same as the previous screen, however the animation & music is replaced with a Video Instrument. The video and sound play continuously, but when the temperature is decreasing the picture shrinks, and when temperature is increasing the picture enlarges.

Training 04 – HRV, Arousal, & Temp Power

This is the only screen in this selection of screens that monitors and trains all 3 metrics: arousal, temperature, and heart rate variability. It is for single monitor use.

The left side of the screen contains a line graph for monitoring heart rate (beats/min), displays for the spectral frequency percent of power data (VLF, LF, HF), and a multi-line graph for arousal and temperature.

On the right side of the screen are the sources of feedback. They are all pre-set:

- The animation is linked to the Low Frequency signal: the animation activates when LF% rises above 80%. When LF% is less than 80, the animation pauses. When the animation plays, music is also heard.
- One star animation is linked to the client's arousal: when arousal is increasing, the star remains grey and un-filled in. When the arousal is decreasing, the star fills in.
- The other star animation is linked to the client's temperature: when temperature is decreasing, the star remains grey and un-filled in. When temperature is increasing, the star fills in.

Use this screen to encourage your client to practice their general self-regulation. Training over multiple modalities is more difficult than a single modality, so this is not suitable for beginners. You can potentially place greater emphasis on the LF% component, while emphasizing the arousal/temperature star animations less.

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

Training 01 - Temperature line graph – 2m

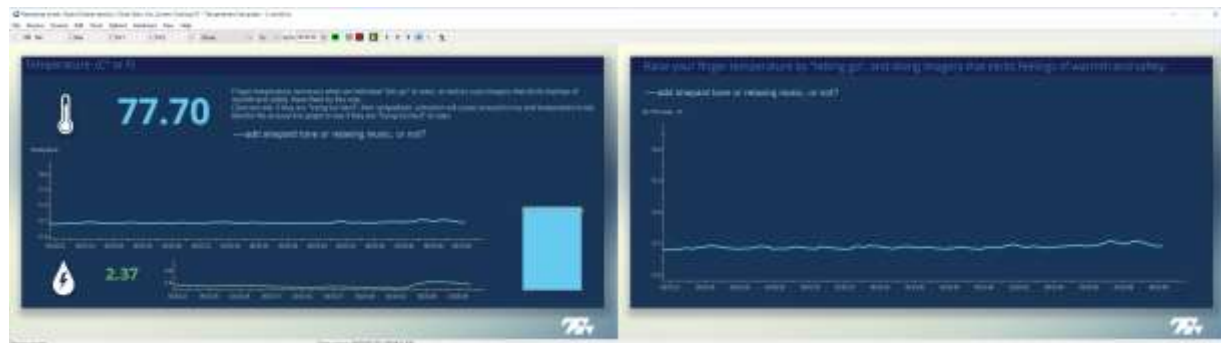This screen is monitoring and training of temperature.

The client's side of the screen (right) is dominated by the temperature line graph. The clinician's side of the screen (left) has an identical line graph, but is slightly less prominent. The line graphs' signals changes colors based on whether temperature is increasing (blue) or decreasing (pink). On the clinician's side of the screen, there is a bar graph that also represents the same temperature value and changes colors.

The temperature bar graph contains a threshold, which is the basis for the color feedback: when temperature is above the threshold, features turn blue; when temperature falls below the threshold, features turn pink. By installation default, the threshold automatically follows the temperature value with a lag, in order to track change. If desired, the user can manually change the threshold to remain at a fixed value.

Feedback for the screen consist of the feature color change and audio tones. The tone rings according to whether temperature is increasing (lower tone) or falling (higher tone).

An arousal line graph, on the clinician's side of the screen, allows the user to monitor if the client is "trying too hard" to relax. Such a state causes sympathetic activation, which leads to arousal increasing and temperature decreasing, thereby sabotaging the attempt to relax.

Use this screen to explore which imagery and thoughts enable deep relaxation, which lead to warming of the finger temperature.

Training 02 - Temperature - Animation - 2m

This screen is for monitoring and training temperature.

The Clinician's monitor (left) is dominated by a temperature line graph. The line graphs' signals changes colors based on whether temperature is increasing (blue) or decreasing (pink). On the clinician's side of the screen, there is also a bar graph and numeric that represents the same temperature value and experience the same color changes.

The temperature bar graph contains a threshold, which is the basis for the color feedback: when temperature is above the threshold, features turn blue; when temperature falls below the threshold, features turn pink. By installation default, the threshold automatically follows the temperature value with a lag, in order to track change. If desired, the user can manually change the threshold to remain at a fixed value.

The Client's monitor (right) contains a feedback animation. When temperature is increasing, the animation activates by slowly playing. When temperature is decreasing, the animation pauses. The temperature bar graph threshold is the trigger for determining an increase or decrease. Music feedback

follows a similar activation pattern as the animation: when the animation is moving, the music is heard clearly; when the animation is not moving, the music is only barely audible.

An arousal line graph, on the clinician's side of the screen, allows the user to monitor if the client is "trying too hard" to relax. Such a state causes sympathetic activation, which leads to arousal increasing and temperature decreasing, thereby sabotaging the attempt to relax.

Use this screen to directly train finger warming with clear visual and audio feedback, while at the same time monitoring for over-effort.

Training 03 - Temperature - Video Streaming - 2m

This screen works the same as the previous screen, however the animation & music is replaced with a Video Instrument. The video and sound play continuously, but when the temperature is decreasing the picture shrinks, and when temperature is increasing the picture enlarges.

Training 04 – HRV, Arousal, & Temp Power – 2m

This is the only screen in this selection grouping that monitors and trains all 3 metrics: arousal, temperature, and heart rate variability.

The Clinician's monitor (left) contains a line graph for monitoring heart rate (beats/min), vertical bar graphs for the spectral frequency percent of power data, and a multi-line graph for arousal and temperature. 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; orange). The Low Frequency graph also contains a feedback threshold that controls the large animation and music feedback of the screen. This threshold is manually set.

The Client's monitor (right) contains three sources of feedback animation:

- The animation is linked to the Low Frequency bar graph found on the Clinician's monitor. The feedback animation activates when the Low Frequency bar graph value rises above its

threshold. When the animation plays, music is also heard. The threshold can be dragged to higher values (to make the task more difficult) or lower values (to make the task easier to achieve).

- One star animation is linked to the client's arousal: when arousal is increasing, the star remains grey and un-filled in. When the arousal is decreasing, the star fills in.
- The other star animation is linked to the client's temperature: when temperature is decreasing, the star remains grey and un-filled in. When temperature is increasing, the star fills in.

Use this screen to encourage your client to practice their general self-regulation. Training over multiple modalities is more difficult than a single modality, so this is not suitable for beginners. You can potentially place greater emphasis on the LF% component, while emphasizing the arousal/temperature star animations less.

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

Learning Control: Heart Rate Variability & Breathing

Training 01 - HRV line graph

This screen is for monitoring and training heart rate variability, in particular using the TPS sensor to measure inhalation/exhalation. As the only screen with the finger pulse line graph, at the top, it can be used to verify signal quality before moving on to other screens. This screen is for single monitor use.

At the top of the screen is the blood volume pulse line graph, to ensure good signal quality from the TPS sensor. The multi-line graph that takes up the majority of screen space features heart rate (beats/min; red) and inhalation/exhalation of the breath cycle (blue). On the right are numeric displays for the heart rate and respiration rate (breaths/min).

Use this screen to monitor and train synchrony between the breathing and oscillations in heart rate, or signal verification before going to another screen.

Take note that for proper measurement of breathing, the TPS sensor requires to be positioned in a specific manner: after the TPS sensor is applied to the client's finger, as is done normally, rest the sensor against the top of the stomach, just below the rib cage. The client should not be applying pressure to the sensor against the stomach. The client should also be seated or lying down. The adjacent image is an example of the placement.

Training 02 - HRV Power with animation

This screen is for monitoring and training heart rate variability, based spectral frequency data. It is for single monitor use.

The left side of the screen contains a 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; yellow), Low Frequency (LF; green), and High Frequency (HF; orange). The Low Frequency graph also contains a feedback threshold that controls the visual and auditory feedback of the screen. This threshold is manually set.

On the right side of the screen it the breath pacer and feedback animation. The pacer should be used to shape the subject's breathing, by teaching them to imitate a comfortably slow respiration rate. The feedback animation activates when the Low Frequency bar graph value rises above its threshold.
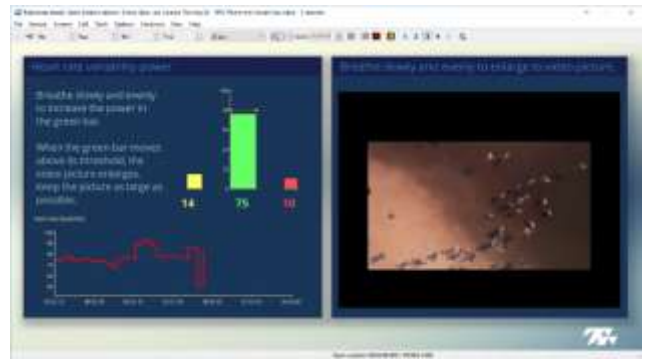
Use this screen to teach sustained slow, relaxed breathing, that leads to the Low Frequency value to rise above its threshold. A greater Low Frequency value means greater heart rate variability. When the Low Frequency is above it's threshold, the feedback animation activates. Music feedback follows a similar activation pattern as the animation: when the animation is moving, the music is heard clearly; when the animation is not moving, the music is only barely audible.

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

Training 03 - HRV Power with streaming video

This screen works the same as the previous screen, however the animation & music is replaced with a Video Instrument. The video and sound play continuously, but when the temperature is decreasing the picture shrinks, and when temperature is increasing the picture enlarges.
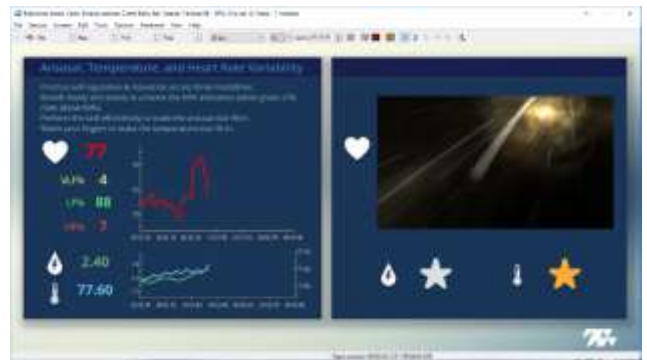
Note: 64-seconds need to pass before the HRV data and feedback begins.

Training 04 – HRV, Arousal, & Temp Power

This is the only screen in this selection of screens that monitors and trains all 3 metrics: arousal, temperature, and heart rate variability. It is for single monitor use.

The left side of the screen contains a line graph for monitoring heart rate (beats/min), displays for the spectral frequency percent of power data (VLF, LF, HF), and a multi-line graph for arousal and temperature.

On the right side of the screen are the sources of feedback. They are all pre-set:

- The animation is linked to the Low Frequency signal: the animation activates when LF% rises above 80%. When LF% is less than 80, the animation pauses. When the animation plays, music is also heard.
- One star animation is linked to the client's arousal: when arousal is increasing, the star remains grey and un-filled in. When the arousal is decreasing, the star fills in.
- The other star animation is linked to the client's temperature: when temperature is decreasing, the star remains grey and un-filled in. When temperature is increasing, the star fills in.

Use this screen to encourage your client to practice their general self-regulation. Training over multiple modalities is more difficult than a single modality, so this is not suitable for beginners. You can potentially place greater emphasis on the LF% component, while emphasizing the arousal/temperature star animations less.

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

Training 05 - HRV Power Game

This screen is designed as a an easy-to-understand game for training HRV Power. All parameters are pre-set. It is for single monitor use.

Have the client practice their slow, even breathing in order to increase the LF% in the green bar graph. As the LF% increases, feedback is provided:

- When LF% = 50, the first star fills in and quiet music begin playing.
- When LF% = 60, the second star fills in.
- When LF% = 70, the third star fills in.
- When LF% = 80, the heart fills in to signal that the client is doing very well. The music also changes to become more upbeat.

As each star or heart remains filled in, a horizontal score bar is being filled. When the bar is full, 1 point is scored. The bar fills up faster with more stars/the heart filled in. A "secret" goal is achieved when LF% = 90, where in the score bar accelerates to score points even faster.

If the client's breathing suddenly becomes unsteady, resulting in the LF% decreasing to a value lower than any of the above stated markers, then the associated star/heart emptied back to grey and the points bar scores points slower. If the LF% falls below 50%, the score bar stops being filled, all music stops, and all animations are emptied back to their grey shapes.

Use this screen to challenge a client to see how many points they can score in "X" number of minutes.

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

For advanced software users: it is possible to change the LF% difficulty goals or the scoring rate of the points bar. That must be done within Screen Editing mode. Refer back to Thought Technology or one of the dealers if you do not know how to access the Screen Editor.

Training 01 - HRV line graph – 2m

This screen is for monitoring and training heart rate variability, in particular using the TPS sensor to measure inhalation/exhalation. As the only screen with the finger pulse line graph, at the top, it can be used to verify signal quality before moving on to other screens. This screen is for dual-monitor use.

At the top of the Clinician's screen (left) is the blood volume pulse line graph, to ensure good signal quality from the TPS sensor. The multi-line graphs that dominate both the Clinician (left) and Client's (right) screens feature heart rate (beats/min; red) and inhalation/exhalation of the breath cycle (blue). On the Clinician's screen are numeric displays for the heart rate and respiration rate (breaths/min).

Use this screen to monitor and train synchrony between the breathing and oscillations in heart rate, or for signal verification before moving on to another screen.
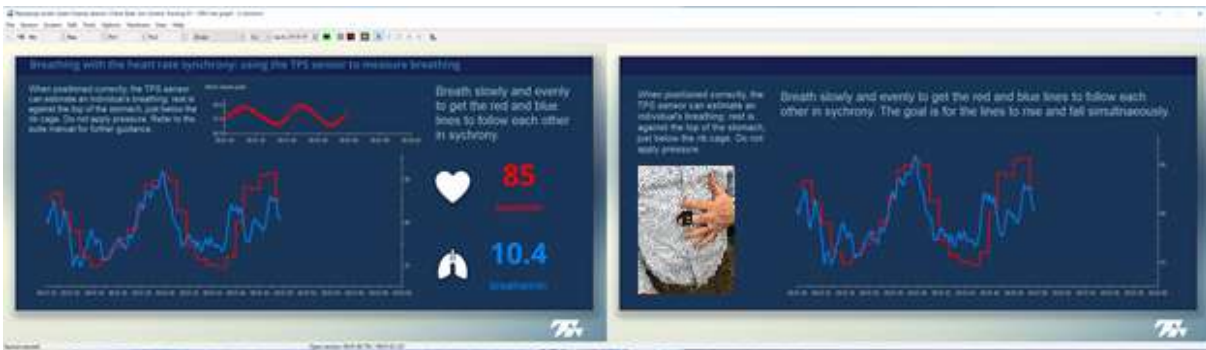
Take note that for proper measurement of breathing, the TPS sensor requires to be positioned in a specific manner: after the TPS sensor is applied to the client's finger, as is done normally, rest the sensor against the top of the stomach, just below the rib cage. The client should not be applying pressure to the sensor against the stomach. The client should also be seated or lying down. The adjacent image is an example of the placement.

Training 02 - HRV Power with animation - 2m

This screen is monitoring and training of heart rate variability, based spectral frequency data. It is for dual monitor use.

The Clinician's monitor (left) contains a line graph for monitoring heart rate (beats/min), vertical 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; yellow), Low Frequency (LF; green), and High Frequency (HF; orange). The Low Frequency graph also

contains a feedback threshold that controls the visual and auditory feedback of the screen. This threshold is manually set.

The Client's monitor (right) contains mirror images of the spectral frequency bar graphs and breath pacer found on the Clinician's monitor, and a feedback animation. Any changes made to the bar graphs and pacer on the Clinician's monitor is automatically extended to those features on the Clinician's monitor. The pacer should be used to shape the subject's breathing, by teaching them to imitate a comfortably slow respiration rate. The feedback animation activates when the Low Frequency bar graph value rises above its threshold.

Use this screen to teach sustained slow, relaxed breathing, that leads to the Low Frequency value to rise above its threshold. A higher Low Frequency value means greater heart rate variability. When the Low Frequency is above its threshold, the feedback animation activates. Music feedback follows a similar activation pattern as the animation: when the animation is moving, the music is heard clearly; when the animation is not moving, the music is only barely audible.

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

Training 03 - HRV Power with video streaming - 2m

This screen works the same as the previous screen, except the following:

- There is no breathing pacer.
- The animation & music is replaced with a Video Instrument. The video and sound play continuously, but when the Low Frequency is decreasing the picture shrinks, and when Low Frequency is increasing the picture enlarges.

Training 04 – HRV, Arousal, & Temp Power – 2m

This is the only screen in this selection grouping that monitors and trains all 3 metrics: arousal, temperature, and heart rate variability.

The Clinician's monitor (left) contains a line graph for monitoring heart rate (beats/min), vertical bar graphs for the spectral frequency percent of power data, and a multi-line graph for arousal and temperature. 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; orange). The Low Frequency graph also contains a feedback threshold that controls the large animation and music feedback of the screen. This threshold is manually set.

The Client's monitor (right) contains three sources of feedback animation:

- The animation is linked to the Low Frequency bar graph found on the Clinician's monitor. The feedback animation activates when the Low Frequency bar graph value rises above its threshold. When the animation plays, music is also heard. The threshold can be dragged to higher values (to make the task more difficult) or lower values (to make the task easier to achieve).
- One star animation is linked to the client's arousal: when arousal is increasing, the star remains grey and un-filled in. When the arousal is decreasing, the star fills in.
- The other star animation is linked to the client's temperature: when temperature is decreasing, the star remains grey and un-filled in. When temperature is increasing, the star fills in.

Use this screen to encourage your client to practice their general self-regulation. Training over multiple modalities is more difficult than a single modality, so this is not suitable for beginners. You can potentially place greater emphasis on the LF% component, while emphasizing the arousal/temperature star animations less.

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

Training 05 - HRV Power Game - 2m

This screen is designed as a an easy-to-understand game for training HRV Power. All parameters are pre-set. It is for dual monitor use.

Have the client practice their slow, even breathing in order to increase the LF%. The Clinician can monitor the LF% in the green bar graph in their monitor (left), while the Client cannot directly see the measurement in their monitor (right). As the LF% increases, feedback is provided:

- When LF% = 50, the first star fills in and quiet music begin playing.
- When LF% = 60, the second star fills in.
- When LF% = 70, the third star fills in.
- When LF% = 80, the heart fills in to signal that the client is doing very well. The music also changes to become more upbeat.

As each star or heart remains filled in, a horizontal score bar is being filled. When the bar is full, 1 point is scored. The bar fills up faster with more stars/the heart filled in. A "secret" goal is achieved when LF% = 90, where in the score bar accelerates to score points even faster.

If the client's breathing suddenly becomes unsteady, resulting in the LF% decreasing to a value lower than any of the above stated markers, then the associated star/heart emptied back to grey and the points bar scores points slower. If the LF% falls below 50%, the score bar stops being filled, all music stops, and all animations are emptied back to their grey shapes.

Both the Clinician and Client's monitors have the same stars/heart/point bar animations, although they are the primary feature of the Client's monitor. For the Clinician's monitor, they are included in the corner for monitoring purposes.

Use this screen to challenge a client to see how many points they can score in "X" number of minutes.

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


For advanced software users: it is possible to change the LF% difficulty goals or the scoring rate of the points bar. That must be done within Screen Editing mode. Refer back to Thought Technology or one of the dealers if you do not know how to access the Screen Editor.

Reviewing a training session and generating a report

If you save the recorded feedback sessions, you can review them to see the trend of what happened while the client was practicing self-regulation and/or following your coaching suggestions. The software will automatically load 3-4 reviewing screens, depending on the session. You can create a simple Word report using any of these review screens.

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
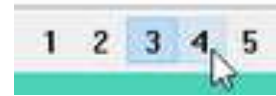
If you are looking for accurate heart rate variability statistics, you will have to perform artifact rejection exactly as was accomplished after the Stress Test. (Refer to Dealing with artifacts on p.21)

Review screens

Review – Physiological trends & statistics This screen is for reviewing the subject's psychophysiological profile based on trend data. On the left, the histograms display the continuous periodic averages. By installation default, each period (also called "epoch") is 20-seconds long. On the right, statistic labels and the numerical values for the current period of focus are displayed.	
Review – Physiological line graphs This screen is for reviewing the subject's psychophysiological profile based on moment-to-moment changes in data. On the left, line graphs display the moment-to-moment changes for the metrics. On the right, statistic labels and numerical values for the current and average of each metric are displayed.	
Review – Artifact rejection This screen is the primary artifact rejection tool for the DeStress Solution. 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. This screen is typically used following the Stress Test.	

*Review – Breath & HRV line graphs*

This screen is for reviewing sessions where the TPS sensor was used for measuring breathing by resting it on the stomach.
On the left, line graphs display the moment-to-moment changes for the metrics, including the inhalation/exhalation waveform.

On the right, statistic labels and numerical values for the current and average of each metric are displayed.

In review mode, select the screen of interest to base a report on, then follow these instructions:

1. Click the **Session Report** icon in the tool bar and select **Generate Text Report**. (This option is enabled for all session types.)
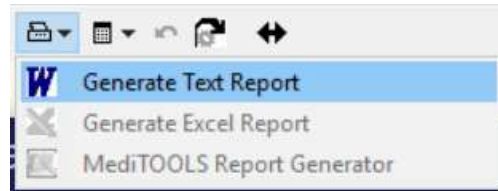
2. When the **Session Report** window opens, select components that you wish to include in the report by placing a check mark in the desired boxes. This can include graphs, statistics, notes, etc.

3. Click **Generate Report** to generate the report. Examples of a report are shown below.
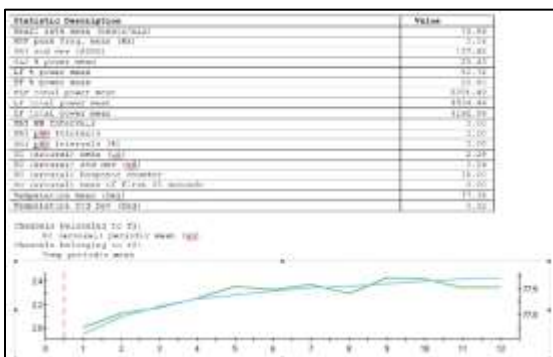
Your report displays as a document in HTML, PDF, or Microsoft Word format, depending upon the setting in **Preferences**. The report can be saved or printed using the **Print** and **Save** functions of the relevant software.

Zukor Feedback Game

A set of self-regulation screens, compatible with the Zukor Interactive games and Media Player, is included within the DeStress Solution. The **Learning Control: Zukor Feedback Games** self-regulation screens train the same core modalities as the other self-regulation sessions, however the "gamey" aspect to the sessions are far more enhanced. Consequently, the software is launched and controlled is a different manner from the rest of the DeStress Solution.

To make use of the Zukor Feedback Games, you require to own one of Zukor Interactive's Games. The games are not included with the DeStress Solution and must be purchased separately.

Loading the Zukor sessions works the same as the other Learning Control sessions. Refer to previous sections in the manual for that information. Make sure to select the self-regulation screen of choice before clicking the **Start** button to record. With Zukor Games, you cannot jump between screens after the session is started otherwise connection with the game is lost.

When the Start button is clicked, the Zukor Game window will appear, prompting you to select the game to use.

For whichever Zukor Game you select, the game will request for you to choose a modality.

Select the appropriate one for your session:

If training **HRV**, select the **TTL 1 Up**.

If training **arousal**, select the **TTL 1 Down**.

If training **temperature**, select the **TTL 1 Up**.

If you do change screens mid-recording, you will have to close the game manually (select **Quit**) and restart the launcher by right-clicking on the yellow connection instrument icon found on the self-regulation screen. Select **Run target application** from the prompt that appears. If it works, the yellow connection instrument will turn green.
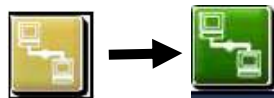
The Zukor Games play best with a 2-monitor setup, where you (the terapist) can see the physiological information on the left and the client sees the game on the right.
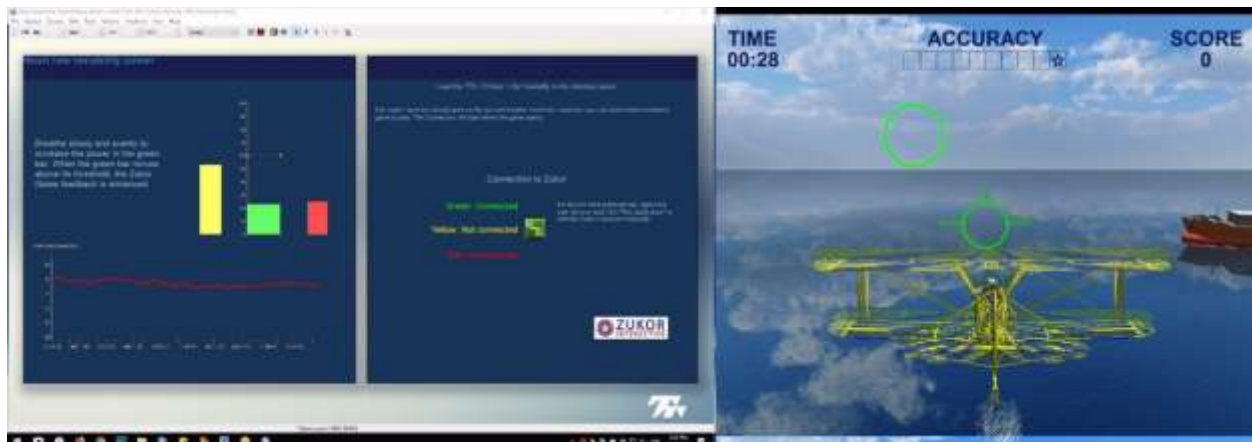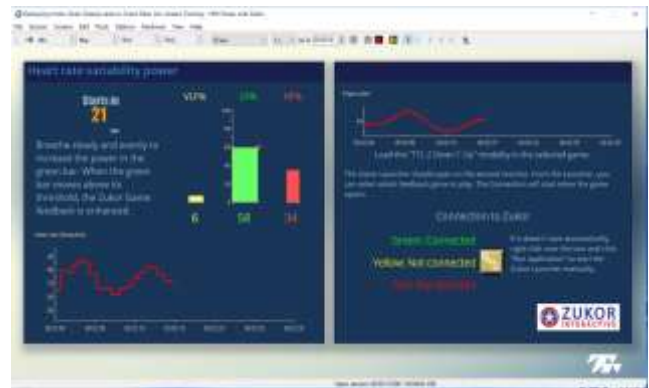
Overview of the Zukor display screens:

Training – HRV Power with Zukor

This screen is for performing heart rate variability training with the enhanced feedback of a Zukor Interactive feedback game.

The heart rate (beats/min) line graph and HRV spectral frequency bar graphs are displayed in the box on the left. The spectral frequency bar graphs are as follows: Very Low Frequency Percent Power (yellow), Low Frequency Percent Power (green), and High Frequency Percent Power (orange).

The feedback goal is for the Low Frequency signal to rise above its bar graph's threshold value. Breathing slowly and comfortably should assist in achieving this goal. The bar graph's threshold can be moved to different values to make the task easier (lower threshold value) or harder (higher threshold value).

The box on the right includes information for loading the Zukor Interactive game.

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

Training - Arousal with Zukor

This screen is for performing arousal training with the enhanced feedback of a Zukor Interactive feedback game.

The arousal value is displayed in the box on the left. The signal changes colors based on whether arousal is increasing (pink) or decreasing (blue).
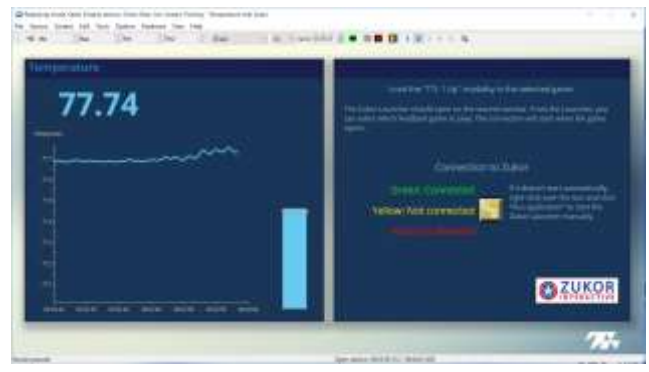
The box on the right includes information for loading the Zukor Interactive game.

Training - Temperature with Zukor

This screen is for performing temperature training with the enhanced feedback of a Zukor Interactive feedback game.

The temperature value is displayed in the box on the left. The signal changes colors based on whether temperature is increasing (blue) or decreasing (pink).

The box on the right includes information for loading the Zukor Interactive game.

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.
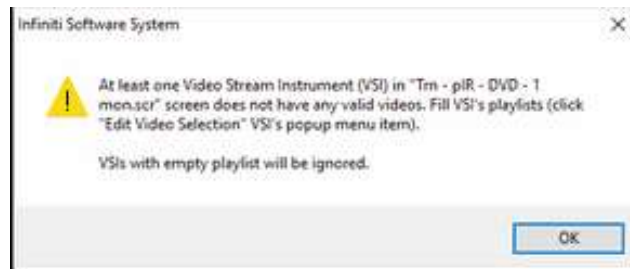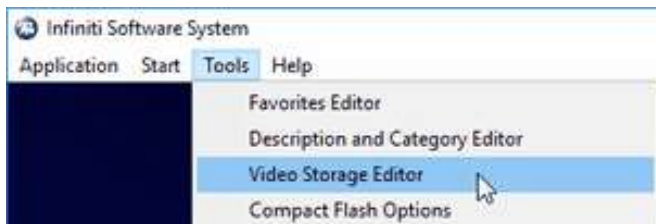

You can associate a video with the instrument or convert the Video Stream instrument to a DVD instrument.
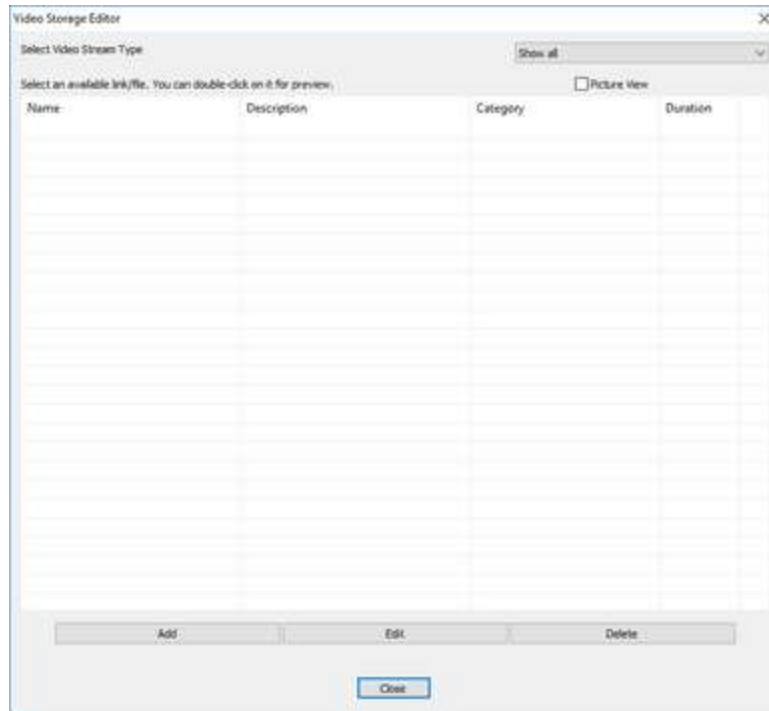
Adding a streaming video to the playlist

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**.
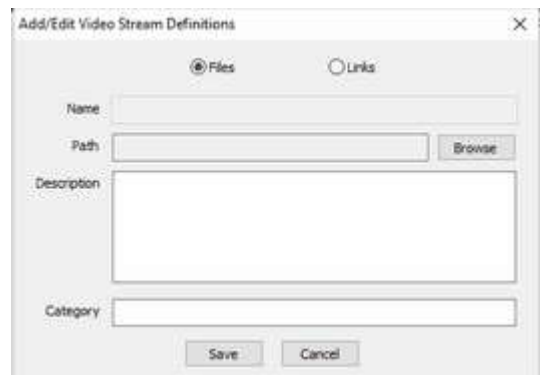
- If your streaming video is from a link to a web site:

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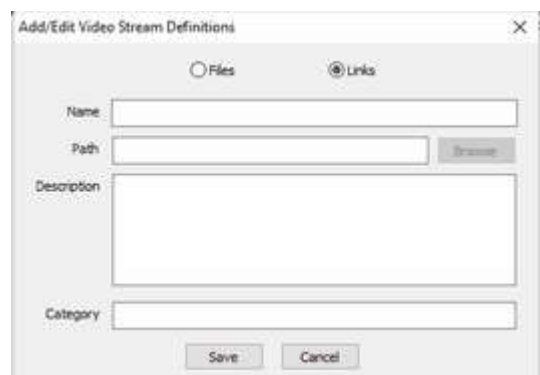
3. Click **Close** to exit the Video Storage Editor.

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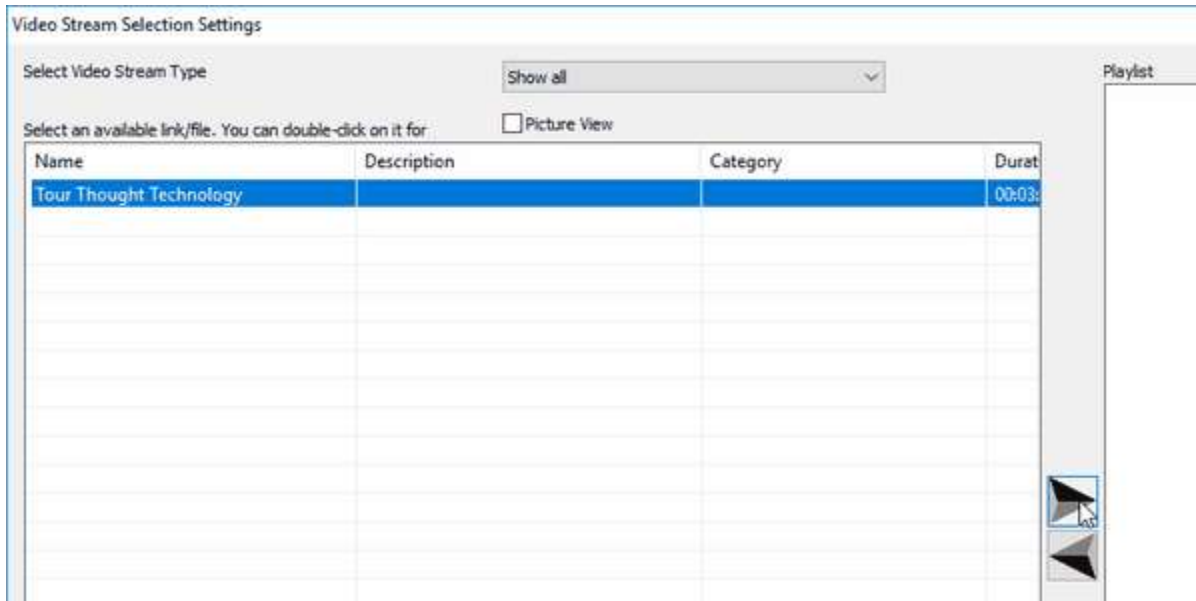
4. Select a streaming video and click the right arrow button to add it to the playlist.

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.
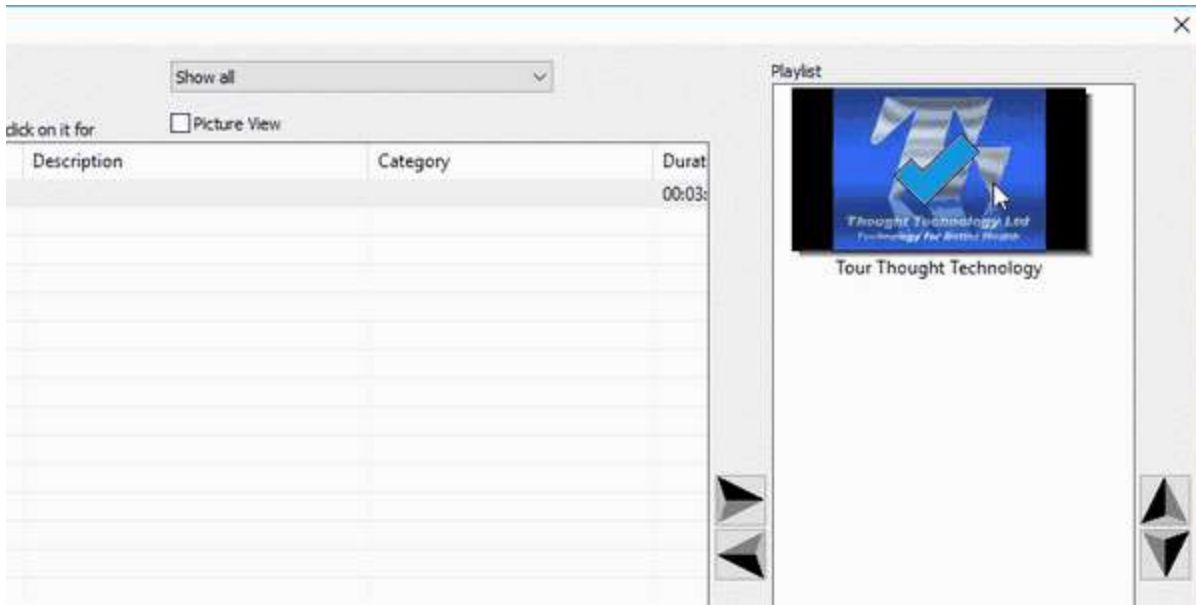
1. Place your cursor over the Video Stream instrument and click the right mouse button.
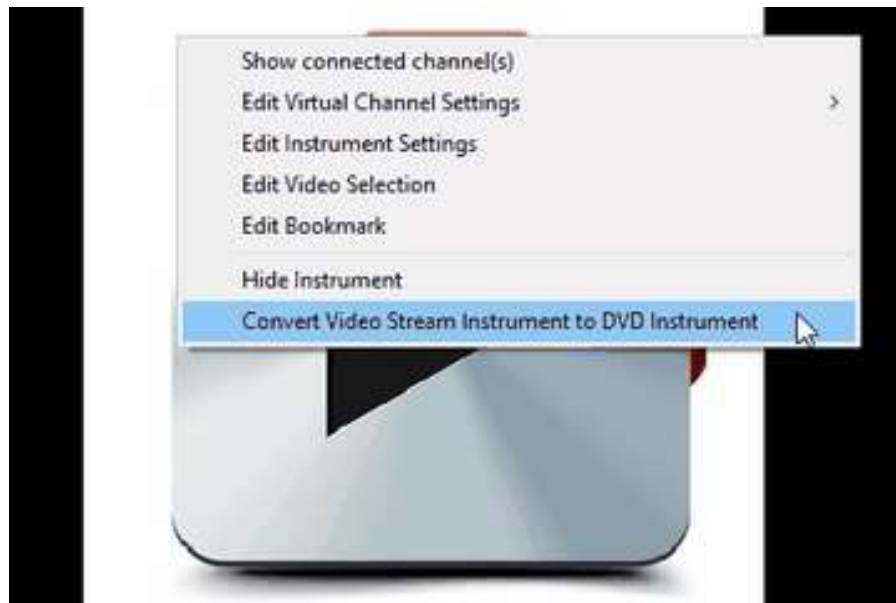
2. Select **Convert Video Stream Instrument to DVD Instrument**.

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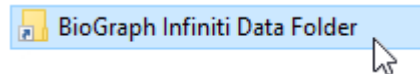
3. Select **Sounds** folder and place the new MP3 files there.

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

1. From **Tools**, select Sound Manager.
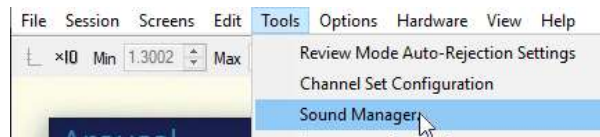
2. An **Instrument Sound Manager** dialog will open. All instruments that are linked to sound feedback will be listed.
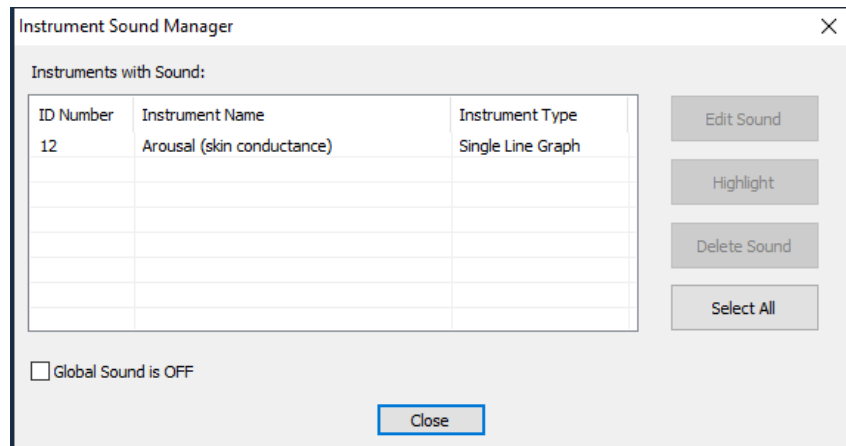
3. To edit a feedback sound, click on the instrument(s) listed, and choose **Edit Sound.** Almost all training displays will only provide a single instrument option. The only exception is the HRV Power Game.
4. A **Set Sound feedback** dialogue will open. In this prompt, click on **Settings** to open the Settings window.
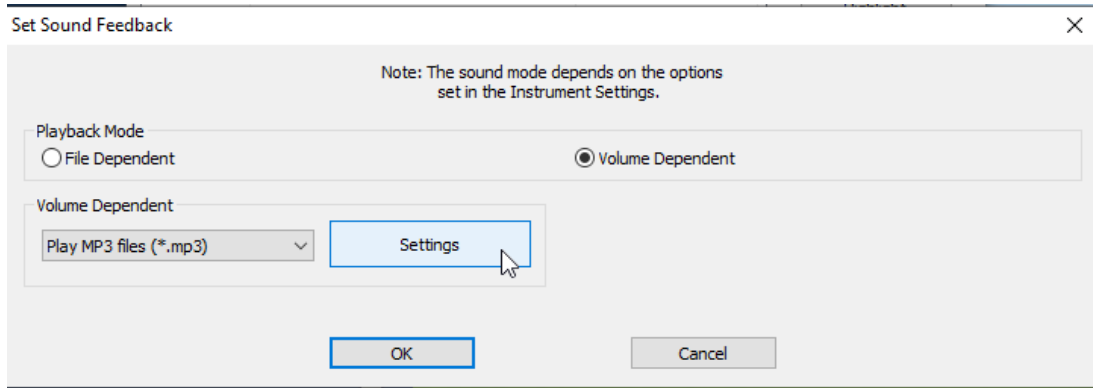
Here is where the choice of music file is made, as well as what volume level the music is played at.
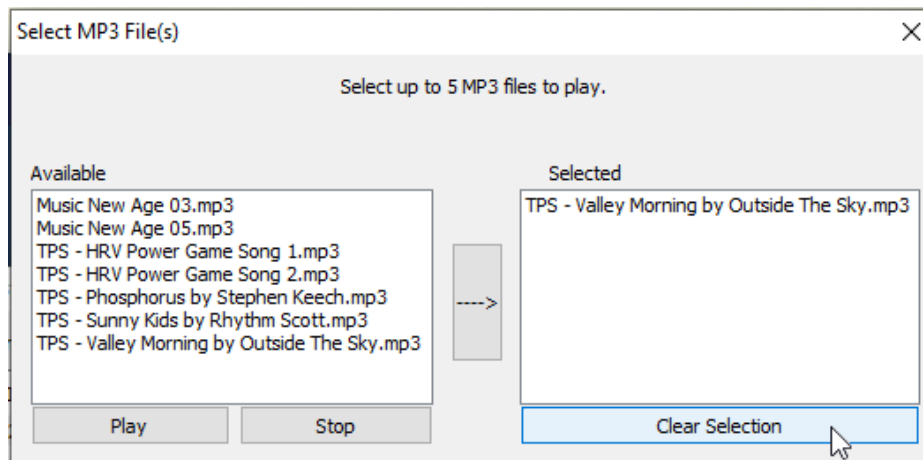
- To remove the current selection, click **Clear Selection**. The Pre-selected audio file will be removed from the **Selected** listing.
- From the **Available** listing, select an MP3 of interest, then click the arrow button:
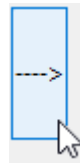
- The new MP3 will now be in the **Selected** listing. You may choose up to 5 audio files to add to this listing.
- Just below the Available and Selected listings, are two volume settings boxes. Here, the music volume is decided when the feedback condition is achieved (Boolean ON) and when it is not achieved (Boolean OFF).
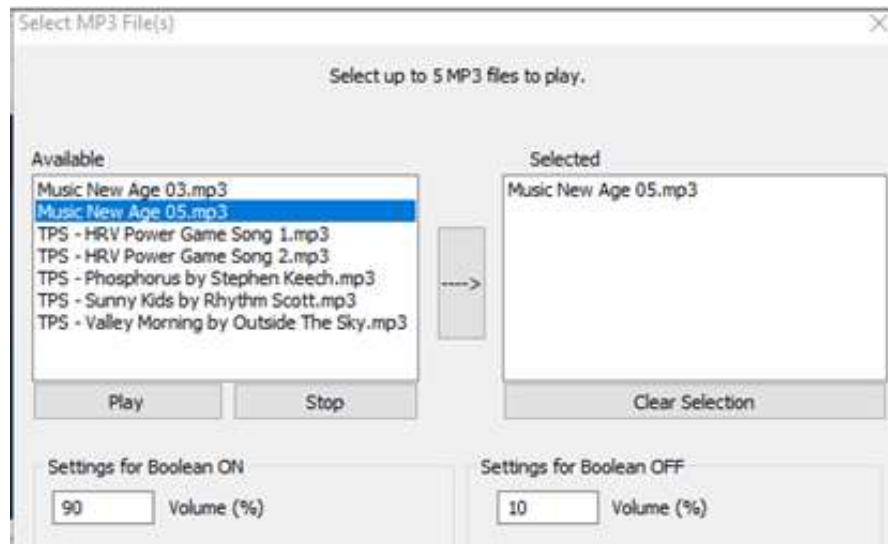
- When done changing the music, click **OK**/**Close** to return back to the main recording window.

Real-time artifact rejection

The DeStress 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 that occurs following a Stress Test (refer to Dealing with artifacts on p.21). 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:
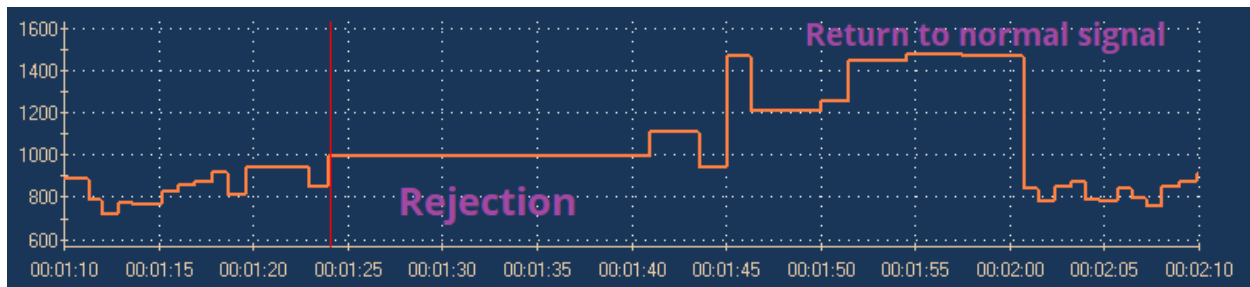
The graph shows how the real-time artifact rejection function works. The raw signal is constantly monitored. If, at some point, the signal goes over the rejection threshold, the function is triggered and the signal becomes a flat line, which tells the software to halt all following calculations. This 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.

Appendix

The following pages contain four math task tables for use with the DeStress Solution.

1081	941	801	661	521	381	241	101
1074	934	794	654	514	374	234	94
1067	927	787	647	507	367	227	87
1060	920	780	640	500	360	220	80
1053	913	773	633	493	353	213	73
1046	906	766	626	486	346	206	66
1039	899	759	619	479	339	199	59
1032	892	752	612	472	332	192	52
1025	885	745	605	465	325	185	45
1018	878	738	598	458	318	178	38
1011	871	731	591	451	311	171	31
1004	864	724	584	444	304	164	24
997	857	717	577	437	297	157	17
990	850	710	570	430	290	150	10
983	843	703	563	423	283	143	3
976	836	696	556	416	276	136	
969	829	689	549	409	269	129	
962	822	682	542	402	262	122	
955	815	675	535	395	255	115	
948	808	668	528	388	248	108	

2048	1908	1768	1628	1488	1348	1208	1068
2041	1901	1761	1621	1481	1341	1201	1061
2034	1894	1754	1614	1474	1334	1194	1054
2027	1887	1747	1607	1467	1327	1187	1047
2020	1880	1740	1600	1460	1320	1180	1040
2013	1873	1733	1593	1453	1313	1173	1033
2006	1866	1726	1586	1446	1306	1166	1026
1999	1859	1719	1579	1439	1299	1159	1019
1992	1852	1712	1572	1432	1292	1152	1012
1985	1845	1705	1565	1425	1285	1145	1005
1978	1838	1698	1558	1418	1278	1138	998
1971	1831	1691	1551	1411	1271	1131	991
1964	1824	1684	1544	1404	1264	1124	984
1957	1817	1677	1537	1397	1257	1117	977
1950	1810	1670	1530	1390	1250	1110	970
1943	1803	1663	1523	1383	1243	1103	
1936	1796	1656	1516	1376	1236	1096	
1929	1789	1649	1509	1369	1229	1089	
1922	1782	1642	1502	1362	1222	1082	
1915	1775	1635	1495	1355	1215	1075	

2001	1861	1721	1581	1441	1301	1161	1021
1994	1854	1714	1574	1434	1294	1154	1014
1987	1847	1707	1567	1427	1287	1147	1007
1980	1840	1700	1560	1420	1280	1140	1000
1973	1833	1693	1553	1413	1273	1133	993
1966	1826	1686	1546	1406	1266	1126	986
1959	1819	1679	1539	1399	1259	1119	979
1952	1812	1672	1532	1392	1252	1112	972
1945	1805	1665	1525	1385	1245	1105	965
1938	1798	1658	1518	1378	1238	1098	958
1931	1791	1651	1511	1371	1231	1091	951
1924	1784	1644	1504	1364	1224	1084	944
1917	1777	1637	1497	1357	1217	1077	937
1910	1770	1630	1490	1350	1210	1070	930
1903	1763	1623	1483	1343	1203	1063	923
1896	1756	1616	1476	1336	1196	1056	
1889	1749	1609	1469	1329	1189	1049	
1882	1742	1602	1462	1322	1182	1042	
1875	1735	1595	1455	1315	1175	1035	
1868	1728	1588	1448	1308	1168	1028	

1098	958	818	678	538	398	258	118
1091	951	811	671	531	391	251	111
1084	944	804	664	524	384	244	104
1077	937	797	657	517	377	237	97
1070	930	790	650	510	370	230	90
1063	923	783	643	503	363	223	83
1056	916	776	636	496	356	216	76
1049	909	769	629	489	349	209	69
1042	902	762	622	482	342	202	62
1035	895	755	615	475	335	195	55
1028	888	748	608	468	328	188	48
1021	881	741	601	461	321	181	41
1014	874	734	594	454	314	174	34
1007	867	727	587	447	307	167	27
1000	860	720	580	440	300	160	20
993	853	713	573	433	293	153	
986	846	706	566	426	286	146	
979	839	699	559	419	279	139	
972	832	692	552	412	272	132	
965	825	685	545	405	265	125	

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 uS
Temperature measurement	Range	10 – 40 °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

  Or contact your local authorized distributor.

Technical support

For technical support please refer to the Thought Technology Ltd. website at
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

  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:
_____

_____

_____

_____

_____

_____