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REHABILITATION BIOFEEDBACK FOR STRESS MANAGEMENT AND INDIVIDUAL WELL-BEING

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ABSTRACT

In recent YEARS the study of psychophysiological processes with Biofeedback for people's well-being has grown significantly. Psychophysiological monitoring allows you to analyze these processes using instruments connected to the tablet via Bluetooth, detecting the degree of activation and deactivation of the functioning of the organism to give adequate responses to the body-mind relationship. It is important to have a good balance of our autonomic nervous system, divided into two parts described as follows: the sympathetic system has a stimulating function, preparing the organism to face situations, the parasympathetic system responsible for stimulating relaxation and energy storage. The body parameters considered in biofeedback are:1. respiratory act,2. the heartbeat,3. skin conductance,4. body temperature

International Journal of Applied Technology in Medical Sciences
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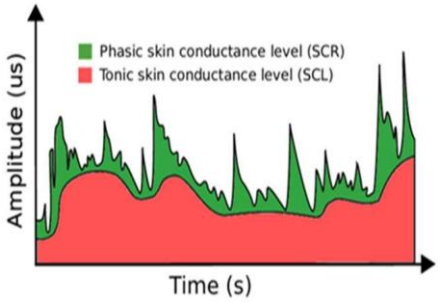
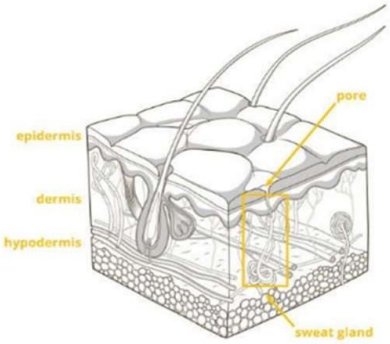
Introduction

Case Study

The research was carried out on a competitive athlete who participates in the Italian Shooting Championships. The research was carried out in 2023, in ten training sessions to be carried out over four months, with specific training of one hour per meeting, to reduce stress before and during competitions. As a parameter, skin conductance was mainly taken into consideration, to be precise conductance is characterized by two types: tonic and phasic, tonic skin conductance is the basic level called Skin Conductance Level (SCL); phasic skin conductance, event-dependent changes in response called skin conductance response (SCR).





The sensor detects the activity of the sweat glands in the finger of the hand, which is related to arousal. Emotional activation affects the pores on the surface of the skin, which in turn affects small variations in sweating. Skin conductance measurement is an indicative signal of mental engagement and perception of stress reflected in an increase in value, while acceptance and tranquility show an inverse response. The higher the excitation level, the higher the mS value, read in the measurement.

Preparation of the technological aspects, basic analysis, biofeedback session and discussion with the professional, the general points to be followed for accurate training are: describe the general guidelines for the execution of the procedure; each activity must take place with adequate time to detect variations; use tools to highlight the methods of individual responses; provide the phases with improvements. In Biofeedback, relaxation methods are used and imagination has been shown to be able to modify the physiological state, with the tendency to consider functional disorders as disorders of a predominantly psychological nature (Cognitive and Behavioral Psychotherapy – Vol. 19 - n. 3 • 2013).

We have several purposes of psychophysiological evaluation:

1. A first purpose concerns the diagnostic process, the identification of a state of physiological dysregulation could be a good starting point and comparison between researcher and subject.

2. A second purpose is related to research planning: a good initial investigation allows the clinician to structure a more targeted intervention.

Training includes three fundamental moments: an adaptation phase, the use of technique and recovery. The steps can be repeated several times to observe people's reaction, to check their progress. This serves to improve the homeostasis of the body, which is the tendency to maintain its internal conditions unchanged by responding to stimuli from the outside. The biofeedback technique is a learning process that allows an individual to learn how to modulate and modify their physiological activity to improve their health or optimize their performance.

The instrumentation makes it possible to measure various indicators of physiological activity, in addition

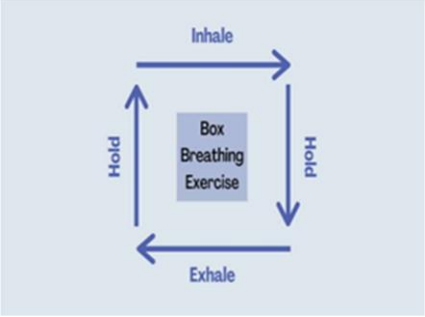
to signal acquisition, biofeedback tools can return this physiological information to the person quickly and accurately, the presentation of this physiological information, combined with the intervention of the biofeedback specialist, can lead the subject to achieve the desired physiological changes. Over time, these changes can become long-lasting. In the context of stress management, it is possible to obtain information both on the levels of arousal at rest, and on the way in which each person reacts physiologically to stress. Skin conductance, for example, is not able to discriminate between positive and negative emotions (valence), but rather differentiates precisely between highly activated emotions (e.g. anxiety, surprise) and those with low activation (e.g. calm) (Cognitive and Behavioral Psychotherapy – Vol. 19 - n. 3 • 2013).

Conduct of training

The first training is considered knowledge, it serves to make the person understand how to use the tool, what it measures and explain the exercises he or she is going to perform. It is useful to familiarize the subject with the instrumentation, i.e. the device and the tablet, explaining which parameters it measures, to provide a satisfactory response to plan the study to be carried out.

It starts with the second training session where a skin conductance value of 8.87 micro-Siemens was obtained, making the person think of the time of the race, therefore a moment of high stress. To reduce the value, a 7-minute breathing exercise was carried out, making you perform precisely 6/8 breaths per minute using the square breathing method, a technique that can help reduce stress in

the body. You put the instrument on your finger and chest and measure how many breaths you take in a minute, also called respiratory awareness. In the relaxation phase, take about 6/8 breaths per minute, training yourself to increase the amplitude and decrease the frequency. The value at the end was 5.27 micro-Siemens.



The third meeting began with a four-minute breathing workout (six breaths per minute) where the value fluctuated between 5.02 and 4.50 micro-Siemens.

The fourth round was always thinking about the race in a winning way, the value of skin conductance was 3.98 the Stroop Test referred to attention was used, in this case the value of conductance rose to 4.74 micro-Siemens good value.

To improve my awareness, I had the person perform breathing exercises at home using a pacer on the smartphone calibrated on 6/8 breaths per minute to be carried out possibly twice a day for ten minutes. The exercises must be carried out between one workout and another.

The fifth and sixth rounds, always thinking about the moment of the race in a winning way, the value of skin conductance was between 2.89 and 1.44 micro-Siemens.

By the seventh meeting, the value had increased slightly, fluctuating between 3.65 and 3.20 micro-Siemens thinking about the race.

The eighth and ninth meetings took place during training directly at the shooting range, always having the breathing exercises carried out at home previously; the results were good, in fact the conductance values fluctuated between 2.78 and 3.20 micro-Siemens.

At the tenth meeting, a final evaluation was made where the results obtained were discussed, therefore the satisfaction of the subject who carried out the study. The person will therefore be able to manage stress even without the use of the equipment in situations that may occur during competitions and training. It would be useful to carry out a follow-up after 60 days with two courses to monitor the data obtained and to understand if the subject has managed to keep the values constant.

In general, a good result was obtained based on precise breathing techniques and positive thinking during training, an important aspect is that this methodology could also be used for other situations in addition to the sporting context.

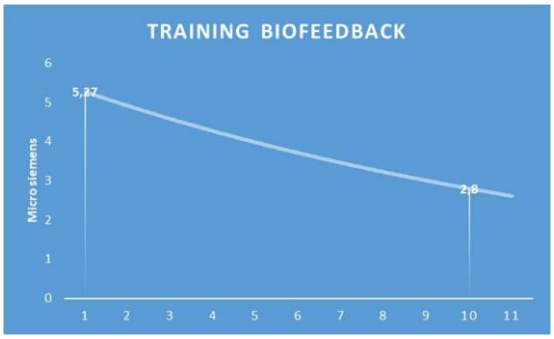
Difficulties can arise for various reasons, family, work, emotional, it is important to follow the appropriate training aimed at improving the balancing system of the autonomic nervous system, which

International Journal of Applied Technology in Medical Sciences
Vol 3 Issue 2 (2024) Pages (4- 8)

contains distinct divisions: the sympathetic which has a stimulating function to prepare the body to face situations; the parasympathetic which helps relaxation and energy accumulation.

Results

Considering skin conductance, the sensor detects the activity of the sweat glands related to excitation, it is measured in micro-Siemens. In the research carried out, the person in the first encounters had a conductance of 5.27 (average) which made him anxious and stressed. After a series of specific workouts focused on positive thinking and breathing, the value dropped to 2.8 (average). The person has learned to manage stressful situations by improving concentration and relaxation.



For Joseph Le Doux, a neuroscientist and one of the leading scholars of neurobiology, emotions are fundamental to obtaining results. Thinking you can do this creates neural connections that produce a synergy of thought by formulating ideas or proposals. Thinking instead of not making it, reduces the activity of thought and magnifies the problem.

(p.137 The representatives receive the publisher Stilgraf on Tuesdays).

Good self-esteem, and to increase it, you should set challenging goals that are achievable according to your abilities. Higher goals can be achieved by increasing mental training. The dynamic combination of goals and capabilities elevates human potential.

How to train self-esteem, Luca Stanchieri, Newton Compton Editori, 2011

The compact and light weight device is around the fingertip and can provide four essential physiological measurements.

Psychophysiological monitoring analyzes these processes using instrumentation connected to a tablet via Bluetooth, detecting the degree of activation and deactivation of the body's functioning.

The biofeedback technique can be useful within the team as it helps to reduce stress and improve people's well-being. There are many benefits to monitoring and training people's psychophysiological state. This technology provides objective measurements of stress levels and helps the specialist teach people mindfulness, relaxation and concentration skills during the training session. This simple device transmits the user's biometric levels with a tablet or smartphone. The application of the device on a single fingertip allows the specialist to measure the patient's stress level and examine the patient's level of relaxation based on four well-studied modalities: breathing, heart rate, skin conductance and body temperature.

Biofeedback has been used to support NASA missions. His system was chosen as physiological monitoring equipment for stress management. www.bmedreport.com article by Christopher Fisher,

PhD, July 22, 2011.

The Ferrari Driver Academy teaches F1 drivers how to manage stress and anxiety, due to the high level of concentration required when excelling in highly competitive environments that generate strong pressures, the FDA program is based on the application of Biofeedback training methodologies.

Conclusion

Psychophysiological monitoring represents a very rich source of fundamental information, the techniques described represent fundamental methodologies for understanding one's physiological processes, with the aim of improving the state of well-being of adults and children, in their private, work and sports lives, this rehabilitation path allows individuals to progress in improvements through specific training.

With Biofeedback you learn techniques to improve concentration, stress management, PTSD (post-traumatic stress disorder), generalized anxiety states and sports activity. Biofeedback is also used for people with attention deficit hyperactivity disorder, as described in several journals.

References

How to train self-esteem, Luca Stanchieri, Newton Compton Editori, 2011

Cognitive and Behavioral Psychotherapy – Vol. 19 - n. 3 • 2013.

Biofeedback for Sport and Performance Enhancement Boris Blumenstein, Iris Orbach 2014.

Biofeedback Stress Management Tool, Harvard University Systematic Review 2018.

Representatives receive the publisher Stilgraf 2019 on Tuesdays.