Lab Log

Practical Training in General Biofeedback

Version 2

Widener University

Widener Biofeedback Clinic & Certification Center
One University Place
Chester, PA 19013-5792

Student's Name ____________________________

Semester/Year _________________

Practical training in biofeedback is one of the requirements of BCIA certification. This log book is designed as a guide. Any approved combination of sessions can be used to fulfill this requirement based on the student's field of study/interest.

Practical Biofeedback Training - 20 hours with a BCIA approved mentor

Candidates for certification must be mentored for a minimum of 20 contact hours to review:

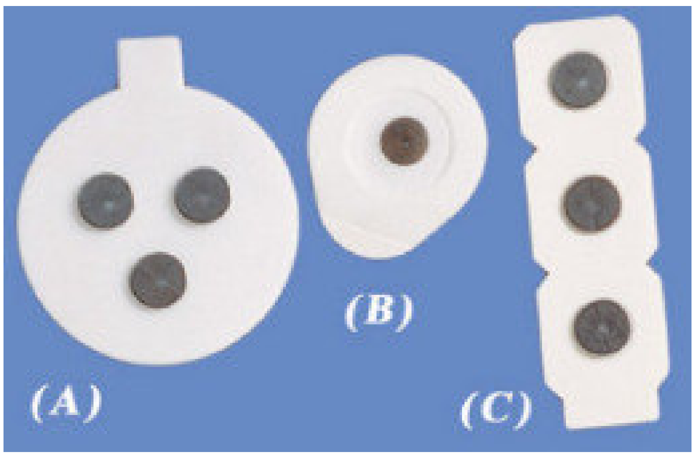
- 10 sessions of personal biofeedback where the candidate demonstrates self-regulation
- 50 sessions of patient/client treatment as follows: 10 sessions each of Thermal, EMG, and GSR. The remaining 20 sessions are to include any combination of EMG, Thermal, GSR, EEG, HRV, and respiration training.
- Work with at least five (5) different clients.
- 10 case conference presentations (can be done as a group)

Two hours must be face to face with the mentor. All mentors must meet specific BCIA criteria.

Regarding your 10 personal biofeedback training sessions

You should demonstrate good self regulation skills through your training efforts. Please let your instructor know if you need help. Typically, self-regulation is done with thermal and GSR but HRV (achieve a meditator's peak at 0.10) and EEG (try SMR at CZ or C4 only) can also be added (unless you have a specific skeleto-muscle problem, SEMG training should not be used for self-regulation).

SEMG Sensors (Electrodes)



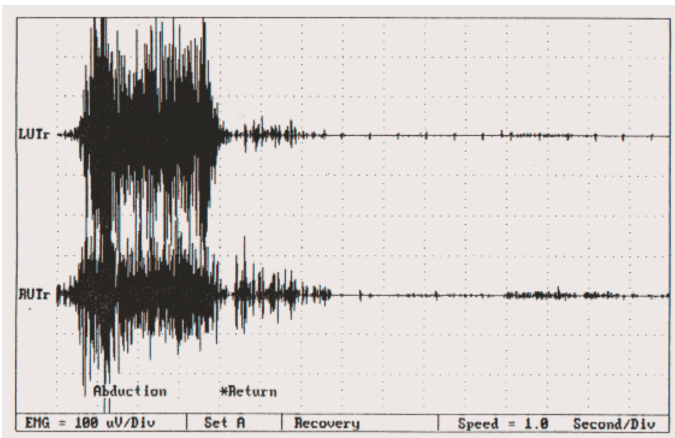
(A) Triode, electrode with standard 2cm spacing of silver-silver chloride electrodes, backed with nickel plated brass snaps to prevent corrosion when connected to pre-amplifiers for extended periods.

(B) UniGel electrodes, pre-gelled single electrodes, for sensitive placements on dry skin.

(C) Single strip electrodes, versatile electrodes that can be used as strip or separated for wider placements

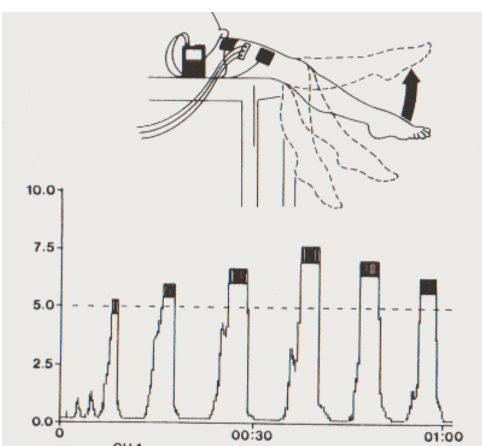
The Data

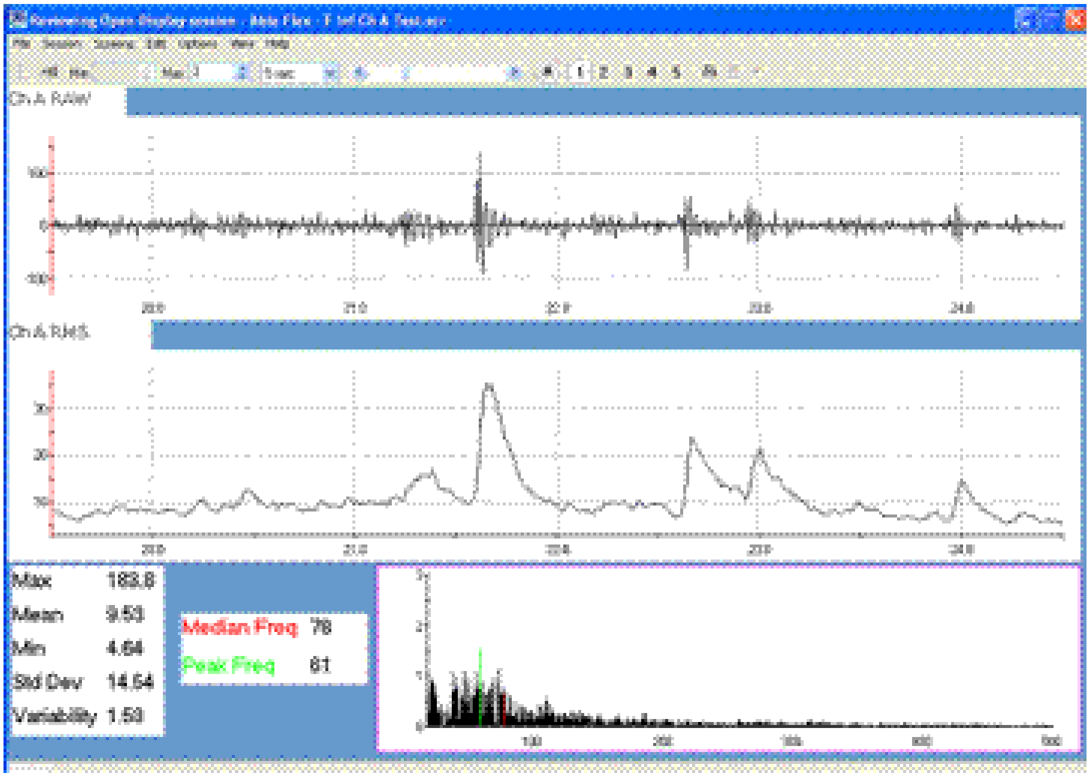
Raw SEMG
The raw wave has both positive and negative values that cycles with a specific frequency (Hz). The amplitude of the wave (height) provides information about the strength of the muscle contraction. The range of SEMG data of interest is from 0-500Hz (compared with EEG data with a frequency range of interest from 0-60Hz).



The x-axis displays time and the y-axis displays amplitude in µVs (microvolts).

Processed SEMG
SEMG data is most often processed using a method called root mean square and is thus termed RMS SEMG. The values are always positive (a process called rectification).





This biofeedback screen shows a Raw Line graph, RMS Line Graph, Max, Mean, Min, Std Deviation, Variability stats, and Median and Peak Frequencies and a 2D power spectrum.

The power spectrum displays the data in the frequency domain. It is a graph with the frequency along the x-axis and relative amplitude along the y-axis.

SEMG Placements

General Rules:
Common distance between active sensors is 2 cm. If further, it is usually referred to a wide placement.

The ground should be equidistant between the two active sensors.

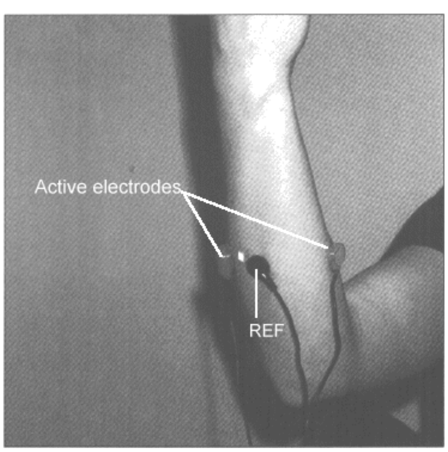
The major SEMG placements used for relaxation training have been the frontalis, trapezius and forearm. However, many more placements are used when working with headache, TMJ, carpel tunnel syndrome, etc.

You should become familiar with a wide variety of placements but become especially proficient in the placements you will be using in your practice of SEMG biofeedback.

Frontalis
Place the ground sensor in center and the two active sensors about ¼ inch above the eyebrow directly above the iris of the eye.
The Frontalis muscle is considered one of the best placements for the treatment of tension headaches. It is also used in training overall relaxation.

Upper Trapezius: wide
Place the sensors off center from the cervical spine at C7 to the acromion.
Upper Trapezius: narrow
Place the sensors halfway between C7 and the acromion

Forearm Placement

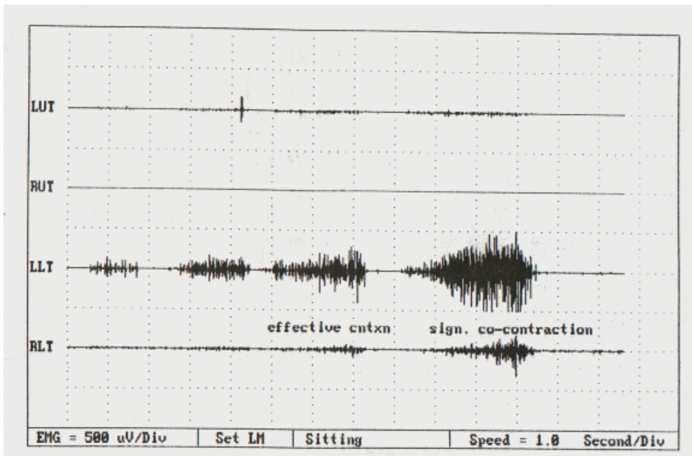


Neck and Shoulder Placements
From back to neck: trapezius, scalenus and SCM placements

Types of SEMG Training

Muscle Awareness and Proper Contraction

A good place to begin is to help the patient locate the muscle proprioceptively. Work on training the patient to isolate the muscle and not to co-contract other muscles.



Isolation Training Example. Surface EMG recording from the right and left upper and lower trapezius during increasing efforts to recruit and isolate the left lower trapezius. Note that by the fourth attempted recruitment, the patient begins to contract the right lower trapezius along with the left. (From Cram and Kasman (1990), Introduction to Surface EMG, Aspen Publishers.)

Symmetry Training

Muscle Imbalances: a 20% difference constitutes abnormal muscle activation.
Subtract low from high and divide by high. Example 100µV-80µV/100µV=20%

Bilateral activity: Observe which muscle activates first.
A symmetrical activation of a muscle will cause a symmetrical signal.

Postural Training

The therapist works with the patient to stand, sit, work, etc. in a relaxed correct posture. This will reduce excessive muscle strain. Postural training is very important in working with patients with lower back pain.

Recovery After Activation

Observe how well the muscle returns to baseline after each movement. You should observe a “micro rest period” after repetitive movements.
Observe whether the muscles return to rest after 4-5 shoulder shrugs.

Tension Discrimination Training

Here the goal is to teach the patient to hold various levels of tension and to be able to discriminate one tension level from another. Train the patient to recognize what 2µV of tension feels like versus 15µV.

Relaxation Training (Down Training)

Work with the client to reach mean muscle tension levels. Try a variety of relaxation techniques such as Jacobson’s Progressive Muscle Relaxation or Luthe’s Autogenic method. SEMG relaxation training works with the psychophysiological aspects of stress and tension. Emotional issues may arise during this work. Feelings of powerlessness are often expressed with excessive trapezius tension; feelings of anger can manifest with clenched teeth (Masseter muscle tension) and excessive worry may show up in frontalis tension. Also, with many pain patients, muscles are often unconsciously kept at high levels of tension due to “learned guarding”.

Normative RMS data for SEMG

Muscle Site	Posture	Mean	Mild (1sd)	Moderate (2sd)	Radical (3sd)
Frontalis	Sit	1.90	3.90	5.90	7.90
	Stand	2.10	4.10	6.10	8.10
Temporalis	Sit	2.40	4.50	6.60	8.70
	Stand	2.30	4.40	6.50	8.60
Masseter	Sit	1.70	3.00	4.30	5.60
	Stand	1.60	3.10	4.60	6.10
SCM	Sit	1.30	2.60	4.30	5.80
	Stand	1.40	3.00	4.60	6.20
Trapezius	Sit	2.20	4.80	7.40	10.0
	Stand	3.10	5.90	8.70	11.50
T10 Paraspinals	Sit	2.20	5.00	7.60	10.60
	Stand	3.00	6.10	9.20	12.10

Ergonomic Assessments (Required)

Workstation ergonomic assessments work to combat inappropriate muscle usage at the workstation. These assessments are usually completed "on-site" and work with a combination of training regimens to decrease the development of RUIs (repetitive use injuries).

Ergonomic Assessments of Worksite - perform 2 ergonomic assessments

BioErgonomics™ is the use of biofeedback monitoring and training to prevent repetitive motion injuries at the workstation. In Healthy Computing with Muscle Biofeedback, by Erik Pepper and Katherine Hughes Gibney, they write, "To reduce the risk for computer-related disorders (CRD), every employee who works at a computer should be trained in healthy computing habits just as they are trained in mastering software."

#1 Date completed ___________

EMG Placement: Bilateral Trapezius

Place a triod electrode on the right and left upper trapezius midpoint between the acromion of the shoulder and T1 on the spine

Record each for 1 minute and record average EMG

	EMG1	EMG2
Sit with hands resting on lap	______	______
Place fingers on the keyboard at home row	______	______
Type a standard text	______	______
Place fingers on the keyboard	______	______
Place hands back on lap in a relaxed position	______	______

#2 Date completed ___________

EMG Placement: Bilateral Trapezius

Place a triod electrode on the right and left upper trapezius midpoint between the acromion of the shoulder and T1 on the spine

Record each for 1 minute and record average EMG

	EMG1	EMG2
Sit with hands resting on lap	______	______
Place fingers on the keyboard at home row	______	______
Type a standard text	______	______
Place fingers on the keyboard	______	______
Place hands back on lap in a relaxed position	______	______

Psychophysiological Assessment (Required) #3 & 4

The Psychophysiological Stress Profile (PSP) is used as a diagnostic assessment tool. Each person's mind/body responds to stress in a unique fashion. Review each profile for information on which stressor produces a response and look to see if recovery to baseline is achieved during recovery periods. Follow Rob Kall's basic PSP profile suggestions (attached with permission).

Stress Profile EMG Sensor 1 ______________________________
EMG Sensor 2 ______________________________

	EMG1	EMG2	TEMP	GSR
Baseline	______	______	______	______
Sx: Perform	______	______	______	______
Recovery	______	______	______	______
Sx: Emotion	______	______	______	______
Recovery	______	______	______	______
Sx: Anticipate	______	______	______	______
Startle Max	______	______	______	______
Recovery	______	______	______	______

Date completed: ________

Stress Profile EMG Sensor 1 ______________________________
EMG Sensor 2 ______________________________

	EMG1	EMG2	TEMP	GSR
Baseline	______	______	______	______
Sx: Perform	______	______	______	______
Recovery	______	______	______	______
Sx: Emotion	______	______	______	______
Recovery	______	______	______	______
Sx: Anticipate	______	______	______	______
Startle Max	______	______	______	______
Recovery	______	______	______	______

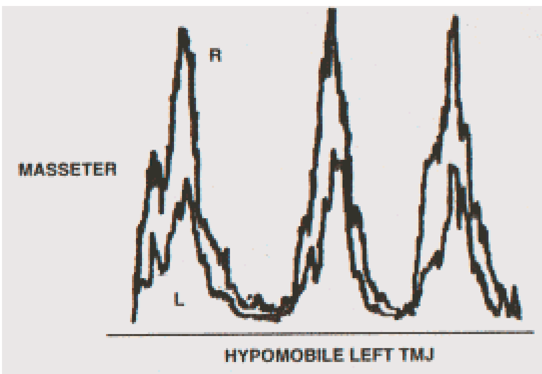
Date completed: ________

TMJ Assessment (Required) #5 Date completed ___________

EMG Placement: Masseter (use triod sensor): jaw pain, ear pain, referred headache pain.

During assessment, ask client to open and close his/her mouth; talk and stop; smile. Smiling with the neck: make sure the SCM muscles are not activated with a smile.

Check for signs of sympathetic arousal in TEMP and GSR measurements. Overall sympathetic arousal may show up in thermal vasoconstriction and may cause night bruxism/grinding.



SEMG activity of the left (L) and right (R) masseter muscles recorded from a patient with left TMJ pain during three repetitions of jaw opening and closing. Decreased left side muscle activity was associated with hypomobility of the left joint. (From Kasman et al (1998). Clinical Applications in Surface EMG, Aspen Publishers).

Postural Assessment - Perform 4 Postural Assessments (Required) # 6, 7, 8, 9

Observe muscle imbalances for hyper or hypo activity.
Record initial resting values. Record muscle activity levels. Record recovery values from muscular activity. Include the length of time it takes the muscle to recover to baseline.

Postural Profile	Site 1 ___________		
	Site 2 ___________		
	EMG1	EMG2	Diff.
Baseline (sit)	______	______	______
Activation (stand)	______	______	______
Recovery (sit)	______	______	______
Activation (arms up)	______	______	______
Recovery (arms down)	______	______	______
Relaxation	______	______	______
Date completed _______			

SEMG Assisted Abdominal Breath Training (Required) #10

Training to encourage abdominal breathing can be done with SEMG assistance. Using bilateral trapezius wide SEMG placements develop deep abdominal breathing patterns by working to eliminate excessive rising and falling of shoulder muscle while breathing. This training should eliminate the use of upper body muscles when breathing which is associated with thoracic breathing.

Also note the rate of breathing. Mild hyperventilation = >18bpm.

SEMG Placement: Bilateral Trapezius, wide placement
Thermal sensor to monitor level of relaxation that often comes with breath training

Date completed: ___________

Temperature Biofeedback

Operation Principal (excerpt from www.bio-medical.com)

Skin Temperature feedback instruments generally employ precision linear thermistors for temperature detection. A thermistor is a tiny semi-conductor embedded in a small epoxy bead; it serves as a temperature sensor when the epoxy bead is in contact with the surface of the skin.

A thermistor also acts as a physiological transducer in that it converts skin temperature information into an electrical resistance coefficient whose level is proportional to the monitored skin temperature. The diameter of a thermistor is very small (usually 1/8" or less) and it accurately detects the temperature only of the small area of the skin surface in direct contact with it. Because skin temperature can vary as much as 1 – 2 degrees Fahrenheit over a one inch diameter of the skin surface, the small area monitored by the thermistor can limit information consistency and reliability.

<u>Temperature Training</u> (Required) #11, 12, 13, 14

Work with each of the following training techniques to promote thermal regulation.

Record Finger Temperature	Starting	Ending	Date completed
Passive Relaxation Training	______	______	______
Autogenic Training	______	______	______
Guided Imagery	______	______	______
Jacobson's Technique (Progressive Muscle)	______	______	______

GSR Training

Galvanic Skin Response or Skin Conductance Response is measured in microSeimens (also called microMhos). Place a small amount of electrode gel on the sensor and apply to the volar side of the fingers.

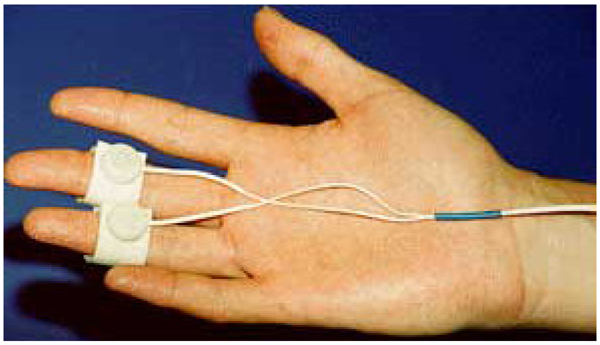


Photo from the Biofeedback Tutor-Dr. Fred Shaffer

GSR (SCR) is a measurement of a psychophysiological response. The baseline or tonic measurement is referred to as skin conductance level (SCL). There is no corresponding GSR measure.

<u>Values</u>

≤ 5 µmhos	relaxed
5-10 µmhos	normal
10-20 µmhos	agitated
≥20 µmhos	anxiety

Note:
Skin resistance can also be measured. The unit of measure for SRL is kohms (the ohm is the unit of resistance while the mho (ohm spelled backwards) is the unit of conductance).

Both skin conductance and skin resistance involve the application of an external current to the skin and then measuring how well the skin conducts (or resists conductance) of that current.

Skin potential (unlike SCL and SRL) is the measure of the skin's actual potential and is measured in volts.

HRV Training

Respiration plays a central role in the both physical and emotional energy. Rapid breathing (hyperventilation) often accompanies a tense or stressful moment. We “blows off” carbon dioxide (CO_2) too quickly and this lowered level of CO_2 is called “hypocapnia.” Hypocapnia induces cerebral vasoconstriction and hypoxia and increases sympathetic nervous system (SNS) arousal and later causes rapid fatigue. The symptoms of hypocapnia include:

1) *Cardiovascular* -- palpitations, tachycardia, precordial pain, cutaneous vasoconstriction.
2) *Neurological* -- Central: dizziness, disturbance of consciousness and vision. Peripheral: paraesthesiae, tetany.
3) *Respiratory* -- shortness of breath, wheezing, chest tightness.
4) *Gastrointestinal* -- globus, dysphagia, epigastric pain, aerophagy.
5) *Musculoskeletal* -- muscle pain, tremors, tetany.
6) *Psychic* -- tension, anxiety.
7) *General* -- fatigue, weakness, exhaustion, sleep disturbance, nightmares.

Heart Rate Variability Sensors

Manufacturers will have various methods for collecting the data needed for HRV biofeedback. Basically, you are synchronizing breath rate with heart rate so you will need a method of collecting this data. In addition to the rate of breathing, many therapists focus also on incorporating diaphragmatic breathing rather than thoracic (upper chest) breathing.

EKG sensor; Respriation (strain) Gauge; Wrist Electrodes

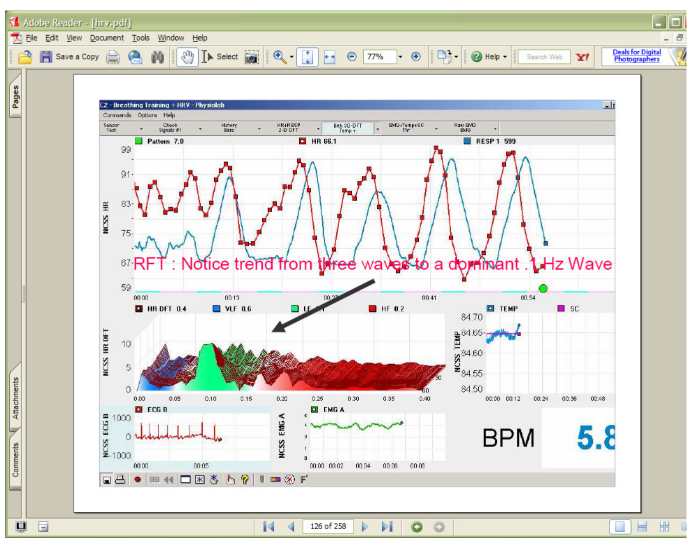
HRV biofeedback sessions

Your training with clients should include at least these four components:

1. Breath retraining: Using a “strain” gauge, you will learn to use the primary breathing muscle, the diaphragm. The diaphragm is located at the base of the lungs. As we inhale, the diaphragm should drop down and push your abdomen out. Diaphragmatic breathing is sometimes referred to as deep abdominal breathing.

2. Paced breathing: Paced diaphragmatic breathing restores synchrony between the respiratory and cardiovascular systems. Paced breathing produces a pattern called the “Respiratory Sinus Arrhythmia” (or RSA), in which low frequency (LF) rhythms prevail in heart function, at a frequency of about 0.1 Hz, or 6 cycles per minute. The heart rate gently increases with each in-breath, and decreases with each out-breath, at a rate of about six cycles of breathing and heart rate change per minute. This RSA pattern produces greater homeostasis in the autonomic nervous system, reducing stress.

3. Achieving Resonant Frequency: Building the “meditator's peak” at about 0.1 Hz (low frequency range). Ordinary breath produces three heart rate frequencies referred to as VLF (very low frequency), LF (low frequency), and HF (high frequency).



4. Home training and integration into your client’s life: several times a day, your client practice and develop the habit of engaging in several minutes of paced breathing. You can ask them to download a pacer on to their computer desktop.

   - ✓ Go to www.bfe.org
   - ✓ Go to the bottom of the page and click 

Record your data and observations on the following sheets
#15, 16, 17, 18

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

#19, 20, 21, 22

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

#23, 24, 25, 26

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

#27, 28, 29, 30

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

#31, 32, 33, 34

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

#35, 36, 37, 38

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

#39, 40, 41, 42

Session Type:	
☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:	
☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:	
☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:	
☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

#43, 44, 45, 46

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

#47, 48, 49, 50

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Personal Biofeedback Training #1, 2, 3, 4

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Personal Biofeedback Training #5, 6, 7, 8

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Personal Biofeedback Training #9, 10,

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Session Type:

☐ EMG1 Site	☐ EMG2 Site
☐ EEG Site	☐ TEMP
☐ GSR	☐ HRV
☐ Resp	

Observations/notes:____

Notes:

Psychophysiological Stress Profiling

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Stress profiling starts with a baseline and then subjects an individual to different kinds of stressors while monitoring a number of psychophysiological and other parameters. After each stressor a recovery period is allowed. The goal of the PSP is to identify stressors which produce stronger reactions and/or psychophysiological systems or behaviors which are excessively reactive. The pattern of system activation and the pattern of recovery or lack of it can be useful predictors of response to different biofeedback interventions to minimize excessive reactions and increase skills for coping with stressors which had caused excessive reactions.

The following sequence is a generic sequence which most stress profiles are based upon. Different stressors can be incorporated as the need dictates.

Working with a post injury patient one might consider avdersive imagery of the injury activity and related activities. And if pain is present, then imagery of situations which activate or exaggerate the pain. If the client is an athlete, then high pressure situations, situations where poor performance has occurred, activities in which injuries have occurred or where unknown factors threaten might be considered as sources of imagery.

The basic PSP Model
baseline
stressor 1
recovery
stressor 2
recovery
stressor 3
recovery
etc.

Pain/injury general PSP
baseline
serial sevens
recovery
aversive imagery
recovery
anticipation-startle
recovery
cold pressor
recovery

The above general protocol is designed for assessing pain, stress, anxiety, post-traumatic-stress and related clients. The goal is to identify significant stressors and the psychophysiological response patterns they elicit. The following discussion will explore what different findings for the different conditions and the interaction between the conditions suggest in the way of interpretation and treatment planning.

You can use as few or as many signals as you wish to in evaluating your client's response to stressors. Typical signals collected include:
EMG wide frontalis placement
EMG upper trapezius
EMG low back
EMG forearm
EMG masseter

non-dominant hand temperature or skin conductance/EDG/EDR/GSR respiration rate, thoracic excursion level, abdominal excursion level pulse/heart rate blood pulse volume (photoplethysmograph)

Less common signals which can be used:
EEG frequency /amplitude
inclinometer angle
EMG median or mean frequency
variability of any signal
proportion between two signals (bilateral, antagonist muscles, bilateral EEG, alpha/theta ratio)
Electrocardiogram

Pain/injury general PSP
Baseline
Serial sevens
recovery
aversive imagery
recovery
anticipation-startle
recovery
cold pressor
recovery

Baseline
The first step of a stress profile is to establish a baseline. Before you get an "official" baseline for the PSP it is important to make sure the client's psychophysiology has stabilized from dramatic temperature differences outside the office, activity level (if, for example, the client ran to the office and had a rapid heart beat and was sweating profusely and breathing fast and shallowly.) It is essential to allow the client to reach some stabilization. Usually this means sitting quietly for some time.

Different people have stated varying guidelines. The ideal is for the client to reach some stable level within the new environment. This could take as long as 15 or more minutes. If you do not wait, it is possible the findings will be tainted and misleading or dampened by the previous stimuli.

Once you are confident the effects of external stimuli, those stimuli the client had experienced outside the training environment, are worn off or stabilized, you can record baseline readings for a fixed period of time. Usually the baseline period is the same or perhaps a bit longer than the average time period for each of the following stressor and recovery periods.

One important decision to make is whether the whole PSP should be performed with eyes open or closed. It is difficult to make comparisons between phases of the PSP if some are with eyes open and some closed. The same is true for any activities which cause muscle activity or changes in energy level.

Talking or strenuous movement, for example, produces EMG activity which is no stress related, so it is impossible to compare recovery periods or other stressor periods with those active phases. For this reason, my own approach is to only record data with eyes closed and when no activity is occurring. During times of activity or talking, data storage is paused. Once the activity or talking ceases, the recording can continue.

Evaluating the baseline information takes some practice and experience. Some parameters have normal readings across individuals to some extent, such as frontalis muscle activity. But even then it is necessary to consider the filter band pass frequency for the instrumentation and to a mild extent for the frontalis, percent body fat. Body fat is more important when considering electrode placements over areas where excess adipose tissue tends to accumulate. When using a narrow, 100-200 Hz bandpass on the frontalis, a relaxed baseline is under three, even under two or 1.5 microvolts with eyes open. Using a wider bandpass, normal, relaxed readings are under 4 or 5 microvolts.