



Psychophysiology today

the magazine for mind-body medicine



Biofeedback – window to an unexpected, undiscovered world

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FROM THE EDITOR



Our last meeting, the 10th anniversary BFE meeting in Vienna was a great success and went beyond our wildest dreams. We enjoyed outstanding speakers, workshop presentations and a dynamic audience, as well as opportunities for informal collaboration and socializing with colleagues during the evening events and breaks. The mood of the meeting was friendly and relaxed with everyone displaying high spirits and energy for promoting biofeedback. Hopefully the meeting contributed to the expansion of our field by opening minds to the greater possibilities for biofeedback in Austria. One of our most important missions is to increase public and professional awareness of biofeedback, and our annual meetings allow organizers to bring public attention to this new field of science and health treatment. We are all looking forward to our next meeting in Berlin February 27 -- March 3, 2007 and hope the Germans will be as open as the Austrians were! My wish for the future would be for people to better understand the importance of self-regulation and taking responsibility for our own health, and that biofeedback as a tool to leave the state of learned helplessness will, one of these days, become a real alternative to conventional treatments.

For the upcoming meeting we have opened a new application area for biofeedback – *biofeedback for dentists* — see the original article in this issue by J. Hindin. We hope that this serves as a model for other explorers to use biofeedback in creative and useful ways.

Again we found a very interesting article for reprint – this time from Ed Taub on thermal biofeedback that we still consider to be a useful description of the technique and how to implement it.

We hope you enjoy reading this issue and we look forward to hearing about your creative solutions on how to use biofeedback and how you have adapted this field to your own personal needs.

For more information about the last meeting in Vienna and pictures from the meeting itself, and for preliminary information about the upcoming meeting in Berlin (workshops and scientific program) see: www.bfe.org

I hope that the selected articles are again beneficial and useful for you. We all look forward to your future submissions on common interests, case descriptions, research articles and/or educational and diagnostic procedures. This information helps to spread the knowledge of biofeedback and neurofeedback with the underlying premise that body and mind are much more closely connected than we think. Please send me your feedback to editor@bfe.org

We appreciate your feedback.

Monika Fuhs
Editor-in-Chief

PRESIDENTIAL NOTE



Applied psychophysiology and biofeedback is an interdisciplinary field integrating technology, medicine, human potential, biology, psychology, and much more. The richness comes from combining these different perspectives which can lead to new or sometimes rediscovered applications and approaches. The 2006 meeting in Vienna truly celebrated the dynamic growth in biofeedback. We look forward to seeing you at the upcoming 11th Annual Meeting of Biofeedback Foundation of Europe to be held in Berlin, February 27-March 3, 2007. We look forward to your submissions to the scientific program and attendance at the meeting.

As Monika Fuhs, wrote in her editorial note, this recent issue includes a reprint of one of the early and best articles by E. Taub and P.J. School, **Some methodological considerations in thermal biofeedback training**. Taub and School's observations are still valid, especially the importance of the person factor in training. In many cases, success in biofeedback training is the result of the interaction between the client/student and the therapist/teacher/coach. This interaction contains the critical dimensions of caring and expectancy. Namely, if the demands of the situation are appropriate and embedded within a compassionate framework, success is increased. On the other hand, if the demands induce excessive arousal and/or vigilance, then trying to reduce sympathetic mediated physiological functions is hindered and clinical success is reduced. This covert process underlies most of clinical and educational biofeedback training. The subtlety of these factors can also be illustrated through an analogy of asking for a urine sample. The demand often inhibits the ability to urinate (Peper, 1976). These covert and yet common sense concepts are sometimes forgotten and need to be continuously rediscovered and taught.

Another forgotten area is the applications of biofeedback to dentistry. This issue describes an exciting new quantifiable new use of sEMG for orthodontics. It is an expansion of the early applications of biofeedback for dental related problems such as bruxism and temporo-mandibular joint dysfunction syndrome (TMJ). These initial dental applications were summarized in a spiral bound book edited by Rugh, Perlis and Disraeli (1977) containing a compendium of articles. It is exciting to see old and new fields expand. It is exciting to see how biofeedback tools can be applied to different areas.

Finally, we invite you to submit your research and clinical observations for the 11th annual meeting. We look forward to seeing you there.

Erik Peper, Ph.D.

President
Scientific Advisory Board

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REPRINT OF INTERESTING ARTICLES

Some Methodological Considerations in Thermal Biofeedback Training

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This article attempts to provide guidelines for acceptable practice in thermal biofeedback training. Criteria are set forth in three major areas: the nature of the interaction between the experimenter/therapist and subject/patient, training procedures, and the physical characteristics of the temperature sensing and feedback system.

In thermal biofeedback training, as in almost all other types of biofeedback training, it is of the greatest importance that three major factors be given explicit attention: (1) the nature of the interaction between the subject/patient and experimenter/therapist, (2) adequate methodological procedures to insure both that the training process is as easy as possible and that a true training effect and not artifact is being recorded, and (3) the physical characteristics of the training environment and of the sensing, feedback, and recording system. It is beyond the purview of this article to deal with each of these subjects exhaustively; however, we will attempt to specify those aspects of thermal biofeedback procedures and techniques that are the most important for avoiding artifact and achieving a good result in training.

THE “PERSON FACTOR” IN THERMAL BIOFEEDBACK TRAINING

Perhaps the most powerful factor influencing whether or not thermal biofeedback learning will occur is the quality of the interaction between the experimenter/ therapist and the subject/patient, that is, the “person factor.” The first experimenter carrying out thermal biofeedback research in our laboratory (May 1970) showed an impersonal attitude toward the experimental subjects and was able to train only 2 of 22 individuals to control skin temperature. Another experimenter, using exactly the same technique, was more informal and friendly, and trained 19 of 21 subjects. We assumed that the person factor was responsible for this apparent reversal of results. This was our first observation along these lines, and it was admittedly unsystematic. A formal experiment was carried out to investigate this phenomenon. The independent variable was the experimenter’s behavior toward two groups of

¹ This research was supported by NIH Grant HL 21323 and by ARPA of DOD under ONR Contract N00014-70-C-0350 to the San Diego State College Foundation. We thank Dr. Joseph Rothberg for the design and construction of the feedback system and Maurice Swinnen for the design and construction of the thermistor probes and thermistor bridges of the first analog temperature training device employed in this laboratory. Alfred Jaknuinas designed and built our current digital temperature system. We are grateful to our collaborators who helped in the conduct of different stages of the research, in particular, Paul Slattery, Cleeve S. Emurian, Priscilla Howell, and Susan N. Rice.

subjects. With one group the experimenter adopted an impersonal attitude (i.e., using last names, discouraging extraneous conversation, avoiding eye contact, etc.). With another group the experimenter adopted a friendly attitude (i.e., using first names, encouraging development of a friendly relationship, frequent eye contact, etc.). Both groups showed significant learning. However, the impersonally treated group altered hand temperature by a mean of only 1.3°F on the last 3 days of a 10-day training series; the group treated in a friendly manner achieved a mean change of 4.2°F on the same days. This striking difference is by far the largest experimental effect we have obtained by the manipulation of any single variable in our entire sequence of experiments. It is almost impossible to overemphasize the importance of the experimenter-attitude variable for the success of thermal biofeedback training. It seems highly probable that the person factor is equally critical for the success of other types of biofeedback training.

ADEQUATE METHODOLOGICAL PROCEDURES

Pre-session Stabilization Procedures

It is extremely important to have an initial stabilization period prior to the beginning of a feedback period. It is well known that skin temperature sensitively reflects the emotional state of the individual (e.g., Mittelman & Wolff, 1939; Neuman, Lharon, & Cohn, 1944). When a subject is involved in a negative affective state, his hands tend to be cold; as he relaxes, his hands tend to increase in temperature. At the beginning of a session, skin temperature can change enormously; when the change is large, it is usually in an upward direction. The large increases are apparently an indicator that the subject is relaxing after being attached (wired up) to the equipment and left alone. Laboratory situations are tense for most people, so subjects often do not relax until the experimenter leaves the room. It is important not to confuse the effects of general relaxation with the effects of specific training. The training task should not be introduced until the relaxation process has been completed. We have been shown results by investigators new to the field that purport to indicate major temperature self-regulation effects on a few individual training days but not on others. These results often arouse suspicion since, once a person has learned the task well, he is able to repeat it on almost all occasions. Often novice investigators do not establish initial stabilization periods. Almost certainly, the result is the type of habituation process described above.

It is preferable to use a stabilization procedure based on performance rather than the simple passage of time. In this laboratory the initial stability criterion established before feedback training requires that the temperature variation be no greater than 0.25°F during 4 consecutive min. The first 6 min are not considered part of the period used to determine the initial stability point; that is, training cannot begin until at least 10 min have elapsed. If the stability criterion is not reached in 30 min, self-regulation is initiated. However, this occurs infrequently. The mean time required for the initial stability point to be reached differs with the season of the year, but is usually about 15 min. Examination of session records in this laboratory indicates that, had a standard temporal interval (such as 15 min) been employed, many subjects would already have stabilized. However, some subjects would not have stabilized, thus contaminating the data for the training period.

Pre-training Baseline Sessions

Some individuals have a marked tendency to exhibit temperature change in a given direction while simply sitting quietly in an experimental chamber for a period of time equivalent to the full biofeedback session. This does not occur in every individual. The temperature of some individuals'

hands increases during some baseline sessions and decreases during others. However, when there is a tendency to change in a single direction, it is important that this be known, since it can make a major alteration in the interpretation of the amount of learning that has taken place. The manner in which this problem has been handled quantitatively in this laboratory is described elsewhere (Taub, 1977; Taub & Emurian, 1976).

The tendency for temperature change in a given direction is most marked during the summer. People tend to come into the experiment from the street with very high hand temperatures, and these frequently do not decrease even after sitting in an air-conditioned laboratory for 1 h before the beginning of a session. During the stabilization period, there is an almost invariable tendency for the hand temperature to decrease slightly, though it often remains above 94°F. This is a difficult problem to overcome. We had subjects wash their hands in cool water, but this often produced instability in hand temperature over a long period of time. Moreover, hand temperature often returned to the original high level within 1/2 h or so. In these cases, we simply accept the initial high hand temperature and proceed with the training from that point. Because outside temperature can be such an important factor in influencing subjects' starting temperatures and the results obtained in the biofeedback situation, we routinely record the outside temperature prior to each session.

At present, we carry out 5 days of baseline testing. Data for the first day are discarded since the initial period of habituation to the laboratory frequently gives an atypical record. This procedure is appropriate because most of our work is experimental. For clinical purposes, baseline sessions are probably not absolutely necessary. However, it is extremely important that there be an initial stabilization period, regardless of setting.

Methods for Determining Whether the Result is Effect or Artifact

One of the best methods for determining that true learning has taken place is to train a subject to alter his temperature in both an upward and downward direction. This can be done in serial periods during the same session from the beginning of training or it can be done sequentially, that is, the subject learns to control temperature in one direction and then in the other. If the subject uses a "trick" to accomplish the task, he probably cannot use the same trick to change temperature in the opposite direction. It is possible, of course, but it is highly improbable that the subject can use two tricks with equal effectiveness. If a bi-directional procedure is employed, considerations of stabilization periods and baseline sessions become less important than if the subject is trained in only one direction. Most clinicians, of course, teach patients to warm their hands, a unidirectional procedure. Thus, bi-directional training is inappropriate for clinical purposes. However, steps can be taken to reduce the chances of artifacts influencing the procedure. One method is to give the subject appropriate instructions prior to the beginning of training. He/she should be told to move as little as possible, compatible with comfort; this is especially true for moving the hands. The subject should also be told to avoid changing breathing from normal resting patterns. During the session, it is important to have subjects under visual observation by the experimenter. If subjects deviate from instructions, they should be requested to stop the undesirable maneuvers, by intercom if subject and experimenter are in separate rooms. The temperature recorded by thermistors can be altered by blowing on the devices. Some subjects direct expired breath in the direction of the self-regulating hand without being aware of it. When the phenomenon of feedback-aided self-regulation of hand temperature was first demonstrated in this laboratory, we constructed a transparent Lucite box, open in the direction facing away from the subject to permit circulation of air. On the side nearest the subject, there was an opening into which the hands fit; a drop cloth covered the opening. This device permitted us to determine that the passage of

expired air over thermistors was not a factor in the control we were observing in our subjects at the time. Clinicians should be alert to this possibility and, when appropriate, instruct subjects to refrain from such activities. In order to prevent heat from being trapped around the thermistors, thus generating unduly high readings, a framed screen (Chucker, Fowler, Motomiya, Singh, & Hurley, 1971) rather than a solid wooden board can be used as a lap board upon which the hands rest.

The training period in this laboratory is typically 15 min, although some subjects given feedback for 15 consecutive min complain of fatigue. Maintaining focused attention for that long can be aversive for some people. Consequently, we have introduced a 10-sec timeout period between successive 50-sec feedback periods. We have no systematic data on this issue, but when we introduced the 10-sec between-trial interval, the subjects uniformly reported a preference for that procedure rather than for continuous feedback.

Post-training Rest Period

It is useful to have a post-training rest period. This procedure serves at least two purposes. First, if the subject is achieving self-regulatory control by employing “passive volition” (Green, Green, & Walters, 1970), it is valuable to give the subject an opportunity to emerge slowly from that condition. If subjects begin to engage in normal activity too soon, they sometimes report discomfort and mild headache. Second, if a subject is being taught to alter temperature in one direction only, temperature variation during a post-training rest period provides a useful crude index of how well the subject has learned the task.

In the early stages of learning, temperature does not change rapidly from the level attained at the end of the feedback period. When learning is well established, however, there is a marked tendency for the temperature to return to baseline fairly rapidly.

The Information Display

Two types of visual feedback displays have been employed in this laboratory. The first was an analog device that controlled the brightness of a lamp so that it was proportional to the temperature at a feedback locus on the dominant hand (Taub & Emurian, 1976). A priori considerations and comments from subjects indicated that this feedback system had a number of drawbacks; consequently, a more sophisticated digital display was constructed (Taub, 1977). Surprisingly, the presumably superior feedback system did not improve the ability to self-regulate hand temperature (for a fuller discussion, see Taub, 1977). Roberts and co-workers (Roberts, Kewman, & Macdonald, 1973; Roberts, Schuler, Bacon, & Zimmerman, 1975) have employed auditory feedback and have obtained results similar to those of this laboratory.

Use of Other than Augmented Feedback

A variety of feedback techniques other than that obtained from temperature sensors, which is processed electronically and then displayed, can greatly improve a subject’s performance. Verbal reward for a subject who does well is extremely important. When the subject is not doing well, encouragement and an implicit attitude that the experimenter confidently believes that he will be able to learn the task are even more important. For the subject who is doing poorly, even small movements in the correct direction should be praised.

When training college students, we routinely employ monetary reward at the rate of 25 cents for each 0.25°F in the correct direction. In one study this procedure improved performance by 0.5°F, but the

difference between subjects given money reinforcement and those without it was not statistically significant. We have continued the money reinforcement procedure because it seems to focus a subject's attention on the task.

At the end of each session, the subject is given a graph showing his performance on that day. This process can be an important ancillary device for maintaining subject interest and motivation.

Finally, at the beginning of training we do not permit a subject to receive too much feedback on changes in the wrong direction; 0.2°F is the maximum allowed. When subjects observe large changes in the wrong direction, many become discouraged and stop trying or become anxious and try too hard. Both reactions are counterproductive and usually result in an inability to perform. The negative results are sometimes not confined to that day alone, but generalize and lead to a complete failure of training.

Units of Feedback and Sampling Rate

We do not have systematic data on units of feedback and sampling rate. However, at the beginning of our work on this project, feedback was given in units of 0.1°F, and learning was poor. The system was redesigned so that the feedback unit was 0.02°F, and the subsequent results were excellent (Taub & Emurian, 1976). Evidently, if the feedback unit is greater than 0.5°F, learning is not as great as it could be with many subjects.

Our current digital feedback system has the capability of a broad range of sampling rates. We began with a sampling-display change rate of 4/sec, that is, the feedback display changed four times every second. Subjects found this unpleasant and confusing. We then reduced the sampling-display change rate to 2/sec, and this was greatly preferred. There is obviously a U-shaped function relating sampling rate and thermal biofeedback learning. We have only the most general idea of what the parameters are.

Factors Conducive to Subject Relaxation

A number of simple conditions can generate a relaxing environment. The subject should be seated in a comfortable chair. The light in the room should be dim. It is desirable to have a rug on the floor since this lends a feeling of warmth and ease. The decor should be pleasant. A few plants and prints or paintings in the vicinity seem to help. On the other hand, during the early part of training, stressors tend to abolish the ability to self-regulate hand temperature. After the task has been well learned, even severe stressors, such as immersing the non-controlling hand in ice water or whole-body cold challenge by water in a "cold suit," do not appreciably affect performance (Taub, 1977).

PHYSICAL CHARACTERISTICS OF ENVIRONMENT AND FEEDBACK SYSTEM

Several physical and technical factors may influence temperature biofeedback results. Environmental factors include temperature, temperature variability, and air flow patterns in the subject's room, as well as outside temperature. Proper sensor placement is critical. In addition, a number of other technical factors contribute greatly to the validity and reliability of the measurement.

Temperature and Air Flow in the Biofeedback Room

It is virtually impossible to devise a means of reliably sensing skin temperature that is wholly uninfluenced by air temperature and flow. Air drafts introduce artifactual measurement variation, not

only because they are warmer or cooler than the mean ambient temperature but also because they change skin temperature by altering evaporative skin cooling. Strong drafts probably cause so great a spurious moment-to-moment temperature change that acquisition is either considerably slower or prevented entirely. Similar considerations apply to any other factor that produces large or rapid changes in room temperature. Consequently, any temperature variation caused by lack of sufficient thermostatic control or drafts must be corrected.

Typically, home or office room temperatures, which presumably are being maintained at a constant level, vary over a 1.5°F to 3.0°F range in a given location. The variability is increased still further because most heating/cooling systems produce temperature gradients that vary greatly at different locations in a room.

In our laboratory several steps have been taken to achieve a biofeedback room temperature of 73°F + or - 0.25°F. The inside of the room has been insulated with 3-inch-thick fiberglass. The material is left essentially open, being kept in place by decorative burlap stapled to the wall. This arrangement eliminates hot or cold spots on the walls and ceiling. Moreover, the essentially exposed surface of the fiberglass provides excellent acoustical isolation. To facilitate achieving the desired biofeedback room temperature, we maintain the temperature of the large air mass in the entire laboratory at 74°F, a level slightly above the desired biofeedback room temperature. A portion of this air is drawn into a semi-closed system consisting of a 13,000-Btu window air conditioner that continuously supplies air to the biofeedback room through ducts and registers located in the ceiling. Return air is picked up with a duct at floor level.

The biofeedback room contains a false ceiling constructed of an 1-inch-thick sheet of air-filter material, called Permalast, suspended 20 cm below the real biofeedback room ceiling. This results in an “air box” with a very porous lower surface. An empirically designed system of baffles within the false ceiling causes inlet air to be fairly uniformly distributed within the space between the false and real ceilings. Although the air flow through the biofeedback room is fairly high, the system of baffles, air filter, and floor-level-return-duct produces a very uniform ceiling-to-floor and wall-to-wall temperature distribution (<5°F) with no perceptible air drafts.

A Yellow Springs Instruments Model 73 tele-thermometer set at 72.75°F with a Model 401 probe controls the compressor in the air conditioner. Many probe locations were tried to achieve the least possible temperature variation. Surprisingly, the best system performance was obtained when the probe was placed in a very atypical location—the air conditioner outlet duct. With this arrangement, the compressor comes on for 10-15 sec every 1-2 min. This brief “on time” is effective in smoothing out thermal hysteresis effects.

The level of temperature control in our laboratory is desirable in a thermal biofeedback setting, but it is recognized that this will be difficult, if not impossible, to achieve in a typical clinical setting. However, a number of relatively simple steps can be taken to improve temperature level and stability. First, a check can be made of the temperature in the portion of the room in which the patient will be located. If there are drafts in that area, the location of the patient should be changed. If a location change is not possible, some means of draft deflection, such as room-dividing screens or large leafy plants, should be provided. If the room temperature still varies more than 1.5°F during a typical session, qualified service personnel or an air conditioning/heating consultant can recommend changes to reduce temperature variation.

Temperature Sensor Attachment Methods

Although there are non-contact methods of skin temperature recording such as thermography, most temperature biofeedback is done with sensors attached to the skin surface. Obviously, proper attachment of the sensors is required to insure adequate sampling of the physiological variable. To prevent the obstruction of blood flow, our subjects are asked to remove rings and tight wrist bands and not to wear tight sleeves. When sensors are located on the fingers, the tape securing them should not occlude blood flow. This can be avoided by applying the tape with light pressure and covering only a portion of the circumference of the finger. Complete encirclement of the finger should be avoided. Attachment is accomplished with a single layer of “skin tape” (Dermilite). For a technical reason (stem effect, described below), we always tape at least 5 cm of the sensor lead wire to the subject’s skin. The second strip of tape also reduces the chances of a sensor falling off during a session.

Temperature Measurement Sensors and Related Equipment

Most temperature biofeedback equipment employs thermistor-type sensors. Thermocouple sensors are not as commonly used. Thermistors are semiconductor devices which change electrical resistance when exposed to different temperatures. Thermocouples are made of two unlike metals that produce a voltage when they are connected electrically. When attached to appropriate circuitry, both thermistors and thermocouples provide a voltage analog that is proportional to temperature. Although thermocouples tend to be inexpensive, fairly linear, and rapid responding devices for skin temperature measurement, most designers of temperature biofeedback equipment have elected to use thermistor because, for the same system cost, the devices provide more sensitive, accurate, and higher resolution readout than that obtainable with thermocouples (The 1977 Omega Engineering Temperature Measurement Handbook, 2nd ed., available from Omega Engineering, Inc., Box 4047, Stamford, Connecticut 06907).

When a commercially available thermilinear device is used to sense temperature, the output voltage is linearly related to temperature. Thermistors do not have a linearizing thermally coupled resistor and are, therefore, not thermilinear devices. Consequently, they may or may not provide enough accuracy, depending upon experimental/clinical requirements. Generally, the small additional expense for thermilinear devices is worth the benefit.

No temperature-measuring device responds to a temperature change instantly. The time a sensor takes to respond is usually described in terms of “time constant 1.” A time constant is defined as the time it takes a sensor to register 63% of a newly impressed temperature. If a sensor has a time constant of 1 sec and is exposed to a 1°F change, the output of the system it drives will indicate 0.63°F when 1 sec has elapsed, 0.86°F after 2 sec, and 63% of the remaining difference from 100% of the full temperature change in each additional second.

Commercially available biofeedback equipment typically incorporates sensors having time constants ranging from approximately 0.3 sec to several seconds. At present there are no data indicating that shorter time constants confer an advantage in temperature biofeedback training. Intuition suggests that the shorter time constant is better. However, when one considers that most subjects acquire control of skin temperature fairly rapidly, despite the fact that the time constant of the skin responding to blood-flow changes is on the order of 5 or more seconds, the additional temporal lag produced by typical sensor time constants of 0.3 to 3 sec may not be important, especially when very high resolution (0.02° F increments) feedback is provided.

Our laboratory employs thermilinear network sensing devices designed to provide good thermal coupling with the skin, a relatively short time constant (0.9 sec), extra electrical insulation to eliminate the possibility of shock hazard, and small-flexible lead wires (Model S015358m, Yellow Springs Instruments).

Accurate skin temperature sensing requires that a sensor be thermally coupled to the skin. To maximize thermal coupling, a sensor should be selected that allows good mechanical contact with the skin. Several temperature measurement specialists have recommended the use of a non-evaporative liquid or viscous substance such as mineral oil, petroleum jelly, or silicone grease to increase thermal coupling. We tested such thermal coupling agents and found they provided no significant advantage. When a perceptible draft was passed over the sensor, sensor wires, and sensed skin area, a drop of mineral oil placed under the sensor eliminated about one-half of the 0.5°F-1°F change that occurred in the absence of a thermal coupling substance. Since thermal coupling liquids are messy and hard to remove, and since they confer little advantage in a non-drafty room, we have elected not to use them. The need for thermal coupling substances should be evaluated in terms of local needs and situations.

Stem Effect

Electrical currents produced by sensors must, of course, be carried by wires or leads attached to the sensing element. Since wires are thermally conductive, the temperature of the lead wires influences the temperature of the sensor. This is called “stem effect” and can produce large artifacts in recording skin temperature. When a sensor is attached to the skin and the sensor leads are suspended away from the skin, a 1.5°F temperature impressed on the lead wires (not the sensor) produces a 0.5°F change in readout. Stem effect artifact is reduced to insignificant proportions if at least 5 cm of the sensor lead wires immediately adjacent to the sensor are thermally coupled to the skin by attachment with skin tape.

Equipment Calibration

A properly designed temperature biofeedback system should provide an absolute readout accuracy of greater than + or -0.3°F in the 68°F to 98°F range. To assure that temperature biofeedback equipment is operating properly, one must perform frequent checks of equipment operation and carry out periodic temperature calibrations. The latter is important because the components and sensors employed in even the best systems change with use and age. In our laboratory, thorough calibrations are carried out every 4 months and each time sensors are changed or equipment is repaired.

Temperature calibration requires a means of impressing a stable, accurately determined temperature on the sensor. We utilize a Haake Instruments, Inc., Model FE constant-temperature circulator. If the Haake instrument has been temperature stabilized for 2 h, it will maintain a temperature that is constant within 0.05°F. Readings taken in 2.0°F steps are sufficient for an adequate calibration. To insure that a sensor is being exposed appropriately to the bath temperature, it must be immersed 10 cm into the bath, and it must be located near, but not touching, the analytic grade mercury thermometer used for calibration readout.

We acquired the Haake constant-temperature circulator because our temperature biofeedback equipment is large and elaborate and because our research requires accurate absolute temperature calibration. Clinical temperature biofeedback units are portable; therefore, they may be taken to a commercial calibration laboratory. If the clinician desires, a crude calibration check can be made in his own office through the use of a 1-liter (or larger) beaker filled with water. The water should be gently

stirred with a laboratory-type magnetic stirring device. An analytic grade thermometer inserted in the beaker can then be used to determine the accuracy of temperatures recorded by the commercially available biofeedback device.

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Note from the editor:

If you train clients in hand (or foot) warming you may want to give homework in order to enhance success.

One way to have your client really do his homework could be to offer cheap hand thermometers that you can order from some companies. Clients like this kind of gifts and get curious on how and if they can do hand warming in different, challenging situations. (e.g. while watching a movie or the news, while facing their boss, when their kids or husband comes home, when being completely relaxed)
In this way you often can often more likely encourage even difficult clients who refuse to do homework.

Similar to the thermometers you can also hand out "mood rings" that change the color if the temperature changes- this is an inexpensive and very discrete way of controlling oneself if your client is female or a child.

Digital thermometers for workshops and training are available for around 20 €.

Dentists using Biofeedback and Physiological Assessment

HINDIN J. S., D.D.S.

HHSsystems, LLC

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Background

For many years dentists have designed and inserted oral appliances (orthotics) to treat bruxism and pain in the head and neck related to jaw pain, correct dysfunctions due to jaw position, vertical dimension, hyper contraction of muscles, and treat snoring and sleep apnea. When these oral appliances are designed, fitted and adjusted properly, patients often have not only demonstrated improvement of oro-facial symptoms, but often reported improvement in a wide range of systemic symptoms and disorders. The basis of these adjustments has been driven by diagnostic films, clinical exam and patient subjective responses to pain questionnaires.

In attempting to provide this therapy, dentists have encountered several obstacles. The treatment results are individual and not necessarily predictable or consistent from practitioner to practitioner. The number of visits required to adjust and balance the orthotics varies, and often dentists spend many more hours than anticipated modifying and adjusting the orthotics. Practitioners have had difficulty in correlating objective data with subjective responses. And finally, often the only evidence used to support results has been anecdotal as to what is occurring both locally and systemically.

New Ideas for an Old Paradigm

A small part of the dental community has over the years used biofeedback for stress and anxiety measurement and treatment of bruxism (1, 2). These biofeedback devices often used EMG and a sound device to alert the patient that they were “clenching” or “grinding” their teeth. Skin conductance and skin temperature have been used to evaluate patient responses to dental smells or other items in the dental armamentarium that elicit anxiety or stress reactions (3, 4, 5). More recently heart rate variability was used to evaluate dental patients prior to undergoing dental surgery making the statement “Clinicians may find that HRV evaluation is useful in monitoring patients with heart disease to detect early signs of cardiac impairment related to local, high sympathetic activity and to prevent cardiovascular emergencies.” (6). In spite of the reported benefits of the utilization of biofeedback instrumentation, its use as a modality in dental care has never become widespread.

A select group of leading dentists in the United States are using the method, developed by HHSsystems LLC of Suffern New York, to monitor key indicators during the insertion and adjustment of dental orthotics. Dr. Jeffrey Hindin monitors EKG, respiration, EMG, temperature, skin conductance and other indicators, to provide objective measures to complement the subjective reporting of patients. A dental assistant attaches sensors to the patient and records pre- and post-insertion physiological data that show any changes as a result of the orthotic. The data provide treatment results that show general indicators that are consistent from practitioner to practitioner. The physiological data also correlate with other measures used in dentistry such as radiography. First indications from these data suggest that there is a clear correlation between the objective data being collected and the subjective responses

of patients, that adjustment and balance of the orthotics can be significantly improved, that the number of visits required to do the adjustments could be reduced and that outcomes could be improved. These programs can be utilized as an aid in diagnosis and assessment, as well as monitoring during the insertion and adjustment of oral appliances and as adjunctive therapy. The dental program monitors multiple physiologic parameters including heart rate variability (HRV). Furthermore, it has been found that the benefits of physiological measuring can be applied to other aspects of dentistry. These areas include restorative dentistry, crown and bridge, and partial and full dentures. Patients can be routinely assessed pre and post insertion of oral appliances.

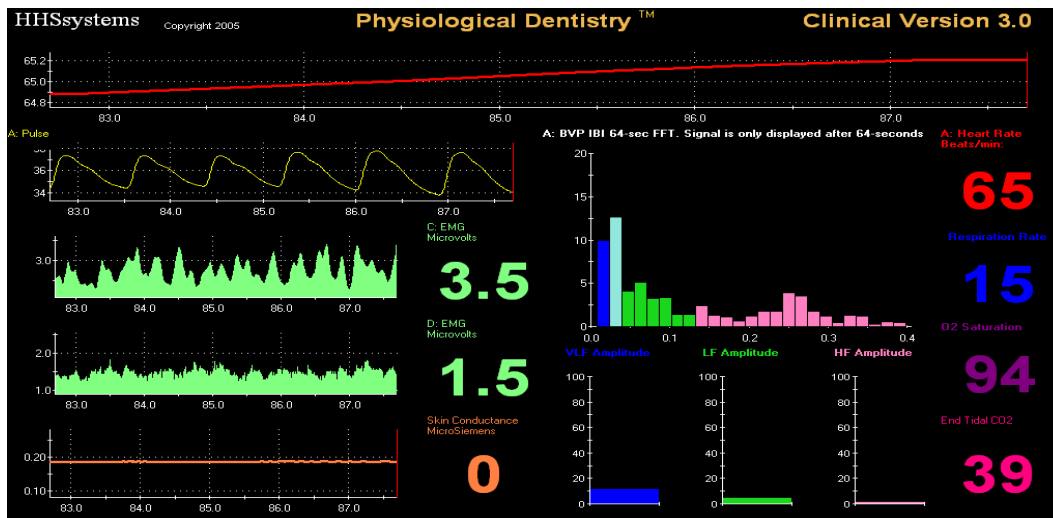


FIG. 1 before insertion of dental appliance, note uneven EMG, respiration rate and heart rate.

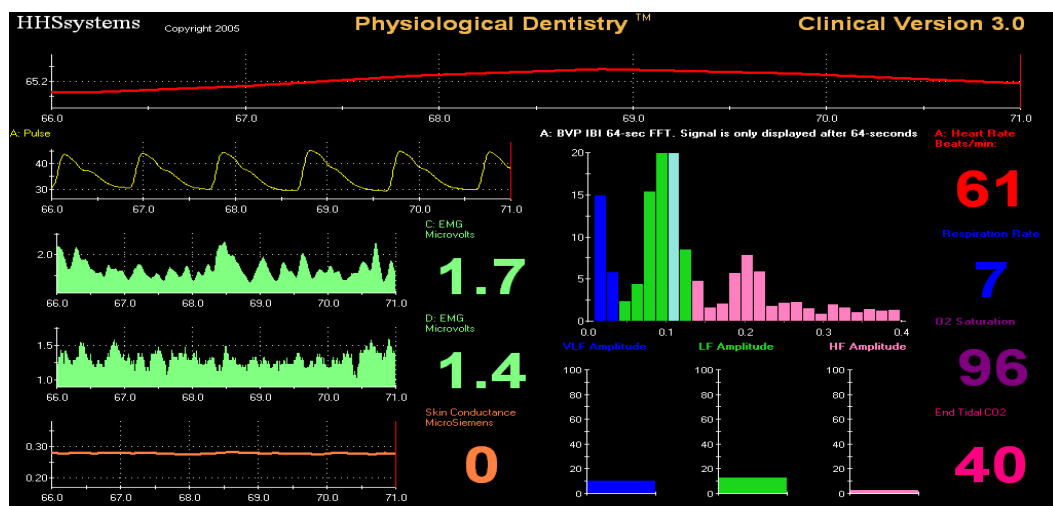


FIG. 2 after insertion of dental appliances, note EMG matched, decrease in heart and respiration rate and change in spectral FFT.

In the near future it is believed dentists may routinely monitor their patients' physiological functions and assess the risks and benefits of their treatment. In addition, they may design treatment specifically aimed to promote and enhance physiological function as well as biofeedback programs where appropriate.

This system may be a common ground where physicians, dentists, biofeedback practitioners and researchers can communicate and coordinate treatment to provide better health care for the public.*

Footnotes:

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- 6) **MONTEBUGNOLI L., SERVIDIO D., MIATON R.A., PRATI C. (2004).** Heart rate variability: a sensitive parameter for detecting abnormal cardio circulatory changes during a stressful dental procedure. J. Am. Dent. Assoc. 2004 Dec; 135(12):1718-23.

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* HHS Systems is now offering seminars and lectures to dentists, dental assistants and the public regarding the utilization and benefits of physiological monitoring as part of dental procedures. To learn more about the benefits of this exciting new innovation contact:
HHSsystems at (845) 357-1595.

HHS Systems LLC with Thought Technology, Ltd. has combined the expertise and experience of dentists, physicians and leaders in the psychophysiology and biofeedback world to create the dental suite programs of "Physiological Dentistry™."

The author Jeffry Hindin, D.D.S. will offer a workshop at the 11th annual BFE Meeting in Berlin, Feb. 27th to March 3rd 2007.

SEMG Biofeedback Treatment improves Diabetic Control an editorial

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A fascinating and long awaited article has just been published: “Biofeedback-Assisted Relaxation in Type 2 Diabetes” by R.A. McGinnis, A McGrady, S.A. Cox and K.A. Grower-Dowling (Diabetes Care 28:2145-2149, 2005).

In an elegant small, randomized controlled study, the authors demonstrated that sEMG and relaxation therapy does reduce the blood glucose levels and the HbA1C concentration. All else being equal, the authors have documented that people with non-insulin dependent diabetes respond over a long period of time to sEMG biofeedback assisted relaxation therapy (BFRT) with a significant reduction of the plasma sugar level and the HbA1C level as compared to a control group ‘treated’ with adequate diabetic education.

Diabetic control in type-2 diabetes (non-insulin dependent) is a complex therapeutic issue. At least 100 million people on the Eurasian and American continents suffer from the condition and the incidence is increasing by the year. Poor response to treatment results in severe complications such as blindness, leg amputation, kidney failure, diabetic neuropathy, erectile impotence, and others.

Control is defined by an improvement in a number of parameters, chief among which are the glycemic level and the HbA1C. The glycemic level refers to the concentration of plasma sugar at any time, especially in the morning, after fasting overnight. The HbA1C level is a measure of the average glycemic control during the preceding period of 2-3 months. Whereas the glycemic level in the plasma can be quite variable through 24 hrs, the HbA1C level reflects all those changes and averages the blood sugar concentration over a long period of time.

Diabetes is currently treated with medication, exercise, diet and education. The results are generally encouraging in patients who can maintain the ideal body weight, follow an appropriate diet, exercise regularly and regularly take their medication in a well- controlled medical follow-up situation. Of course, this situation is less than common in the clinical practice. Is this the best we can do to treat diabetes?

Novel approaches are necessary that target physiological and psycho-physiological parameters connected to the diabetic state. It is well known that stress and its correlates such as muscle tension, anxiety and increased plasma cortisol levels (associated with the stress response) are associated with increased plasma glucose levels in non-diabetic and diabetic persons alike. A logical outcome of this physiologic reality is that one should attempt a treatment that would involve a methodology such as sEMG biofeedback in order to reduce the muscle tension levels and related anxiety state. A number of researchers have done pilot studies in the area and their results were generally successful.

The present article endeavored to evaluate the issue of reduction of the glycemic & HbA1C levels within the context of a well-controlled randomized study where the control group was quite similar to the treatment group in terms of diabetic characteristics and underwent adequate diabetes education.

Results

The results of the study were very clear: the BFRT group sustained significant glucose decreases over time (i.e., after the sEMG/BFB treatment; $p=0.001$). Similar results, as expected, were noticed for the HbA1C levels. In terms of the reduction in muscle tension, the BFRT group response, pre-test to post-test showed a significant ($p=0.006$) difference.

The control group did not show any significant difference regarding the tension parameter. With regards to the anxiety/depression parameters, both groups showed improved scores (Spielberger State-Trait Anxiety Inventory), but only the BFRT group had a significant anxiety trait reduction ($p=0.037$).

Whereas diabetic education is always recommended, learning more about the condition and its follow-up has not been shown in this study to produce any significant differences in the reduction of the glycemic level, HbA1C or anxiety level.

While it is true that the researchers have not measured an important parameter of stress response, (ie: the plasma cortisol level) it stands to reason, by inference that the improved glycemic response may be directly related to a decreased cortisol concentration, as shown historically in many studies. The plasma cortisol level and the correlate of anxiety may be associated and mediated partly by increased catecholamines such as adrenalin and noradrenalin.

The authors demonstrated the increased skin temperature in the BFRT group as compared to the control group. Although the catecholamines were not measured, the increased skin temperature would be a direct correlate (inversely proportional) with the catecholamine production and cortisol level.

This article, simple, clear and elegant is the forerunner of larger studies conducted within the same realm. It demonstrated that the new neuromuscular learning in the BFRT group had the consequence directly on reduction of muscle tension measured with sEMG units and also of the anxiety trait as measured with the Spielberger inventory.

The greatest news however is not that tension and anxiety were decreased in the diabetic population but that the glycemic level and HbA1C were significantly reduced as well and the reduction was maintained after the treatment period. For that, Kudos to the authors!

BIOFEEDBACK AT THE OLYMPIC GAMES

Italy's weapon is all in their heads

DERFEL A.

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Published: Saturday, July 08, 2006

A Montreal firm developed the Mind Room, which helps Azzurri players put soccer into focus.



When Italy plays against France tomorrow in the World Cup final, some of its best players will be relying on a secret weapon. Shoes with special cleats? No. Shorts that make a forward run faster? Not really. Rather, the secret weapon in question is called the Mind Room and it was developed in Montreal.

For months now, at least four players on the Italian national team have been training in the Mind Room to prepare themselves mentally for clutch moments in the World Cup. Although the Mind Room is located in Italy, the biofeedback equipment was invented by Thought Technology Ltd. of Montreal.

Forward Alberto Gilardino, defender Alessandro Nesta as well as midfielders Andrea Pirlo and Gennaro Gattuso all swear by ProComp, the main device in the Mind Room. Although Nesta is injured, the other three are likely to play in the final.

"These guys have been trained by Bruno De Michelis, the head of sport science of AC Milan, to be able to focus, to concentrate and to get into the zone for their peak performance," said Lawrence Klein, vice-president of Thought Technology.

"There is no question that mental preparation is the key difference, because these guys are all extraordinarily fit and talented. Our instrumentation helps the athletes reach that optimal state of mind."

In the Mind Room, the athletes lie on reclining chairs, their bodies strapped to the ProComp device that measures seven physiological signs - from their brain waves and muscle tension to their breathing and heart rate. De Michelis then trains them to use their minds to reach a meditative state.

The next step is to teach the athletes to maintain that state while visualizing in their minds their athletic performance. They often watch videos of their performances on the pitch.

If they have a particular problem - like missing a penalty kick or hitting the crossbar - De Michelis will train them to relax mentally. He does this by first getting them into the meditative state, then showing them a video of their flawed performance for a couple of seconds. Naturally, their muscles will immediately tense and their blood pressure will go up as they watch the missed goal, but De Michelis will get them to relax again.

The psychologist will repeat this until the player can watch the flawed performance from start to finish while maintaining the meditative state.

The idea is that when they go out on the pitch and have to make the penalty kick, they'll be so focused, so prepared mentally, that they won't miss. They'll be able to bring down their heart rate when they don't have to run to conserve energy, and they'll do that without even thinking.

"The athletes will be able to reach that state of mind when presented with challenges," offered Hal Myers, the inventor of ProComp, who holds a doctorate in experimental medicine and is a part-time collector of Victorian-era medical equipment that adorns his office.

Klein and Myers, both sports buffs, founded Thought Technology in 1974 to devise instrumentation for stroke rehabilitation and other medical conditions. But they soon realized that their biofeedback technology can easily apply to athletics. Their modest offices occupy the second floor of a nondescript brick building in Notre Dame de Grace - hardly the place one would expect to find soccer's secret weapon.

Reached by phone in Italy yesterday, De Michelis said that a number of companies specialize in bio- or neurofeedback, but he considers Thought Technology's instrumentation to be the most reliable.

"These devices are just tools to train better mentally," he said. "Integrated training gives you the capacity to recover through relaxation, to practise better, to concentrate better and to visualize in order to improve your skills."

Not all of Italy's players have used the Mind Room, only those who belong to AC Milan. So how have they performed?

During the World Cup, Pirlo has been making razor-sharp passes on the pitch. Although Gilardino has been used mostly as a substitute, he set up a crucial goal against Germany in the semifinal.

As for Gattuso, he has run hard in the midfield, often winning the ball. The Washington Post has described him as among the best players in the tournament, known for his "tenacious tackling."

The Post predicted that "the battle between Gattuso and (France's Zinedine) Zidane will be one of the key duels of the final."

A final that might be decided more in the mind than on the pitch.

Comment from the editor: We all know by now how the key duel turned out and it is all clear that Biofeedback could have helped Zinedine Zidane to control his impulsivity a bit more.

Placebo's power goes beyond the mind Scientists tap into fake pill's effects to help real pains

By Linda Carroll

MSNBC contributor

Aug. 21, 2006

'Pain is not in the muscles or the arm that may be injured. The pain is in our brains.'

Even though medical researchers told Chuck Park that he might be getting a sugar pill, the 30-year-old software producer was pretty sure he was getting the real thing. Just a few weeks into the clinical trial, Park's depression started to lift. He began to feel less anxious and sad. So when Park learned he'd been taking a placebo all along, it was a surprise.

"I was fully expecting to receive the real drug even though I knew that the placebo was a possibility," remembers Park of Culver City, Calif. "I guess I wanted it to work — and in a way, it did."

For years, scientists have looked at the placebo effect as just a figment of overactive patient imaginations. Sure, dummy medications seemed to curb epileptic seizures, lower blood pressure, soothe migraines and smooth out jerky movements in Parkinson's — but these people weren't *really* better. Or so scientists thought.

Now, using PET scanners and MRIs to peer into the heads of patients who respond to sugar pills, researchers have discovered that the placebo effect is not "all in patients' heads" but rather, in their brains. New research shows that belief in a dummy treatment leads to changes in brain chemistry.

"There have always been people who have said that we could make ourselves better by positive thinking," says Dr. Michael Selzer, professor of neurology at the University of Pennsylvania School of Medicine. "After pooh-poohing this for years, here are studies that show that our thoughts may actually interact with the brain in a physical way."

New insights into how placebos work may even help scientists figure out how to harness the effect and teach people to train their own brains to help with healing.

Mind over brain matter

Recent reports show that anticipation of relief from a placebo can lead to an actual easing of aches, when the brain makes more of its own pain-dousing opiates. Brain scans of Parkinson's patients show increases in a chemical messenger called dopamine, which leads to an improvement in symptoms when patients think — mistakenly — that they are receiving real therapy.

And studies in depressed patients like Park have found that almost as many are helped by placebo treatments as by actual medications. In fact, as it turns out, a person's response to placebo treatment may offer clues as to whether "real" treatments with antidepressants are likely to work.

Researchers are just starting to appreciate the power that the mind can have over the body, says Tor Wager, an assistant professor of psychology at Columbia University. "An emerging idea right now is that belief in a placebo taps into processes in your brain that produce physical results that really shape how your body responds to things," he says. "The brain has much more control over the body than we can voluntarily exert."

As an example of this, Wager points to the body's response to perceived threats. "Say it's late at night and everything is quiet and then suddenly you see someone outside, near a window," he explains. "Your body starts to respond. Your pupils dilate. Your heart rate goes up. You start to sweat."

The belief that something threatening is out there produces a host of physical responses that you have little control over. If you were told to calm down and turn off these sensations, you couldn't, Wager says. "But if the belief changes — say, it turns out that it's just your husband coming home — the physical response changes."

The question, now, is how to tap into these powerful, unconscious responses, Wager says.

Editor's note: Given the increase in sense of control as well as actual physiological control provided by biofeedback over those "physical responses" that Wager insists we have "little control over," it is not surprising that self-regulation strategies have such immense potential for harnessing the placebo effect. Now if we could only get real-time feedback of neurotransmitter levels... (See abstract in this issue regarding real-time fMRI.)

A Neurobiology of Sensitivity?*

New study suggests a link between environmental sensitivity and anomalous perceptions

Vienna, Virginia (April 24, 2006) – People with a 'sensitive' personality type are far more likely to report apparitional experience, according to a paper in the current issue of the *Journal of the Society for Psychical Research*. Such persons commonly report longstanding allergies, chronic pain and fatigue, depression, migraine headaches, or sensitivity to light, sound, and smell. These individuals are also more likely to report that immediate family members suffered from the same conditions. The survey raises the question of whether a 'neurobiology of sensitivity' could underlie reports of apparitional experience occurring across societies and throughout history.

62 'sensitives' participated in the study, along with 50 individuals serving as controls who did not profess any outstanding forms of sensitivity. Persons in the former group were 3.5 times as likely, on average, to assert that they'd had an apparitional experience (defined as perceiving something that could not be verified as being physically present through normal means). Sensitive persons were also

2.5 times as likely to indicate that an immediate family member was affected by similar physical, mental or emotional conditions.

Overall, 8 of the 54 factors asked about in the survey were found to be significant in the makeup of a sensitive personality:

- Being female
- Being a first-born or only child
- Being single
- Being ambidextrous
- Appraising oneself as imaginative
- Appraising oneself as introverted
- Recalling a plainly traumatic event (or events) in childhood
- Maintaining that one affects - or is affected by – lights, computers, and other electrical appliances in an unusual way.

Additionally, synesthesia – the scientifically recognized condition of overlapping senses, such as hearing colors or tasting shapes – was reported by approximately 10% of the sensitive group but not at all among controls. This finding gives added weight to the possibility that apparitional perceptions stem from an underlying neurobiology of sensitivity.

“It seems quite possible,” writes study author Michael Jawer, “that certain individuals are, from birth onward, disposed to a number of conditions, illnesses, and perceptions that, in novelty as well as intensity, distinguish them from the general population. If so, apparitional experience might have a bona fide neurobiological basis that makes it accessible to scientific inquiry.”

**The paper is posted online at <http://cogprints.org/4846/>. The Society for Psychical Research, founded in 1882 by a distinguished group of Cambridge University scholars, is the foremost British organization for the scientific study of anomalous perceptions. Its website is <http://www.spr.ac.uk/>. Michael Jawer directs the Emotion Gateway Research Center, based in Northern Virginia. The Center is an independent organization that investigates the neurobiological basis of personality. Details: emotionalgateway@hotmail.com.*

Ritalin Warnings from Federal Advisory Panel*

We are all familiar with the heart problems and deaths that surfaced related to Vioxx. This finally led to a recall. There have been other warnings of possible long term negative effects associated with Ritalin and other stimulant drugs. Could the same thing happen with Ritalin?

According to a February 2006 New York Times article by Gardiner Harris there have been reports of 25 sudden deaths (mostly children) of people taking stimulants. A review of millions of medical records suggested that the use of stimulant drugs may double the risk of heart problems. A federal advisory panel voted unanimously to have manufacturers include written guides to those using stimulants.

They voted 8 to 7 to suggest serious drug-risk warning labels. Dr. Thomas R. Fleming of the University of Washington served on the panel. He believes that stimulants might be even more dangerous to the heart than Vioxx or Bextra which were both taken off the market. The article states that stimulants are the type of medicine most prescribed for children with behavior problems.

The number of children taking stimulants is about 2.5 million

There are about 1.5 million adults taking them. It is estimated that over 30 million stimulant prescriptions are written every year.

As a result of analyzing millions of medical records, evidence was found to suggest that stimulants cause an increase in the risk of arrhythmias and also strokes. In response to the presentation, Dr. Nissen, another committee member said "I want to cause people's hands to tremble a little bit before they write that prescription".

I am in the process of reading the book "Natural Cures They Don't Want You to Know About" by Kevin Trudeau. In this book Trudeau mentions an experiment in which 100 people were sent to psychiatrists to be tested for ADD.

These people did not have ADD. They were "normal" well balanced people who received good grades in school. The psychiatrists were not aware of this. They were just told that the subjects were having concentration problems and needed to be tested. In this experiment every single one of the 100 people were given the diagnosis of ADD and prescriptions for Ritalin or other psychiatric drugs.

This is hard to believe and very upsetting. It means that it is very likely that many people are being given prescriptions for potentially dangerous drugs for conditions that they may not even have.

William Pelham who is the director at the Center for Children and Families at the State University at Buffalo believes that a stimulant drug warning may result in more people looking at behavioral treatments for ADHD before turning to stimulant drugs.

As the public becomes more informed about the potential dangers of stimulant drugs more opportunities are being created for those who are trained in neurofeedback and other non-drug therapies.

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INTERESTING ABSTRACTS

Control over brain activation and pain learned by using real-time functional MRI

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Edited by Marcus E. Raichle, Washington University School of Medicine, St. Louis, MO and approved October 17, 2005 (received for review June 21, 2005)

If an individual can learn to directly control activation of localized regions within the brain, this approach might provide control over the neurophysiological mechanisms that mediate behavior and cognition and could potentially provide a different route for treating disease. Control over the endogenous pain modulatory system is a particularly important target because it could enable a unique mechanism for clinical control over pain.

Here, we found that by using real-time functional MRI (rtfMRI) to guide training, subjects were able to learn to control activation in the rostral anterior cingulate cortex (rACC), a region putatively involved in pain perception and regulation. When subjects deliberately induced increases or decreases in rACC fMRI activation, there was a corresponding change in the perception of pain caused by an applied noxious thermal stimulus.

Control experiments demonstrated that this effect was not observed after similar training conducted without rtfMRI information, or using rtfMRI information derived from a different brain region, or sham rtfMRI information derived previously from a different subject. Chronic pain patients were also trained to control activation in rACC and reported decreases in the ongoing level of chronic pain after training.

These findings show that individuals can gain voluntary control over activation in a specific brain region given appropriate training, that voluntary control over activation in rACC leads to control over pain perception, and that these effects were powerful enough to impact severe, chronic clinical pain.

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Invited Speakers:

Porges S., Ph.D.: Director of the Brain-Body Center, Department of Psychiatry at the University of Illinois at Chicago, USA
Carter S., Ph.D.: Co-Director, of the Brain Body Center, Department of Psychiatry, College of Medicine, University of Illinois at Chicago, USA
Wilson V., Ph.D.: York University, Toronto, Ontario, Canada
Gorter R., MD: Founder and Director of the Medical Center Cologne, Germany
Hamiel D., Ph.D.: Head of the Cognitive-Behavioral and Psychophysiological Unit, Tel-Aviv Mental Health Center, Israel

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STRESSTIPS

Alchemy

Kim Allen

Director, Training and Licensing Programs HeartMath LLC 14700 West Park Avenue Boulder Creek,
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with the friendly permission of Kim Allen, Hearthmath newsletter:

In most of the workshops I teach, I ask for everyone's typical stresses. Even in Guadalajara, Mexico I was not surprised to see at the top of the list, *No bastante tiempo*. People everywhere experience what experts tell us is one of the major sources of stress: The perception that we *don't have enough time*.

Whether real or imagined, maybe the true culprit is how we're spending what little time we think we have.

Case in point: make a list of the conversations, events and situations that caused you to feel stressed the last 3 or 4 days. Go beyond the obvious stuff and consider the little things: The long line at the grocery store; that e mail from your boss; the argument with your spouse; the extra inning game your team lost, etc. Estimate how much time you spent worrying, fretting, reacting or getting irritated or annoyed over each of these events. (Are you still feeling guilty about that argument?) Add it all up.

Now revisit the same 3 or 4 days, and consider all the events, conversations, etc. you enjoyed. Feel better? How much time did you spend paying attention to this list? If you're like most people, you focus more on the negative events. Yet every time you do, you recreate the stressful feelings and rarely resolve anything. Talk about a waste of time!

So until someone figures out a way to add more hours to the day why not make the most of the time you do have?

1. Pay attention to and appreciate the positive situations, events, relationships, thoughts and emotions in your life. Each time you do you'll reduce your stress and feel better.
2. Become more aware of the situations, events, relationships, thoughts and emotions that are negative. Ignoring them creates the constant level of stress most people have grown accustomed to. Then stop the stressful feeling by repeating #1.

The best part is this takes no longer than saying, "I don't have enough time for this!"

Time Quotes:

Half our life is spent trying to find something to do with the time we have rushed through life trying to save. (Wil Rogers)

They say that time changes things, but you actually have to change them yourself. (Andy Warhol)

RELAXATION EXERCISES

One Minute Relaxation Break



M. Fuhs – sunset in the mountains of Corse

Just have a very short break while looking at this picture, take a deep breath and imagine being in the middle of this breath-taking landscape!..... Imagine smelling the spicy air of the forest..... feel the warmth of the sun on your skinand a smooth breeze of the wind that strokes your skin.

Now tense your shoulders and make a fist and let gohave a short stretch and feel your body sensations. Do you feel refreshed?

5 Minutes Exercise Break:

Refresh your feet and give yourself a foot ball massage:

Do your feet scream for attention? Do they feel trapped in your shoes?

Do you take your shoes off almost immediately upon arriving at home?

Sitting at a computer during the day without much movement can be stifling for the whole body, especially for the feet. Without muscle movements lymph fluid and blood tends to pool in the legs and feet. Free yourself and energize with a FOOT BALL MASSAGE.

This exercise requires 1 or 2 tennis balls.

- Stand barefoot and lean against a wall or closed door. Make sure that you are completely relaxed and breathing diaphragmatically.
- Place a tennis ball under one foot and gently roll it on the floor. Roll along the length of the foot, then in small circles. Change the pressure from light to firm. Roll the ball for 1 to 2 minutes knead it really tightly.
- Then just stand and feel the difference between the massaged foot and the other one. How different do they feel? Can you feel the blood circulating, do you feel the pressure on the floor
- Now switch feet and massage your other foot in the same way....again feel the differences...

Alternatively, sit comfortably in a chair. Place a ball under each foot and roll from heel to toe, then in circles. Keep your body relaxed and maintain your diaphragmatic breathing. Do this for 2-3 minutes. Optionally, use nubbled massage balls.

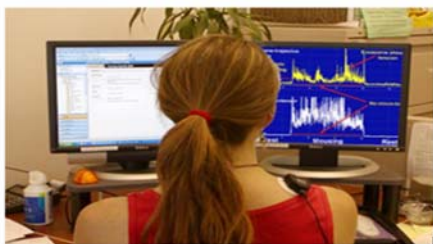
Relax your whole body as you relax your feet.

BOOK RECOMMENDATION

Erik Peper and Katherine H. Gibney

Muscle Biofeedback at the Computer is an indispensable guide for the prevention of Repetitive Strain Injury (RSI). This comprehensive text provides clinicians and computer users with step-by-step instructions for implementing proven strategies to promote health.

MUSCLE BIOFEEDBACK AT THE COMPUTER



A Manual to Prevent Repetitive Strain Injury (RSI)
by Taking the Guesswork out of Assessment,
Monitoring and Training

Erik Peper and Katherine Hughes Gibney

The book details the “nuts and bolts” of how to do it! It teaches how to use muscle feedback (surface electromyography) and outlines in detail a seven session group training program to become an effective coach. It describes guidelines and techniques to apply muscle feedback for awareness, assessment, training and coaching fellow employees.

As Denise Fox Needleman, Associate Vice President, Human Resources, Safety & Risk Management of San Francisco State University, states: “*Their peer-based models and techniques for ergonomic safety have been the most effective methods we have found to reduce our injuries.*” For this work, the San Francisco State University Ergonomic Safety Program that received a “*Governor of California Employee Safety Award*”.

Peper and Gibney present to the reader a systems perspective for maintaining health while working at the computer. They debunk many of the conventional myths surrounding employee safety and provide scientific and anecdotal evidence that attests to the efficacy of the concepts they present. They address systematically the challenges and concerns for individuals and corporations who contemplate changes in work styles, ergonomics and/or corporate culture. For example, understanding that Administrators might miss the value of financially supporting a healthy computing program, Peper and Gibney provide references to address cost concerns and provide evidence that implementing their program reduces discomfort and costs. They also present many of the challenges that they have encountered and suggest resolutions for these concerns.

Available at: <http://www.mindgrowth.com>

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Monika Fuhs, Mag.rer.nat., Dipl.Psych.

Studied Psychology at the University of Vienna, worked at the neuropsychiatric station for children at the Vienna AKH for many years as well as doing a study about kids and development of language for the Vienna Academy of science. Board member of the ÖBfP (Österreichische Gesellschaft für Biofeedback und Psychophysiologie), editor of the new BFE Journal 'Psychophysiology Today', author of articles with Erik Peper, Co- Director of Work Solutions for the “Healthy Computing and prevention at the worksite” program and Director of the Holistic Learning Institute. Monika Fuhs is a licensed teacher and trainer for dyslexia and perception problems (ReLeMaKo®) and brain-friendly learning. She teaches workshops in the fields of stress management, Holistic Health, Healthy Computing and optimum human functioning with Erik Peper and brain management and “brain-friendly” teaching and learning in different schools, workshops for “Stress Management and Success for Kids” as well as leading a private practice for kids and adults. Her main interests focus on mind body medicine and what it takes to make people change and how biofeedback and related therapies can help to make this process as successful as possible.

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Daniel Hamiel, Ph.D. is head of the Cognitive-Behavioral and Psychophysiological unit, Tel-Aviv Mental Health Center, Tel-Aviv University, Medical School. Director of Cognitive-Behavioral Intervention, the Cohen Harris Center for Trauma and Disaster Intervention. He is a clinical psychologist, certified in biofeedback (BCIA), neurofeedback, and in hypnosis. Past president of the Israeli Association of Biofeedback, he teaches workshops on cognitive psychology and biofeedback in many countries. He was in a clinical practice in Cincinnati, Ohio from 1992-1995. Currently, Dr. Hamiel is involved in developing and performing a stress management program in schools in Israel, Turkey and the USA, for schools that have suffered terror attacks.

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Donald Moss, Ph.D., is adjunct graduate faculty in Health Psychology at Saybrook Graduate School in San Francisco, California, and a partner in West Michigan Behavioral Services in Grand Rapids, Michigan. He is Editor of the *Biofeedback Magazine* and Consulting Editor for the *Journal of*

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Gabriel Sella, M.D.

Gabriel E. Sella, M.D. has been a member of AAPB for over 10 years. He has done research and clinical work in the area of biofeedback for over 10 years. Dr. Sella has published 85 peer-reviewed papers, 10 textbooks and 1 technical CD ROM. He has written chapters in several scientific textbooks and publications. Dr. Sella has given 267 international conferences and seminars, many of them in the area of SEMG investigation and neuromuscular rehabilitation as well as soft tissue injury and pain. Dr. Sella is a founding member of the Biofeedback Foundation of Europe. He is on the editorial board of several journals, including *Europa Medicophysica*.

Jessica Cameron (Section Language and Style)

Jessica hails from Australia and holds a Bachelor of Arts in English Literature and a Post Graduate Diploma in Management. She is an enthusiastic advocate of biofeedback and works with her partner, Dr. Martin Brink, running an institute for the treatment of chronic pain patients in Berlin. Furthermore she is willing to serve as a volunteer in editing *Psychophysiology today* which ironically takes her back to her first career role as a book editor.

Dianne M. Shumay, Ph.D. (Section Language and Style)

Dianne holds a Ph.D. in Clinical Psychology and is a specialist in self-regulation strategies for preventing and coping with pain, advanced disease, and aversive medical treatments. She has designed and delivered interventions for children and adults in hospital, outpatient, workplace and community settings. She has over 12 years experience in biofeedback and has co-authored articles with Erik Peper on biofeedback approaches to Healthy Computing, as well as numerous other scientific publications including research on coping, treatment decision-making and alternative medicine use among patients with cancer. As far as English language editorial skills, Dianne apologizes in advance to the European audience of this publication for her very American writing and spelling style.

GUIDELINES FOR SUBMISSIONS TO *Psychophysiology Today*

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Articles should be of general interest to the Biofeedback community.

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Feature articles should not exceed 2,500 words; department articles 700 words; and letters to the editor 250 words. Manuscripts should be submitted electronically, preferably Microsoft Word. PDF files and scanned documents can not be accepted.

If your files are too large for sending electronically please submit on a **CD** to the address below.

For the authors section submit a biographical sketch (30 words) and photo of the author. Graphics and photos may be embedded in Word files to indicate position only. Please include the original, high-resolution graphic files with your submission -- at least 266 dpi at final print size. GIF or TIFF preferred for graphs and JPEG for photos.

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