YOU CAN CONTROL STRESS NOW

Medical biofeedback for stress control, anxiety and fear

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SPIRO DIAMANTIDIS
MEDICAL DOCTOR

Medical Doctor Spiro Diamantidis was born in 1948 in Thessaloniki Greece. He graduated from the Athens University Medical School but in the 5th year of his medical studies, he realized that allopathic medicine did not fully meet his expectations regarding therapy. Except Europe he travelled around the world for four years including the United States, South America, Africa, China, and Japan in the pursuit of holistic therapeutic approaches. He tried to explore and study every known therapeutic method he encountered, without excluding traditional African methods or those of Asian spiritual origin. Due to lack of income as a travelling student, he survived by selling his photographs to travel magazines and drawing portraits for clients sitting for their portraits. During his journey he discovered homeopathy in Geneva with Dr. Pierre Schmidt who would become his future professor, parallel to studies in psychoanalysis. He completed his homeopathic studies in cooperation with the most renowned professors in the field. He settled in Athens in 1976 and has since devoted his life to medicine. The amazing progress of his medical work fuelled his swiftly soaring reputation. As a charismatic and eloquent speaker he attracted and was followed by a huge crowd of medical students and practitioners who became members of his homeopathic school which he founded in 1985 named Medical Institute for Homeopathic Research and Application. This school has provided homeopathic education to more than four thousand Greek medical students, physicians, pharmacists, dentists and veterinarians. Five years later he founded the International Medical Homeopathic Centre built on a private property of one hundred thousand m2 providing summer education on holistic therapies to over twelve thousand international students up to now. He is a guest lecturer at the most prominent homeopathic faculties worldwide. His involvement with Biofeedback began in 1972 after attaining the third degree black belt in Shotokan Karate and Zen mastering during his effort to find answers to human aggression and the possibilities of transforming it into positive behaviour through martial arts and yoga. John Dollard's old but ever contemporary book "Fear in Battle" and his frustration-aggression hypothesis was his inspiration to study human behaviour during his classes as a Karate teacher (sensei). He began by using the original old and bulky biofeedback equipment early, and when he founded the Greek Biofeedback Centre in 1983 he established his own electronic laboratory which produced the heavy and cumbersome EMG, GSR and THERMAL machines for the needs of the centre thus being pioneer of biofeedback expansion in Greece. The then popular Mowrer's Integrity Groups supplied him with the model to work on groups with the support of psychoanalysis and Hans Eysenck and other famous psychologists influenced him with their teachings. His achievements include numerous biofeedback strategies for stress control and management as well as biofeedback applications for high performance, sports, education, business and health. He is a pioneering physician who designed and implements group biofeedback applications on control of work related stress in many businesses globally. Due to his personal experience in defending against groundless and unjustified civil and criminal attacks of slanderers, attain a fully victorious outcome and counter attack lawfully while continuing on with his extensive medical work, he is known in the biofeedback field as the "veteran", the one who has demonstrated through his survival and victorious recovery under extremely adverse conditions that he knows how to cope with stress, anxiety and fear. For the same reason as a homeopath, in the circles of international journalism he is referred to as the "Mandela" of Medicine.

Complete CV in page 486.

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Spiro Diamantidis
Dragoumi 20 Ilissia, 115 28 Athens, Hellas
Tel.: +30-210 7241700 – Fax: +30-210 7213346
e-mail: spdiamantidis@gmail.com

Published by: UNIPRINT
Aristidou 1, 6050 Larnaca, Cyprus
Tel.: +0357-24664834, fax: +00357-24664835
e-mail: uniprint@cytanet.com.cy

English translation by:
Georgia Polymenea, M.D.
Kofiniotou 29, 212 00 Argos, Hellas
Tel: +30-27510-61283 cel:+30-6977-318144
e-mail: zpolimenea@hol.gr

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ISBN 960-630-817-0

Dedicated
to a society of stressed people
as feedback
to its own
stressful bio-psycho-social action.

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Preface

This book encompasses my experience and knowledge gathered within 30 years of research and professional engagement in Biofeedback.

As a physician longing to experience deep satisfaction from my social work, I have always wanted to share with you this valuable knowledge that can expand your horizons and offer you the opportunity for optimal development of your potential. In this manner, I deem that I actively contribute to the betterment of society assisting those in need to exploit their skills, talents and adopt a positive attitude towards life.

This book is addressed to those of you who have aspirations for great accomplishments and to people who consider success, balance and happiness as basic human rights and divine gifts not worthy to remain unexploited.

This book was written for those of you who keep searching and who believe that life becomes more beautiful and meaningful as you grow more mature and wise.

Genuine achievers and leaders on every level and in every field, share the same belief that success initiates issues from the maximal exploitation of capabilities, in conjunction with setting goals that are matched to ones idiosyncrasy or temperament. Thus, the visions and dreams chosen according to our potential, talents and skills can be implemented.

Biofeedback concurs from a scientific angle this viewpoint, furthermore provides you with the method and practices for its continuous confirmation.

Your time and life are valuable entities.

Utilize your time and your life by following the most objective and reliable scientific method that represents you the best by combining information collected from you.

Biofeedback is meant for you.

In my countless working hours with Biofeedback, I have

people transform, pass from sickness into health, from misery to prosperity, from inertia to creativity, and from indigence to wealth. I have repeatedly found that persons with modest abilities, by exploring and cultivating their potentialities to the maximum, often get ahead of others who despite possessing greater abilities, never cared enough to unearth and develop them: Sleeping talents.

Great changes are not accomplished unless pursued. But even then they remain unattainable if we do not find the vital lead, if we do not discover the pathway.

That is why I dedicate my book to those who keep searching for betterment and also to those who might accidentally stumble upon it, hoping to encourage them into action.

You can approach this book in three different ways: The first is to read only the graphics. The second is to restrict your reading to the colored bold parts and the third way is to read its entire contents, as a gift to yourself. The third way yields the most benefits.

I now feel like a singer who having fulfilled all the requests from his audience, finishes his program by dedicating to the audience his most cherished song. He signs with all his heart and passion. That's my Biofeedback song and I dedicate it to you. It is meant for you.

Enjoy!

Introduction

- *What and how I have seen and learned*
- *Don’t shoot those who “know-it-all”*
- *Dedicated to you*

What and how I have seen and learned

I had the tendency to explore the how and why of things from very early on. The best presents for me became the "Learn how it works" books. Even in junior high, immersed for long hours in my thoughts, I was trying to imagine how the world would be if things worked differently.

One day I told my teacher about an idea I had to launch an electron to the external layer of a circular magnetic field, then accelerate it and drive it with maximum velocity toward its center to bombard the atom. He laughed so heartily that he became breathless. I felt embarrassed for the "bubble" I thought I had blurted out. But when he found his voice again, he told me that he was laughing from surprise and said "Son had you been born 15 years earlier you would now be the great inventor of circular electron accelerator".

My exploring disposition never ceased over the next years and continued during my studies at the medical school of Athens University. Studying human physiology, I learned that the human nervous system is divided into two basic sections. The central nervous system, part of which is governed by our will and responds to instructions, and the autonomic nervous system which functions completely autonomously, not subject to our will. I was somehow not "comfortable" with this explanation.

What if the autonomic nervous system was not completely independent? I kept wondering. And even so, what is its mechanism and the rules governing it? I started looking in various sources. This was in 1966 when computers didn't yet exist and gathering information was difficult.

I continued building up my knowledge when I encountered biofeedback, at that time in an early research stage in several fields. I found out that other scientists were also looking in the same direction and had already discovered that the autonomic nervous system indeed was not completely autonmous, since indirectly its operation relied to a great extent upon man's will. I also learned that scientists were amazed by the horizons that this breakthrough opened and from the plethora of options for biofeedback applications.

Much has since been revised in medical knowledge. Medi-

cal students are now being taught that the autonomic nervous system is not entirely autonomous. Various medical specialties exploit the applications of this discovery of neurophysiology in parallel with biofeedback, which in the meantime developed into a systematic science, thus training people how to benefit from its applications both clinical and not.

Biofeedback counts backward into 70 years of history. However, until recently it was confined within the walls of scientific laboratories, and its applications restricted in research. Researchers were often confronted with phenomena subverting several of the establishments up to that time, regarding human nervous system functions and responses. On the other hand, studies focusing on human brain capabilities brought to light data that formed the foundation of the biofeedback edifice.

Lately, many physicians and clinical psychologists have been engaged in the exploitation of the cognitive abilities the human mind possesses. The ever increasing volume of information contemporary man is obliged to process and store has emphasized the necessity to create a learning model that will exploit the faculties of the human brain to the maximum.

Many human physiology researchers share the view that in everyday life we minimally utilize the brain's potentialities. A phenomenon mainly attributable to the fact that man is neither fully aware of his capabilities nor of the methods enabling their exploitation.

In this scientific research, the study and application fields biofeedback arrives to contribute dynamically and essentially.

The method of biofeedback offers the average person the opportunity to comprehend how the organism functions and responds, and in particular the nervous system. Thus, a person who practices simple everyday biofeedback techniques gains knowledge and control over his/her potential and significanty develops inherent somatic and psychomental abilities.

All of the amazing experience of scientific research can now be shared with the person who is training in biofeedback. Experience that endows man with positive feelings. It is important to be able to discover simply and practically that one is capable of controlling his reactions and can avoid being driven by anxiety generating factors that have been affecting him.

Trainees in biofeeback get the opportunity to enjoy deep

refreshing sleep, to increase endurance and performance, and experience everyday life more essentially and constructively for themselves and fellow humans.

Not only students, pupils and individuals engaged in mental work, but also people who read and want to assimilate information, discover that biofeedback has the means to better utilize the brain's wonderful "computer".

The person who is caught between the gears of daily hassles, compressed by thousands of virtually fabricated needs, becomes able to overcome them psychologically and become detatched.

Smoking, food over-consumption leading to obesity, alcoholism, substance and drug abuse, among others, have always been the substitutes of repressed man, escape exits offering a sense of discharge. However, through biofeedback man masters such catastrophic discharges since he can contol them in genesis and control as well the factors which drive him to such anti-human habits.

Personal relationships, through biofeedback, find their proper roles. People can better comprehend themselves and others, their needs and desires, the dynamics of human relationships and thus properly direct them in conformity with their natural destination: nothing less than human happiness.

Biofeedback is a basic tool in the hands of any person who wants to steer and personally define his fate regarding health, life quality, resilience against stress and anxiety, mental clarity, work performance, sports and intrapersonal relationships and who furthermore wishes to enjoy all the positive feelings emanating from life itself.

Biofeedback is addressed to people who do not want to allow pathetically unnatural actions to breed sickness upon their body or psychomental organ. It is addressed to those who want to have their own share in self-management through biofeedback to find the solutions, pathways and practical processes that will enable them to achieve their goals.

Don't shoot "Mr. Wiz who knows-it-all"

The audiences attending my biofeedback seminars are often comprised of people who have already followed many seminars on mind control, self-improvement, self-confidence, self-control, self-awareness, relaxation, etc.

At our special seminars on sales management via biofeedback techniques I have met successful businessmen who, in search of applicable techniques to improve the homogeneity and performance of employees, have even attended psychoanalysis seminars or group drama. Such people make a tough audience since, despite their accumulated special knowledge, they often suffer from the "know it all" syndrome: The person who knows everything and displays the mental ankylosis and rigidity this syndrome encompasses. Some of these people, irrespective of whatever they heard in previous seminars, were never convinced about their usefulness to the extent that one wonders what kind of masochism drives them constantly to attend similar events. However, the scientific explanation is that it is not masochism but fear to experience internal changes, since in order to settle somewhere more comfortably and enjoy more quality of life often requires one to unsettle a little from the past. Such people can become annoying in an audience by constantly posing "trap" questions, doubting for doubt's sake and conveying disrespect towards the scientist, speaker and his effort. A few decades ago, I too felt inclined to reprimand and show them the way out. But before doing so, I tried to interpret this phenomenon based on natural law. Eventually, I reached the conclusion that these people serve some purpose in the audience and ever since I let them function as catalysts assisting the understanding of the rest. They evoke such indignation to people that the rest of the audience are brought closer to the issue and make an example to be avoided. In such cases there is no room for theories and I don't waste my time on speculations. Besides, theories are usually employed as interpretations or preambles of actions, however I use them only when needed, that is when they are necessary in order to build or embellish a cognitive edifice. My method is simple, I connect such people to the electronic devices used in biofeedback and let them get a glimpse of the way they respond during a casual and everyday discussion. Then I ask them:

"How much awareness did you have before about your reactions?"

The reply is almost always the same:

"I thought I was reacting in a completely different manner. I thought I was stressed by other things than those I found out here. How little we know about ourselves and how superficially we often interpret ourselves. It is definitely useful for one's evolution to get a real picture of oneself".

My next question is more practical:

"How great are your chances cut down for success in any field without this very useful and essential knowledge?"

The answer almost always conveys the self-evident:

"Up to now, I headed towards success interpreting subjectively both myself and others depending on my moods. My course was rather accidental despite my misconception that I consciously steered it. Up until now, I learned about myself through theories, often contradictory or subjective processes. Biofeedback offers the objective eye that I was really missing".

Thus, as a physician, I feel peaceful and satisfied because I have shown them the way to realize that biofeedback is a personal biomatic experience through which you get to know yourself relying on your objective electronic portrait which is nothing but your own emotional experiences. It is a cognitive-behavioral process based on the advances of current neurophysiology. We could say that biofeedback operates as a perfect electronic objective mirror, depicting you as you truly are. Enabling you, if you wish, to keep your true image of yourself and ornament it either to your direct personal benefit or to the indirect benefit of other people.

Dedicated to you

When I address audiences, many people ask me to describe the benefits of biofeedback based on my personal experience. I give various examples, however I often feel I am not quite convincing. I describe the difficulties I have managed to overcome and give more examples. Eventually, I can see it in their eyes that I am more persuasive, nevertheless the question lingers on. Perhaps thousands of other people

have had the same success without biofeedback.

Every person going through a difficult situation resorts to his/her own biofeedback. He mobilizes his body and psychic reserves in the best way he can and tries desperately to cling to life. In such cases, if he happens to know a relevant method, he can save his strength and psychic energy resources. Without a method, even if he manages to succeed, he may sustain irreparable damages or permanent disabilities. The science of biofeedback offers you the advantage of training, so when things get tough you can cope with the situation in a more "professional" manner ensuring greater safety and certainty. You never now when you will reach your limits; however with the assistance of biofeedback, you can justifiably hope that they are not too close. It is like putting airbags in your car to create a buffer zone in the case of a crash. Biofeedback, of course, is not only meant for extreme conditions. It is not just an airbag: It also represents a high tech "air-conditioning" helping you to maintain stable internal and external environments at a perfect, thus also delightful, homeostasis.

I do not believe in miracles, just in marvelous things. Among these marvels lies the method of biofeedback which in our age is a great lesson for all people. Biofeedback is indispensable knowledge turning into a fashion out of need. Particularly in the United States, all dynamic companies adopt biofeedback group seminars to train their employees. Among others: directors, insurers, journalists, coaches, lawyers, students, athletes, teachers, advertisers, judges, diplomats, musicians, singers and actors turn to biofeedback seminars aiming at more efficient performance in their fields.

With this book, I have attempted to give, in a simple and descriptive manner, all the elements one needs to comprehend the mechanisms involved in biofeedback without limiting its scientific nature. I have tried to make the text as accessible as possible to every person who needs biofeedback as much as food and air and who has the human right to have access to such indispensable knowledge. My many years of scientific experience has proven that this is not a verbal exaggeration but an explicit reality. That's why it is dedicated to you.

Chapter 1

My nervous and muscular system in simple terms

- The central computer of the organism
- The functions of the autonomic nervous system
- The action mechanisms of the autonomic nervous system
- Levers and belts in action

The central computer of the organism

This particular piece of knowledge is essential not only to you who will attend biofeedback, but to any person who deems it purposeful to enrich his cognitive edifice, aiming to gain better understanding of himself. Simple terms have been chosen instead of strictly medical ones, making the information approachable to every reader, since it is cardinal for comprehension to be able to have a clear picture of the function described.

The nervous system consists of two main sections:

1) The central nervous system, including the:

1a) brain and 1b) spinal cord

2) The peripheral nervous system, including the:

2a) voluntary nervous system and

2b) autonomic nervous system

The voluntary nervous system has two branches:

2a-a) sensory nervous system and

2a-b) motor nervous system

The autonomic nervous system (ANS) also has two branches:

2b-a) sympathetic nervous system and

2b-b) parasympathetic nervous system

Your organism is part of a circuit constantly communicating via feedback, with its environment.

Your organism communicates with its external environment by perceiving incoming stimuli which analyzes, for example, “judges” if it is desirable or undesirable. In succession the organism “responds” either by bringing changes in its environment or by altering its response towards the stimuli. In parallel, a continuous communication loop is also held

with the organism's internal environment, meaning that while some sensory receptors perceive changes occurring in the external environment, such as touch, pressure, sounds, visual stimuli, simultaneously other receptors feed or feedback to the organism with vital information on the conditions prevailing inside the body, i.e muscular length and tonus, internal organs' tonus, pain, lack or abundance of various chemical substances etc.

The organism analyzes and processes both external and internal information, which is called feedback, and either undertakes outward action or proceeds to internal regulations. In other words, demonstrates a certain "behavior" towards its environment. This entire process aims at enabling the organism to maintain its homeostasis.

It is evident that both the behavior of the organism and maintenance of homeostasis are performed and controlled through the feedback loops in the organism.

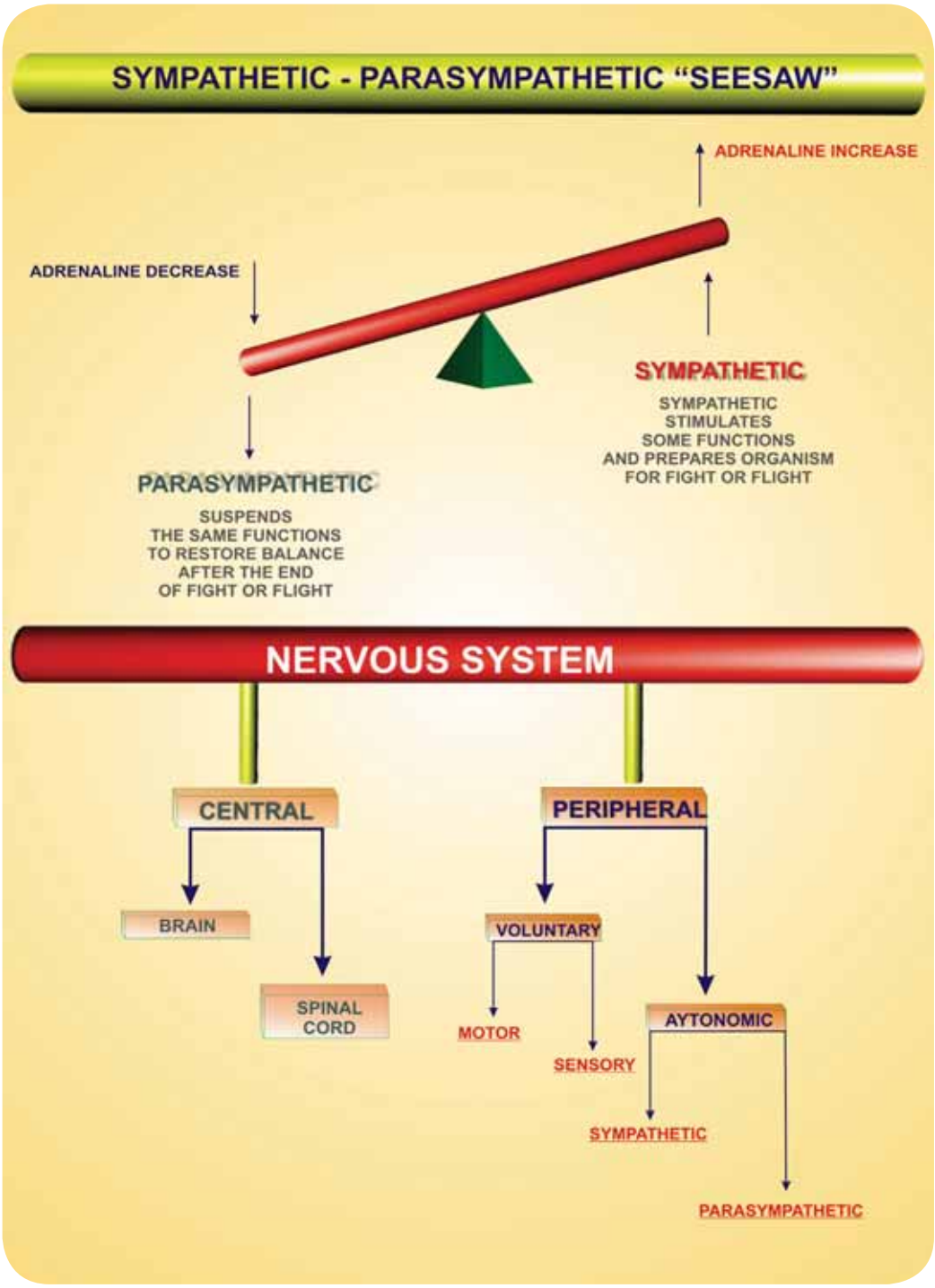
The role of the nervous system is to perceive the changes occurring in the internal or external environment of the organism, to process this data and assess its significance in regard to organism or sub-systems survival, and to react accordingly.

The operational core of this complex process is our nervous system.

These regulations compose the organism's behavioral patterns towards its environment.

The previously mentioned functions: information perception, processing and response are executed respectively by the sensory, central and motor section of our nervous system.

The sensory part, which is characterized as centripetal, receives information from the internal or external environment, processes it, and makes the necessary calculations


SYMPATHETIC - PARASYMPATHETIC "SEESAW"
ADRENALINE INCREASE
ADRENALINE DECREASE
SYMPATHETIC
SYMPATHETIC STIMULATES SOME FUNCTIONS AND PREPARES ORGANISM FOR FIGHT OR FLIGHT
PARASYMPATHETIC
SUSPENDS THE SAME FUNCTIONS TO RESTORE BALANCE AFTER THE END OF FIGHT OR FLIGHT
NERVOUS SYSTEM
CENTRAL
PERIPHERAL
BRAIN
SPINAL CORD
VOLUNTARY
AYTONOMIC
MOTOR
SENSORY
SYMPATHETIC
PARASYMPATHETIC

and estimates its impact on the preservation of homeostasis or survival. Subsequent to the identification and evaluation of the information, the course of response to be followed is decided.

The motor or centrifugal section transfers the instructions given by the central nervous system to the rest of the organs, muscles, bowels, vessels, glands, etc, thus regulates their functions according to the circumstances.

In order to demonstrate any kind of behavioral pattern, the centrifugal section of our nervous system uses three different channels to transmit orders to the organs-receptors. Specifically:

a) the hypothalamus-pituitary axis, a highly specialized nervous pathway situated in the brain, in order to exert influence over the glands secreting the various body hormones

b) the body motor channel to transmit orders to the motor muscles of our skeleton and

c) the autonomic or vegetative nervous system to regulate the functions of bowels, vessels and certain glands.

The participation of the autonomic nervous system is a fundamental prerequisite for the synthesis and expression of any behavioral model for the undertaking of any function or communication with the environment. The autonomic nervous system is responsible for the preservation of internal homeostasis in the organism.

Internal homeostasis is vital for the organism with respect to preservation of life as well as efficient communication with the environment. In this case, communication gets a broader meaning and encompasses functions such as food intake and assimilation, coping with external temperature fluctuations, changes in sound or verbal communication etc.

The functions of the autonomic nervous system (ANS)

What bears special interest for Biofeedback is the autonomic nervous system, granted that it controls the entire range of our automatic functions with regard to bowels and glands, including blood circulation, respiration, digestion, endocrine functions etc. The autonomic nervous system serves a huge purpose and has tremendous usefulness for the organism, because by controlling all automatic functions it relieves the brain from redundant, monotonous and uncreative labor.

Can you imagine man's condition if he had to attend, regulate, coordinate and direct all the autonomic functions related to blood circulation, breathing, digestion and glands? Surely, there would be no time left at all to think of anything else, nor to produce mental work, and our civilization would not have reached its current level.

The functions of the autonomic nervous system are the equivalent and resemble the work of a butler, a private secretary, assistants and councilors who sub-serve an intellectual master, who leaves in their hands the care and good operation of his estate and the everyday worries, in order to be able to devote himself to the production of high intellectual and cultural work.

As mentioned before, the autonomic nervous system consists of two branches:

1) The sympathetic nervous system and

2) The parasympathetic nervous system.

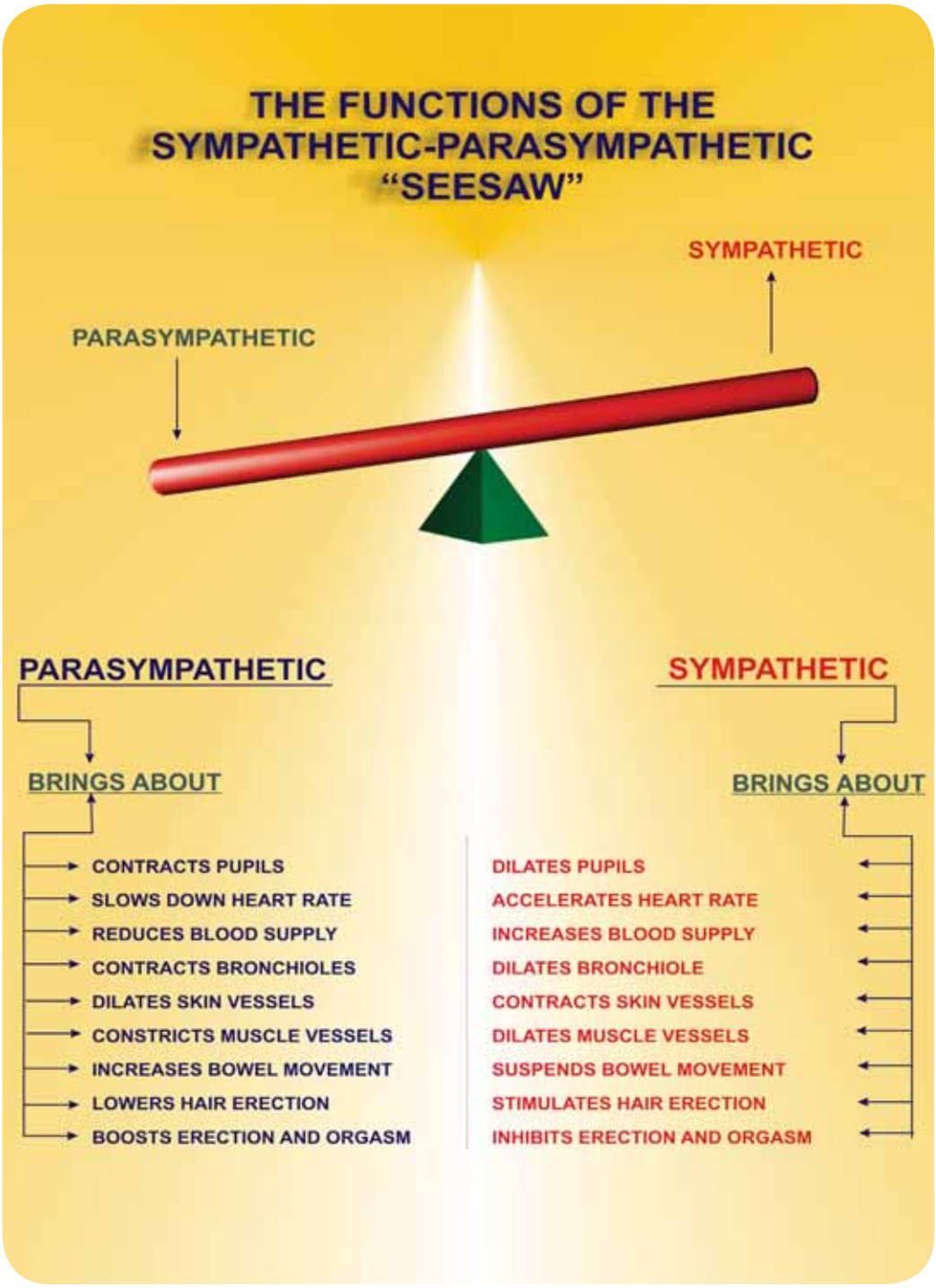
Under general sympathetic arousal the body enters a state of alertness, and is prepared to resume intense action, increases heart rate, accelerates respiration rhythm, etc. The sympathetic nervous system prepares and mobilizes the organism to respond with fight or flight.

The parasympathetic system mobilizes, stimulates and keeps in good order the reproductive system, the digestive and immune systems. Nonetheless, it has a relaxing or supressive effect in all the systems of the organism which are stimulated by the sympathetic nervous system.

Both branches cooperate harmoniously and are in coordination with the higher levels of our nervous system. Both branches function in parallel. The sympathetic branch comes into play when the organism is called to cope with a situation demanding increased alertness, whereas the parasympathetic prevails when the organism relaxes and replenishes its energy or other losses. For instance the parasympathetic controls the functions of digestion and urination, while the sympathetic regulates the blood supplies to the muscles. This explains why these two branches were characterized (W.Hess, 1957) as trophotropic and ergotropic respectively.

Both sections of the autonomic nervous system, sympathetic and parasympathetic, form a kind of seesaw and balance the operation of each other via feedback mechanisms, so that the organism's functions do not overstep the normal limits.

The scientific knowledge that gave new dimensions to the antagonistic or complementary relation counterbalancing the action between sympathetic and parasympathetic nervous system came from the discovery that the operation of the autonomic nervous system, in particular the sympathetic branch, depends upon and is influenced by mental or cognitive functions, in such a manner that permanent sympathetic arousal is brought about. In realizing the fact that certain cognitive mechanisms are capable of inducing sympathetic-mimetic action, in specific sympathetic-arousal, it led to the realization that the autonomic nervous system is not completely autonomous and that the human brain can intervene in its action through its mental functions.


THE FUNCTIONS OF THE SYMPATHETIC-PARASYMPATHETIC "SEESAW"
SYMPATHETIC
PARASYMPATHETIC
PARASYMPATHETIC
BRINGS ABOUT
CONTRACTS PUPILS
SLOWS DOWN HEART RATE
REDUCES BLOOD SUPPLY
CONTRACTS BRONCHIOLES
DILATES SKIN VESSELS
CONSTRICTS MUSCLE VESSELS
INCREASES BOWEL MOVEMENT
LOWERS HAIR ERECTION
BOOSTS ERECTION AND ORGASM
SYMPATHETIC
BRINGS ABOUT
DILATES PUPILS
ACCELERATES HEART RATE
INCREASES BLOOD SUPPLY
DILATES BRONCHIOLE
CONTRACTS SKIN VESSELS
DILATES MUSCLE VESSELS
SUSPENDS BOWEL MOVEMENT
STIMULATES HAIR ERECTION
INHIBITS ERECTION AND ORGASM

Cognitive intervention, insomuch as entails the creation of imaginary dangers or threats, is equivalent to stress which through the arousal of the sympathetic system brings about in the organism responses and mechanisms relating to fight or flight.

In other words, it seems as if the honourable intellectual mentioned in a previous example, during his time-out from his mental work and production, intervenes in the tasks of his assistants and councillors and modifies it based on imaginary dangers and problems mentally produced.

When sympathetic and parasympathetic innervate certain organs, their actions counter-balance each other. For instance, the blood vessels' walls are made up from smooth muscle fibers which are wired by the sympathetic and the parasympathetic branch. The action of each branch counterbalances that of the other maintaining thus a dynamic balance. Increased activity of the sympathetic branch causes constriction of the vessels walls, diameter reduction, and relevant reduction in blood circulation at the periphery. However, blood also carries heat amounts to the extremities, consequently as a direct result of this increased activity of the sympathetic system, sympatheticotony, their temperature drops. Exactly the opposite occurs when the parasympathetic branch comes into play. That's how a functional "seesaw" links the two systems, enabling each to balance the action of the other, restoring balance in the organism. In this manner, our organism exerts the best possible control over all its organs and systems.

The action mechanisms of the autonomic nervous system

Most of the organs are enervated by the A.N.S and retain always a basic functional tone (tonus). This means that the activity of these organs is regulated at a certain level with the aid of continuous orders through the A.N.S.

In some organs the sympathetic branch prevails, meaning more sympathetic tone, whereas in others the parasympathetic presents more activity, meaning more parasympathetic tone. The existence of this constant nerve signal enables the organism to obtain, by fluctuations in the tone of only one of the two branches, the desirable alteration in the organ's function, without having to mobilize the other branch. For example, the constant sympathetic tone of the vessels' walls, keeps the vessels contracted and their diameter is almost half compared to that observed in complete inactivity by the sympathetic system. An increase of the sympathetic tone will result to further wall contraction (vasoconstriction), whereas decrease in the sympathetic tone will bring about relaxation of the vessel walls (vasodilatation).

Apart from the nerve originated tone, the organs which have smooth muscles in their walls also present an endogenous tone, accountable to their own muscular mass. In other words, a self-evoked contraction level, that is independent from the nervous system's commands. This muscle-generated tone offers to the organs wired by the A.N.S a degree of automatic independent activity. In this case, the role of the nerve commands is the regulator. The heart or bowels, for example, even if isolated from the nerves that wire them keep operating quite normally. However, they cannot regulate, increase or decrease, their functional intensity according to the organism's needs.

Ganglions are formed by groups of similar nerve cells and play the role of connection cross stations for nerves transferring information from the periphery to the center and commands from the center to the periphery.

The medulla of the adrenal glands is essentially a sympathetic ganglion which has been functionally modified to an endocrine gland. When at ease the adrenal glands secrete adrenalin and noradrenalin, in ratio 80% to 20% respectively. These hormones, through blood circulation, reach all the cells of our organism and affect their functions. Adrenalin increases cardiac supply, while noradrenalin increases the peripheral resistances, and consequently blood pressure.

The medulla of the adrenalin glands is stimulated almost every time the sympathetic system is stimulated. And the hormones it secretes reach, through the blood circulation, in all our cells, even those which are not wired by the sympathetic system. Thus, these hormones ensure prolonged sympathetic cotony, without needing constant transmission of commands by the nervous system. Furthermore, adrenalin or noradrenalin, normally found constantly in the blood, significantly contributes to the maintenance of the tone of vessels' walls.

In every circumstance that the organism must cope with conditions demanding or causing anxiety, fear, panic, rage, generalized alertness, intense muscular effort etc, the sympathetic system is activated massively on the whole. Such general activation aims at altering the functional state of the organism rendering it capable to face this external threat which causes the above emotions.

This reaction, which as we will see in succession, is called "fight or flight response", develops as follows: The vessels' walls in the periphery are constricted and blood recedes from the extremities to a considerable degree. Thus, there is more blood available for the muscles and the vital organs, and also the possibility of blood losses from a wound caused during the fight is reduced.

Especially, in the case of bleeding from a possible wound, blood coagulability increases and more cortisone circulates in the blood in order to speed up the healing processes. The walls of the vessels bringing blood to the abdominal organs also constrict. At the same time, the intensity and frequency of

the heart contractions rises significantly. Thus, blood pressure rises also and the supplies to the muscles increase. The muscular tone ascends and metabolism becomes faster to meet the energy needs of the organism. Lipolysis, calorigenic action and glycogenolysis in the muscles are all actions governed by the sympathetic system. Finally, numerous changes are also observed in cerebral activity.

The fight or flight response is triggered not only when danger exists, but as well as when someone thinks that he is in danger. This is the starting point, as we will explain later on, of the harmful repercussions of stress upon the organism.

Once the external danger has stopped imposing threat on the organism, the parasympathetic system takes over the control, replenishes energy and other losses and restores functional balance in the organism.

Among the basic tasks of the parasympathetic system, the wiring of the muscles is responsible for the eyes' adaptation, heart rate slowing down, bowel evacuation, urination and erection, whereas ejaculation is a function of the sympathetic.

All autonomous functions are practically regulated from the hypothalamic centers. And superior cerebral centers can affect autonomous functions, though these hypothalamic centers.

Levers and belts in action

The human muscles are comprised of bundles of extra thin muscular fibers interconnected and surrounded by a coat, called the fascia, binding all the fibers into one single formation, as the main body or volume of a visible muscle in our body.

Think of a thick cable, consisting of small thin fibers of fabric, connected all together to form a thick rope. Similarly, every muscle resembles a leading rope comprised from many thin muscular fibers connected.

When a muscle gets an electric stimulus it responds with contraction. And when it doesn't receive an electric stimulus it relaxes.

The muscles adhere and attach to the bones with the tendons in such a way that levers are formed.

Every time a muscle, or muscle group, receives an electric stimulus, it contracts and activates this bone-lever, producing the motion of some body part.

The electric stimuli travel into the muscles through "cable" which brings to the muscle's fibers the electric current. This cable is the motor nerve. The cable begins in a special area of our spinal cord and stretches to reach even the tiniest and most remote muscles of our body. In this special area of our spinal cord, the special cells called a-motor cells are found.

From every motor cell in the spinal cord starts one nerve which when reaching a muscle, becomes divided into branches, each one entering a single muscular fiber.

The nerve, namely the special cable transferring the electric current from the a-motor cells towards the muscular fibers, is called an axon.

The a-motor cell along with its axon, in other words the battery producing the electricity and the cable extending to the muscle, is called a-motor neuron. The a-motor neuron and the muscular fibers to which its branches finally end constitute a single motor unit.

The motor or kinetic unit is the smallest unit in the muscular motor system and is the only way through which the nervous system transmits electric charges, that is electric current, to the muscles, thus giving them the order to contract and perform a movement.

The contraction of muscles initially is an electric phenomenon taking place via wires carrying electric signals to the muscles, meaning the motor or kinetic nerves.

Adding up all these small currents provides the final electric energy, which can be detected and recorded by an electromyography, enabling observations upon muscular activity.

Similar electric phenomena also occur during the heart's operation and the recording of the generated electric potentials which gave birth to the electrocardiogram. Likewise, the electric potential created during the brain's functions, are traced and recorded in the form of an electroencephalogram.

Muscular fibers are classified into two types.

Type I includes the fibers which contract slowly and contain low levels of special enzymes.

Type II includes fibers which contract fast and contain high levels of special enzymes. That's a valuable piece of knowledge when biofeedback is used in order to explore the skills of athletes. When in the muscular mass of an athlete the I-type muscular fibers prevail, he is more competent in long runs and endurance sports, whereas an athlete with prevalent II-type fibers in his muscles, has explosiveness in his motion and is better apt as a sprinter.

Skeletal muscles have different composition depending on the function they perform.

Therefore, the facial muscles, performing the particular movements related to expression, mainly comprise from muscular fibres which contract fast, mean duration time 43

thousandths of a second, while the muscles located in the lower extremities, performing in comparison with gross movements, consist of fibres contracting more slowly, with an average contraction duration of 80 thousandths of a second.

Not all of the fibers of a muscle are mobilized and contract when the muscle contracts, thus on the one hand excessive and uncontrolled contraction is avoided, while on the other hand a reserve of fibers is kept. Therefore they are not all tired at the same time. This reveals that there is a special intelligence controlling the muscular contraction so as to give the movement plasticity and functionality.

There are substances, such as curare, which block the neuromuscular synapses, where the nerve enters the muscular fiber, and then the neurotransmitter, meaning the special substance that intervenes in the mechanism that will release the electric current required for the contraction of the muscular fiber, will be ineffective.

Eventually this leads to a state of paralysis. However, there are also substances bringing about the opposite result.

It is amazing how many processes and functions take place in our organism during a simple movement, when some of our muscles contract. A fact accountable to the intervention of several electric and chemical mechanisms which transpire in one thousandths of a second rendering the motion promptly feasible.

Chapter 2

The mechanisms of stress

- *Definition and function of stress*
- *Mental - cognitive stress factors*
- *Is stress my enemy?*
- *Fight or flight response*
- *I must not have stress, but how do I achieve that?*
- *Mental - cognitive functions and pseudo-stress*
- *“Being stuck” causes serious damage to one’s health*
- *How is anxiety and fear generated?*
- *Biofeedback and stress*

Definition and function of stress

H. Sellye, one of the younger founding fathers of psychology who conceived the term "stress", defines stress as the response an organism demonstrates in its attempt to adapt towards every change occurring in its internal or external environment.

Our daily activities are governed by constant changes. Change, generally speaking, is a phenomenon inseparable from the very flow of life itself. Man has been familiar with this reality since antiquity. Heraclitus expressed it as "everything flows", meaning that in our world, in the entire universe, continuous succession of phases occurs revealing that nothing is completely stable.

If we look at a person this moment, the very next moment we will find out that he has changed both internally and externally. Because, the next moment he is older.

Contemporary biology has proven that each tenth of a second, several thousands of our body cells die and are replaced by others. If we put our hand on an electronic manometer which measures blood pressure every few minutes and records values in a computer, we will observe that our blood pressure constantly ranges. The final blood pressure curve resembles that of the stock market index in the sense that it is characterized by continual fluctuation. This is the case with all natural phenomena. Everything in our lives is subject to this law of incessant flow and alteration.

In this context, we could say that you virtually live under conditions of constant stress, as does every person: A reality, indeed. The perpetual alteration generates a steady and constant stress state in you, which is counterbalanced by the relaxation and harmonizing mechanisms responsible for the preservation of internal and external homeostasis. In connection to this, the term homeostasis signifies the entirety of con-

ditions which range within acceptable, normal limits allowing an organism to adapt timely.

Man's adaptability covers a vast scope, displaying enormous resiliance, however it is not unlimited. Man can adjust and survive in tropic or arctic conditions. He can also adapt to circumstances ranging from equanimity to extreme psychic fatigue. Human adaptability, along with the mechanisms preserving homeostatic stability is what ensures man great survival capacity when coping with an assortment of adversities.

Let's see the sequence:

With every change taking place in the outer or inner environment of an organism, in other words with every stress, there poses a **threat** against the balance of the organism and this in turn mobilizes its mechanisms, involved in the effective adaption to the new conditions. The adaptation is accomplished through the arousal of the sympathetic branch of the autonomic nervous system and is manifested in the form of **fight** or **flight** response.

Each factor causing an alteration in your internal or external environment triggers a special adaptive response to the organism toward this particular change, and is called a stressogenic factor or stressor.

According to Elliott & Icedorfer, 1982, "Stressor is every stimulus bringing about a non-specific respone in the organism, which is identified with stress".

Stressors are classified into two types:

1) Natural stressors, denoting sudden or not sudden changes in the internal or external environment and

2) Artificial, mental or cognitive (Gnostic) stressors, representing threats and dangers, deriving from mental processes and relating to ego's expressions.

Stressors can either be real or not real-imaginary and can either be external, deriving from outside the organism, or internal, coming from the inner environment of the organism.

The organism is more competent to defend and mobilize its defense mechanisms against natural stressors, because it always recognizes them as a threat. On the contrary, mental or cognitive stress factors issue from learning processes, thus are camouflaged beneath the cloak of either expertise or prestige that learning encompasses, therefore too often deceive the organism rendering him incompetent for defense.

The organism does not ring the alarm when coping with cognitive stress factors simply because it does not identify them as a threat, because it takes the train of mental associations employed in cognitive functions for “granted”, as indisputable truth. However, in all events, they act as stressors too with all the unpleasant consequences. To give an example; when a car heads towards your car, you take this movement as a threat, this conception acts as a stressor. In succession your organism responds by activating its sympathetic nervous system which mobilizes the flight mechanism and you turn the wheel to avoid collision. Clearly, the threat of crash is an obvious natural stress factor, an overt threat to which your organism responds mustering its inherent mechanisms that are mobilized every time the sympathetic branch of the autonomic nervous system is aroused.

Stress generated by natural stressors is an underlying motivation force responsible for the organism’s reaction and reflexes. This is a natural, beneficial and protective type of stress, without which the organism would be incapable of surviving.

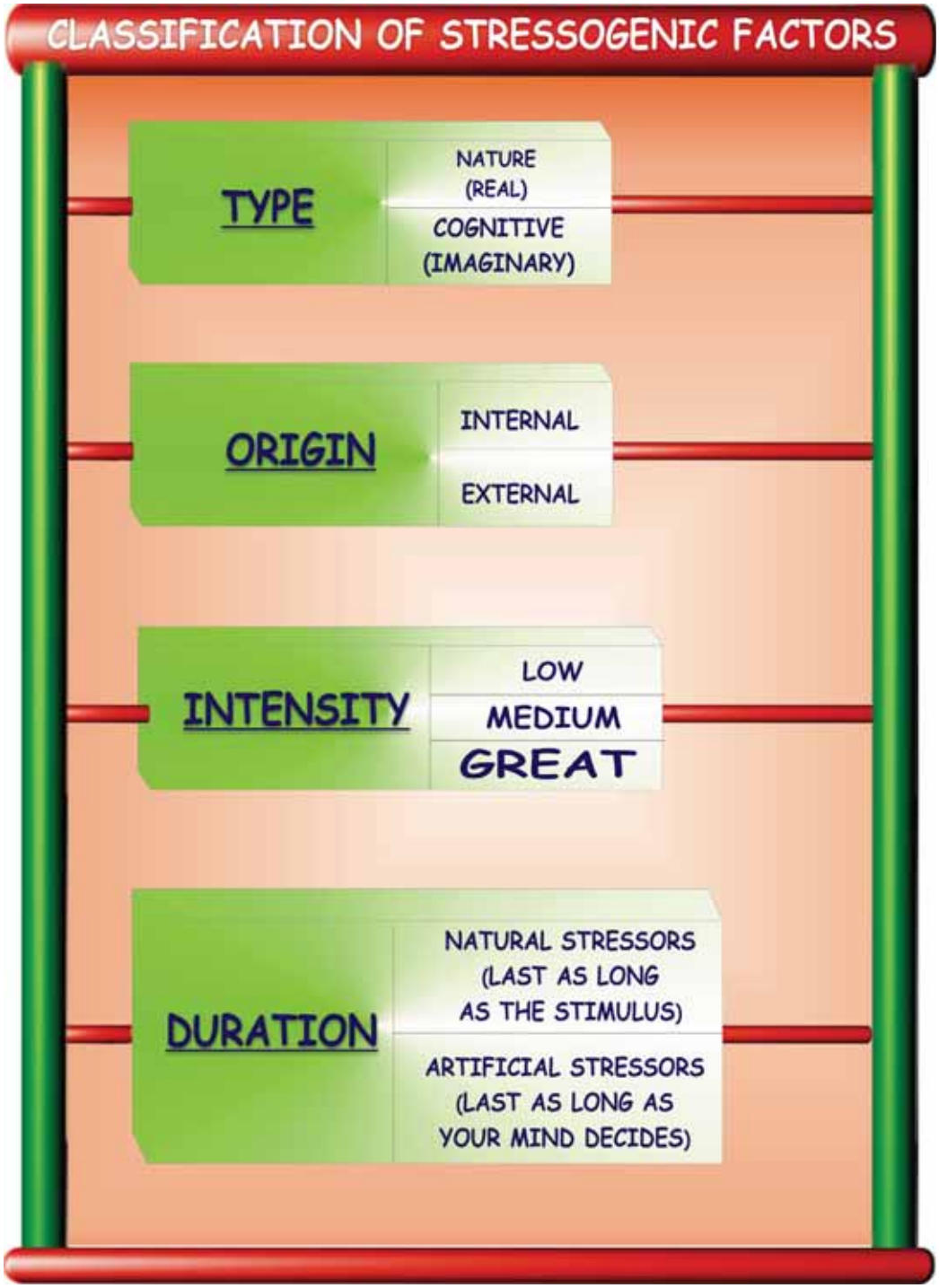
Mental - cognitive stress factors

When you suspect that your boss considers firing you, because he didn't address you today as warmly as usual, inside you rises the threat of losing your job, subsequent to mental processes and associations which rely on what you have learned about interpreting other peoples behavior. Feeling as a true psychologist, experienced and certain, you persuade yourself that a hidden threat lies beneath his aloofness and consolidate this conviction in your mind. "Surely, this poison-tongued Lisa, my colleague, must have spoken to him and told him I was backbiting him, no doubt she added extra sauce to undermine me and get my job. Besides, it is all too obvious, the boss spoke nicely to her today. So, I am right that he is about to fire me".

Your masters in psychology has done its job well and placed you in a vice; between the clutches of an artificial cognitive stressor. Notwithstanding that this stressor immensely upsets you, produces dysfunction and eventual sickness, nevertheless, it cannot be identified by the natural stress-tracing mechanisms of your organism. Since you are unaware of the way this stressor acts upon you, you are not in the least suspect of it. It is a wolf disguised in a sheepfold. You simply puff out repeating monotonously, "I have anxiety, I am in stress, I have phobias, I will lose my mind...".

In other words, once your cognitive edifice dictates and you decide that your boss is about to fire you, then you experience stress because "that's how things are". Your reactions are based upon the way you have learned to interpret other peoples' behavior. But, if you had been taught that your boss's behaviour might be attributable to other reasons as well, and is not necessarily a sign of your dismissal, then you would construe facts differently and his behaviour would not act as a stress-causing factor for you.

Cognitive stressors are based upon the way you have learned to interpret things, according to your cognitive edifice.


CLASSIFICATION OF STRESSOGENIC FACTORS
TYPE
NATURE (REAL)
COGNITIVE (IMAGINARY)
ORIGIN
INTERNAL
EXTERNAL
INTENSITY
LOW
MEDIUM
GREAT
DURATION
NATURAL STRESSORS (LAST AS LONG AS THE STIMULUS)
ARTIFICIAL STRESSORS (LAST AS LONG AS YOUR MIND DECIDES)

This is a complex and multi-factorial process. It relies upon the knowledge that you have accumulated over time from various educational cores which fuelled you with the constructive materials underpinning your cognitive edifice. These cores of education signify the sources of your knowledge.

The ordinary cores offering knowledge and education are family, school, the books you read, the mass communication media and the people you associate with. These are the sources you derive from and still derive materials in order to form your convictions and the way in which you interpret events or other peoples' behaviors.

Therefore, stressors associated to the learning process and based on what you know are called cognitive factors, and are characterized by great subjectivity and unreliability, since they are dependant on the main source of your knowledge. If, for example, your cardinal knowledge source is the opinions of your friends, then you can imagine the extent of subjectivity and error your beliefs entail?

Mental or cognitive stressors are of a fabricated nature, thus incorporate a camouflaged trap without an escape exit, because the human organism is unable to respond in the archetypical or primordial flight pattern against such stressors. Precisely because they are produced by the mind itself, the organism cannot break away from them. It cannot escape from its own mind. However, it can fight back. To rephrase it; man is capable of revising his mental processes to convert them from stressful to stress-free.

The organism mobilizes the necessary mechanisms enabling it to adjust to new conditions for the pupose of safeguarding its survival and integrity.

Is stress my enemy?

We could, therefore, argue that stress is itself an intrinsic phenomenon of life, integrally participating in the life orbit of a person. Stress, as a natural mechanism, certainly could not be deemed as your enemy, but rather as a condition to which you should adapt to and address in the best possible way.

One of the most common reaction patterns you follow in coping with stress is the attempt to create a stable internal and external environment, in which changes and consequently stress occur in the least possible manner. You try to build water-tight compartments around you, a private protective shell that will ensure ideal protection from the everchanging environment.

You strive to create stability for yourself and your family with respect to the external environment. Let's see this in terms of your biological functions, in particular your sensory organs.

In regard to vision, you try to keep your visual field as steady and clear as possible according to your standards. You chose a piece of land with magnificent view. Nevertheless, a new building soars up next to it and radical changes take place. If you stay away from this place for some time, when you return, you find it hard to adjust to the new situation. The same happens at work. You furnish your office and decorate it, when all of sudden you get transferred and everything changes.

As for the hearing sense, you try to maintain the lowest possible noise and sound-pollution levels. You put sound insulation and fill your environment with pleasant music. This involves higher building costs, which in itself forms a stressor for some people, with having high running expenses. Money will have to be spent on buying special equipment to create the accoustic environment you desire and service costs will be required. However, even when you have obtained the best results, you will never be as protected as you planned, because if your next door neighbor is in the

habit to hear loud music or partakes in tap dancing, nothing can save you.

In your social environment also, you try to maintain a certain degree of stability. However, this is almost never attainable, because international, political, social, economic and other factors, often bring rapid changes incompatible to the stability you so long for.

Despite your attempts to keep your working environment tranquil and good-humored, assorted factors, from the most simple ones, like a computer shutting you out and refusing to do its job, to the most complex, like your colleague who confides and unloads his family problems, form de-stabilizing and stressogenic circumstances.

We, thus, watch man striving, usually in vain, to obtain special conditions so as to barricade himself, in order to retain his homeostasis and psychic calmness. This effort alone constitutes a stressor and anxiety factor. The cost invested in such actions is extremely high and eventually leads to one of the numerous forms of neuroses commonly tantalizing contemporary people.

This super-pursuit of ideal conditions is a conception that dominated human relations and habits, nevertheless was proved quite a utopist action. The fact that this form of action demands huge energy expenses for its maintenance is contrary to the natural law stating that each action should be achieved with the least energy waste or otherwise, the law of the least resistance.

Now, with respect to your internal status, you invest great amounts of psychic energy in order to create a stable, quiet, calm and tranquil internal life. You try to have steady friendships and experience stress every time a friendship proves precarious or somebody betrays you. This situation causes both bodily and psychic symptoms, because it raises the tonus of the sympathetic nervous system and mobilizes your organism to fight or flight.

Will you fight for this relationship or give it up and feel bitterness, keeping inside you negative emotions?

Will you respond with fight or flight?

You keep trying to have stable working relationships, solid relationships with your partners, your boss, your suppliers and clients. In this endeavor you invest great amounts of energy. However, the result is not up to you. It also depends on a host of other parameters either of natural or human origin. What depends solely upon you is how you feel inside you during the stable period or during a crisis in the relationship.

Things get even more difficult in love affairs. In order to accomplish stability in a love affair considerably greater energy investment is required. In a love affair, the balances overturn within fractions of a second as a result of very subtle processes. Competitiveness between the sexes resembles a time-release bomb which can explode any moment in the foundations of a love affair. This situation is by itself a stressor.

In order to retain balance against the threats constantly endangering and upsetting your personal relationships, you mobilize diverse psychological mechanisms. The supportive mechanisms you employ in order to keep equilibrium are contingent upon your idiosyncrasy, in the sense of personal, psychoemotional tendencies and on your conscious or subconscious choices. Most of the psychological defense mechanisms, save those in absolutely archetypical and instinctive, are based on the self-cognition and what you know about others and intrapersonal relations. Thus, meaning that many defense mechanisms reflect the robustness of your cognitive edifice. If this is a small and neglected place, one you never took care of or paid any special attention to, your defenses will likewise be poor, confined and ineffective. Whereas, a firm cognitive structure, rich, multifarious, comfortable, providing warmth, safety and alternative solutions, guarantees better organized, enduring and effective defenses. The quantity and quality of knowledge you have acquired about intrapersonal relationships decisively determines how successfully your defenses will psychoemotionally protect you.

The more solid and safe your cognitive structure is, the less frequent and weaker the impact of the cognitive stressors is upon you.

From the cognitive material you possess, issue your cognitive stressors which can be either real, in case actually there is a crisis in your relationship, or unreal based on evidence.

Stress, as aforementioned, is a natural response towards the ongoing changes that constantly take place in the environment. If you want to address stress realistically you should view it as a natural process. Each stress raises a reaction-response in your organism.

Natural stress is not your enemy provided that it does not outlast the duration of the stressor. Stress becomes your enemy when it goes on even after the stressor has ceased, that is, when it has prolonged and abnormal duration.

Stress has various levels. There is low, medium, high and a very high stress level. The intensity escalates in connection to the degree a stressor threatens your life, the extent of the change you are called to adjust to and the energy amount demanded for this. Every stress generates responses simultaneously in bodily and on psycho-mental level. This is a natural, physiological phenomenon, granted that only dead matter lacks capability to react to the various stimuli.

When a change takes place in your environment, you must respond and adapt. Then stress will mobilize your mechanisms, bringing you to a motivated alertness, and create an impatient sinking feeling longing for action and success.

Natural stress, meaning stress induced by natural and not by imaginary stress factors, is a beneficial type of stress. This is what mobilizes you to act and solve problems, to make progress, to evolve.

Natural stress, meaning from natural and not imaginary stressors, is a beneficial type of stress. It initiates you to act and solve problems, to progress and evolve.

Creative stress creates this sweet sinking feeling, particularly in the solar plexus area which lasts during your fruitful and creative activity.

When you complete your efforts, creative stress gives its place to a calm and relieving sense of satisfaction, emanating from a place of creative victory.

Furthermore, pathologic stress which stems from an unatural mental process that misevaluates an unreal threat as real, is your insidious and merciless enemy.

Fight or flight response

When confronting a threat you have two distinct response options; Either to fight against the threat, win it over, survive and preserve your integrity, or to run and escape from it; the aim always being the same, your survival.

In 1999, psychologist W.B.Cannon referring to the results of his research on the response models used when facing a threat or peril, used the term fight or flight response.

Stress always ignites the natural fight or flight response, since stress is always linked to either threat or peril. The notion of threat in conjunction to the feeling of vulnerability triggers the psycho-somatic function,which through the over-arousal of the sympathetic branch of the autonomic nervous system tend to bring your organism to a state capable of meeting the fight or flight demands.

The organism's fight or flight response constitutes a reflex, preparing the organism to face danger or threat. Normally this is activated subsequent to perceiving a real danger or threat. This preparation is achieved through the

sympathetic arousal, and the arousal degree corresponds to the threat's seriousness, irrespective if the latter is real or imaginary.

The preparatory stage aims at the empowerment of the organism to either fight against the threat, tackle it, defend its life and integrity, or to enable the organism to escape with flight; meaning to run as fast as it can to get away from the risk. Both action types demand the prompt and intense mobilization of the muscular system. Summoning our systems gears at activating certain mechanisms and the reserves of our organism, enabling us for fight or flight.

The activation of the cardiovascular, respiratory system and metabolic processes intends to carry nutrients and oxygen to the muscles, ensuring their performance efficiency either in fight or flight. The heart's operation increases, both in velocity and blood output volume. Vasoconstriction takes place and blood shifts from the bowels to the muscles, to economize and save energy resources for their function. The oxygen supply towards muscles grow, through the increase in respiration rate and bronchi dilation, capacitating and facilitating better performance.

The metabolic functions are instantly brought into action to provide nutritive substances to the tissues. Cortisole is secreted and in turn releases cholesterol and triglycerides to the blood stream, since this is the best fuel for muscular tissue. Glucagon's production mechanism is mobilized to provide rapid available energy to the muscles.

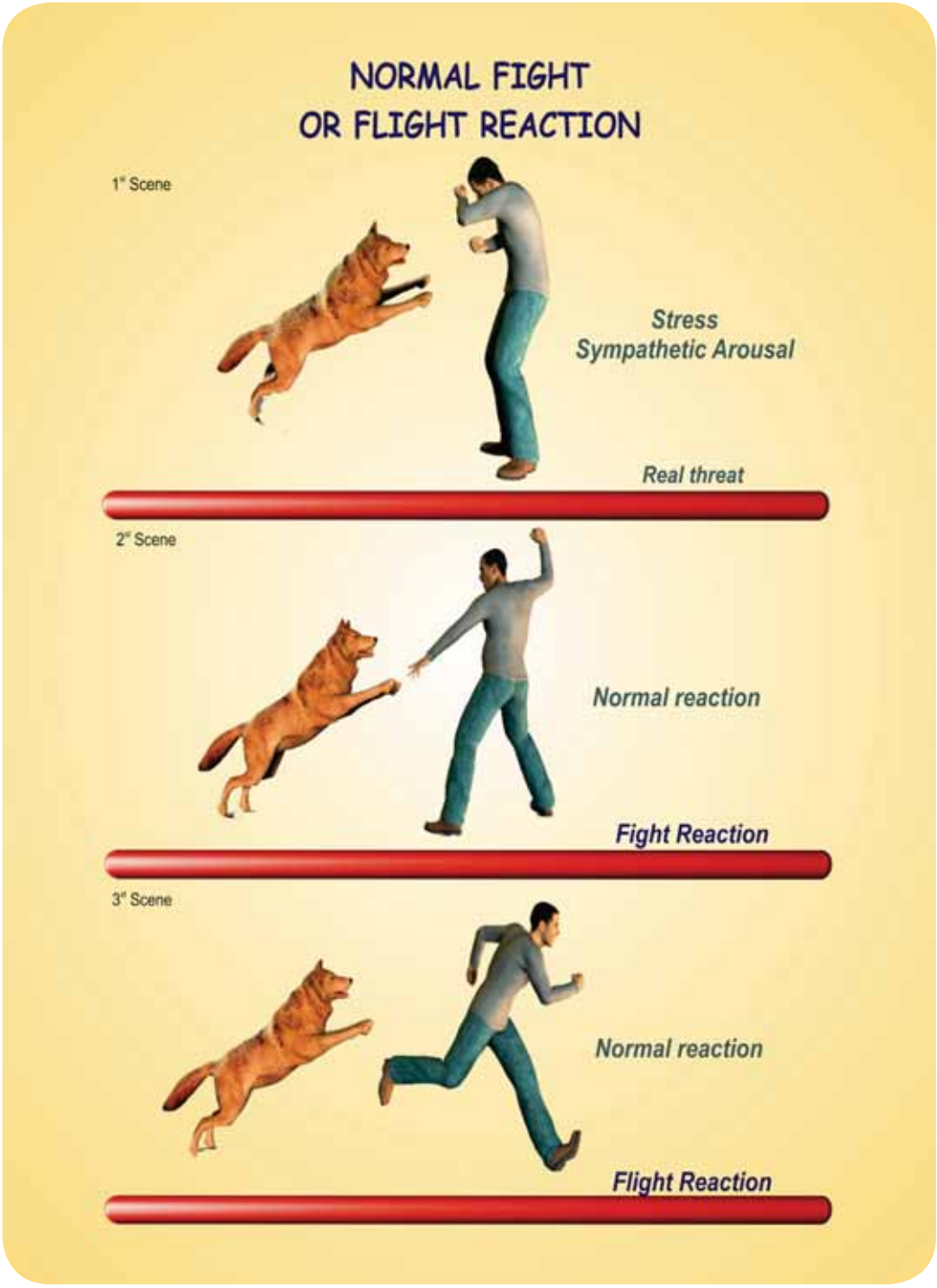
Perspiration is increased, to regulate body temperature and make you slip from your enemy's grip.

Muscular tone increases since the muscles are now ready to participate in the fight or flight response.

All body sphincters, in the esophagus, urinary bladder and anus, constrict.

In certain cases body hair raises to produce impressive growth in body volume and send to the enemy the message that you are ready for confrontation.

In other cases mydriasis occurs, dilation of the pupil, to


NORMAL FIGHT
OR FLIGHT REACTION
1st Scene
Stress
Sympathetic Arousal
Real threat
2nd Scene
Normal reaction
Fight Reaction
3rd Scene
Normal reaction
Flight Reaction

allow the eyes to perceive more light, thus gaining better and a more detailed perception of the environment and surroundings.

Endorphins are released; the organism's morphine, to deal with the pain in case you get wounded during the fight.

Cortisone-substances are also released to attend to wounds that might ensue from the fight.

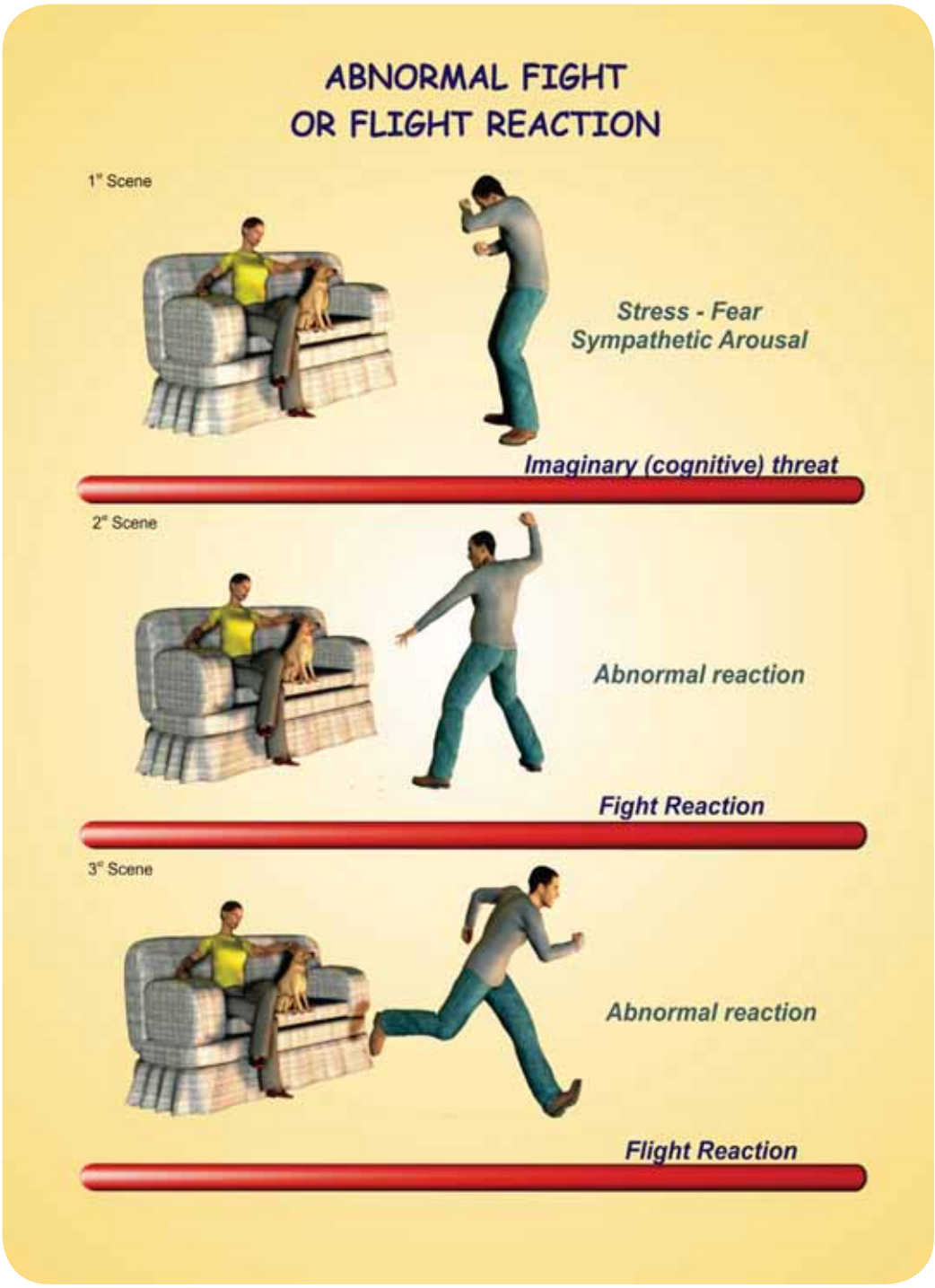
Simultaneously, along with the increase brought about by the operation of the sympathetic system, the parasympathetic functions are toned down or supressed, on account of the aforementioned "seesaw" function connecting the two systems.

The greater danger for you lurking in stress does not stem from the changes brought about in the somatic functions, but chiefly from the continuous diffusive feeling of apprehension ignited from the external stimuli. This uneasiness keeps the body in a constant state of semi-mobilization, which is the equivalent of anxiety.

This mobilization affects our physiology in three ways, we will examine step by step.

Every mechanism in our organism is considered to operate properly when its function ranges within normal levels with respect to a) duration b) intensity and c) sensitivity. When its function infringes the normality criteria, it becomes pathologic. If we talk about, for instance, the heart's function, what matters is how long the increased heart rate lasts, the number of pulses per minute, as well as how easily the person presents tachycardia. These parameters determine whether the heart functions normally or not. Thus, it becomes evident, that incessant and intense mobilization of many systems in the organism definitely indicates a pathologic condition.

The mobilization of the organism's functions, in order to respond to external stimuli, namely stress, is a completely


ABNORMAL FIGHT
OR FLIGHT REACTION
1st Scene
Stress - Fear
Sympathetic Arousal
Imaginary (cognitive) threat
2nd Scene
Abnormal reaction
Fight Reaction
3rd Scene
Abnormal reaction
Flight Reaction

physiological process. However, the maintenance of this mobilization even after the stressor has been removed, upsets homeostasis and creates conditions which the body, clearly, was not designed to endure.

Our organism receives daily successive stimuli from its environment. Normally, you should be able to relax immediately after the effect of stressor A, restore your balance and be prepared to be, possibly, exposed to an oncoming stressor B. However, the prolonged impact of stress upon your organism, on account of incorrect mental structures as we mentioned previously, renders you incapable to relax right after the removal of stressor A, so when in succession stressor B appears the new stimulus adds on to the preceding stressor and is still affecting you.

It is obvious that the accumulation of tension will at some point reach the organism's endurance limits and then the organism will "break down" thus developing some somatic or psycho-mental illness.

The third way, through which erroneous mental attitude affects how we cope with stressing situations, is directly connected with the previous two. The longer the organism stays under the influence of certain stressogenic factors and the greater the number of factors cumulatively add up, the organism has greater sensitivity towards environmental stimuli.

Let's take a look at this function using a simple, nonetheless quite corresponding example. Suppose that we wear a shoe that "hurts" a certain spot in our foot. If we put it on, we feel discomfort and take it off, then our foot will have minor irritation. However, if this was a sore spot from the past and we are worried whether the tight shoe might traumatize it, the sense of annoyance is augmented and lingers on because mental concern intensifies it. Now, let's suppose that the discomfort lasts for some minutes. If we are obliged to wear our shoe again, before the previous discomfort fades away,

a new discomfort will be added to the older. If this process is repeated several times, the successively added stimuli will lead to a serious ailment or wound. Furthermore, our sensitivity will be significantly increased rendering us unable to tolerate anything touching that spot. This fact, in succession, becomes the starting line for new stressogenic situations.

This accumulated tension, is scientifically called “over-arousal of the psycho-neuro-endocrine axis”. In difficult times of stress it does not find a way to be expressed or demonstrated verbally or in action. Consequently, the accumulated tension or charge and psychosomatic ordeal becomes indirectly expressed with side manifestations. The lateral discharge takes the form of somatic symptoms, or problems in human relations and communication. And eventually, drives the person participating in such processes to somatic and psychological imbalance.

When you follow the flight response you always leave behind, at the abandoned “battle field”, a part of yourself and the dilemma whether it would have been better to fight that still haunts you. In the case you chose to fight, a piece of yourself usually remains attached to the fight scene; you either won or lost. In the course of the fight against an insurmountable threat, you take the risk in being totally exterminated. However, if you are the winner, you gain a feeling of supremacy and satisfaction emanating from your fight and gain wisdom from the elaboration of the fighting experience.

The flight response often involves lower risks than the fight response, but also gives less satisfaction which must then be offset or compensated by means of psycho-mental associations and alternative outlets,which ever will justify your choice.

I must not have stress, but how do I achieve that?

The brain is the pinnacle of the nervous system from an evolutional and operational aspect, the supreme organ controlling everything in our organism.

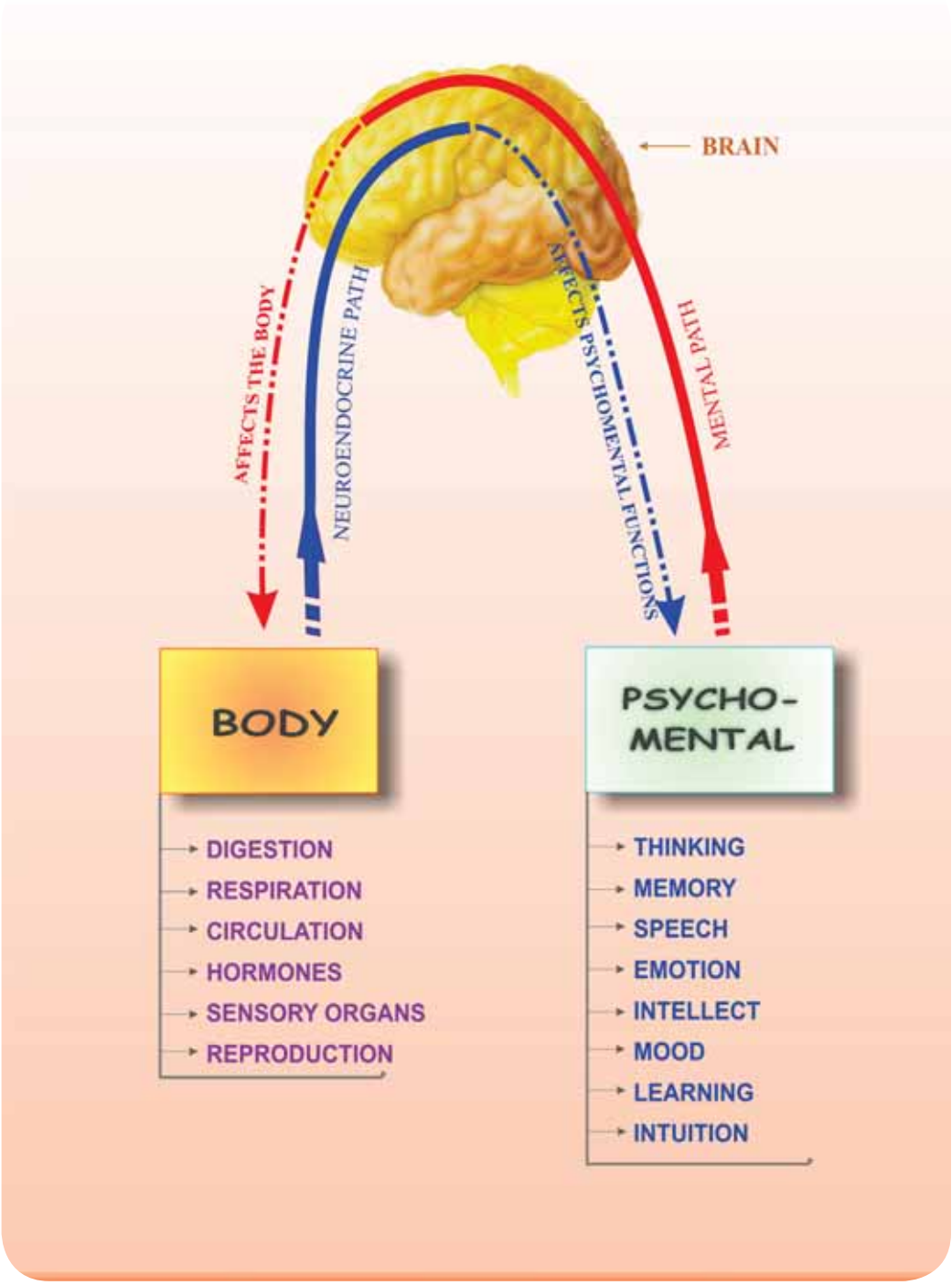
Brain control is exerted upon various functions through two main channels.

The first channel is that of the nervous system, which in cooperation with the endocrine system comprise the neuroendocrine axis which controls all the functions in our organism, voluntary and involuntary. It also controls metabolism as well as various other biological reactions and functions.

The other channel is the mental pathway, through which the mind and intelligence are expressed, employing brain functions related to thinking. Thought, memory, speech, mood, emotion and cognitive functions participate in influencing and controlling the periphery.

Psyche and body always go hand in hand. In the same manner that bodily weariness influences our mental functions, emotional charge or strain affects the somatic functions of our organism.

Psychological tension, lacking other means of expression, tires the systems and functions in our body, a fact that is not easily recognized because it builds up little by little. The human organism gets tired day after day: The most susceptible organs and systems are worn out faster and deplete their endurance limits. At this point psychosomatic health problems can begin. Usually, in the begining, simple psychosomatic


BRAIN
AFFECTS THE BODY
NEUROENDOCRINE PATH
AFFECTS PSYCHOMENTAL FUNCTIONS
MENTAL PATH
BODY
DIGESTION
RESPIRATION
CIRCULATION
HORMONES
SENSORY ORGANS
REPRODUCTION
PSYCHO-MENTAL
THINKING
MEMORY
SPEECH
EMOTION
INTELLECT
MOOD
LEARNING
INTUITION

problems appear, such as headaches, stomach ailments, insomnia and so on. Persons who had not suffered such problems in the past, start presenting ailments for the first time. For those persons already having health problems, things get worse.

The biggest secret in treating such cases is psychosomatic relaxation and the best weapon is logic: Relaxation and calmness. Yes, but how? Everybody, especially doctors, tell us not to have anxiety. How? How can we achieve this? Our mind, and in particular our intellect distinguish us from animals; it is about time to make our minds work. We must pay attention to the signs of tension; such as vocal tone, contracted forehead, jaws or shoulders, and shallow and tight respiration, etc.

We will be half-way in counteracting stress and anxiety when we learn the mechanisms through which these are generated. The other half is pointed-out to us through biofeedback.

Mental - cognitive functions and pseudo-stress

Notwithstanding the fact that stress is a natural phenomenon, the human mind gets involved in the entire process in an erroneous manner and tends to lend to this response enormous, unnatural dimensions and a very long duration.

Natural law states that stress lasts as long as the stressor, and when it departs, stress also ceases. This precise equilibrium between stressor and stress is destroyed by the intervention of the human mind.

The process through which the unnatural intervention of the human mind prolongs stress, was given the name “dis-

tress", by Hans Selye, in other words "pathologic" or 'pseudo-stress".

The human mind is a trunk where all the pre-fabricated mental structures are stored according to the subjective opinion of a person, and which are useful in one's daily life. These mental structures' genesis are based upon certain maxims, which instead of abiding to selfless and inviolable natural laws, follow man-made laws serving certain interests or expediencies.The intervention of mental structures in the natural course of action of a stressor unnaturally prolonges the effect of the natural stressor, despite the fact that the stressor itself has gone. Thus, pseudo-stress, is founded on an imaginary threat, bearing nevertheless exactly the same impact with the natural stress.

Primitive man perceived threat as a real and natural phenomenon. Since then mankind has considerably evolved, however not equally in all aspects. The human brain cortex keeping pace with the evolution of life and civilization, evolved much faster than the biologic body which remains almost the same since the primitive era and responds in the same manner towards situations regarded as edangering or threatening its integrity.

The evolution of brain cortex was completed with high accelerations, thus a gap was formed between natural threat and imaginary threat; the latter has no physical hypostasis, but a cognitive one.

Imaginary threats result from mental processes, which are based on cognitive factors, toned and inflated or deflated according to the circumstances. However, this new type of threat elicits, just like natural threats, ceaseless sympathetic arousal because it is impossible to flight from one's own mind when it is responsible for mental or cognitive threats. One can not fight it unless he knows the proper way.

Modern man, equipped with a highly developed brain, characterised from excessive sentimentality and unre-

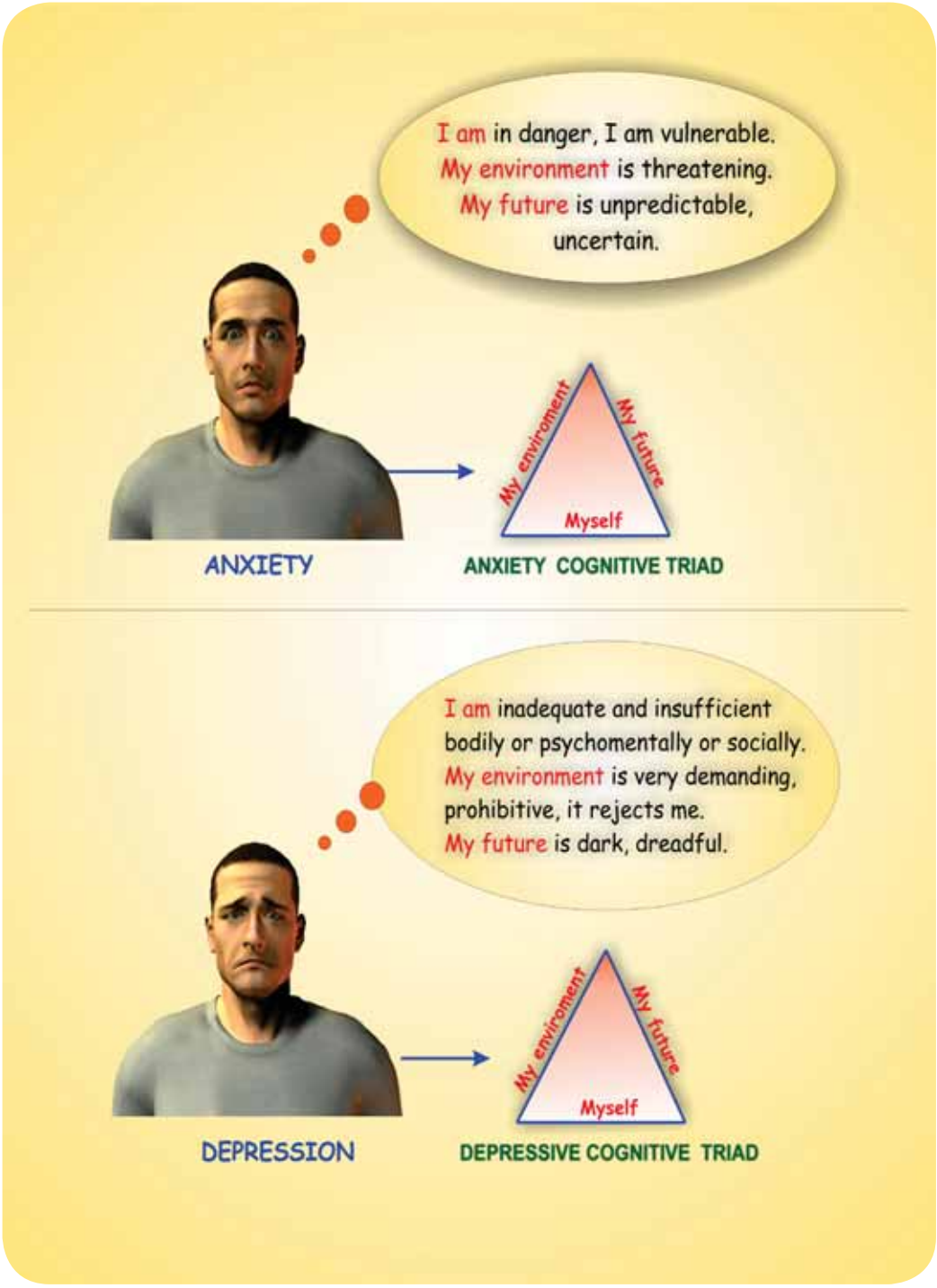
strained intellect with respect to mental structures, becomes a captive from the processes resulting from the enormous evolution the cerebral cortex has reached. These processes are very useful when man utilizes them in order to survive, create, or self-integrate into a contemporary social environment. Nevertheless, they turn into a trap and impass when they are operating as sources of stressors, which imprison man into a constant state of stress and anxiety from which he cannot be released by means of the natural or primordial responses, since he can neither flight nor fight: unless he knows a special fighting manner.

Beck, between the years 1967 and 1979, identified the depressive cognitive triad as the state when someone positions himself as insufficient and inferior psycho-mentally, physically or socially. One believes that his environment is too demanding, prohibitory or rejecting and he deems his future dismal and gloomy, seeing no light at the end of the tunnel. Eventually he looses the connective link to his own personality and environment, and is thus driven to depression.

In 1990, Blackburn & Davidson described the stress-generating cognitive triad. This is when a man thinks he is vulnerable to danger, regards his environment as threatening and finds his future unpredictable and uncertain. He ends up suffering a feeling of constant threat, which produces constant anxiety, driven initially to anxiety neurosis and in succession, to psychosis.

There are two main categories of stress: acute and chronic. The stressors generating acute stress are numerous. However, some of them are underestimated or least suspected such as; movies leaving one with an unpleasant taste, a state of psychic flabbiness, poor occupational activity, being overloaded with responsibilities at work, sudden or inescapable noises, a risk to lose our social status or destroy our social image, electromagnetic shock caused by electric home appliances, loosing control of a situation, disease, surgical operations, incidents threatening our self-esteem and psycho-traumatic experiences.

Stressor inducing chronic stress encompasses sleep


I am in danger, I am vulnerable.
My environment is threatening.
My future is unpredictable, uncertain.
My environment
My future
Myself
ANXIETY
ANXIETY COGNITIVE TRIAD
I am inadequate and insufficient bodily or psychomentally or socially.
My environment is very demanding, prohibitive, it rejects me.
My future is dark, dreadful.
My environment
My future
Myself
DEPRESSION
DEPRESSIVE COGNITIVE TRIAD

deprivation on account of sleep disorders or working conditions, frequent arguments, disputes, quarreling, excessive responsibilities incompatible to our potential expansion of our social role, and social isolation.

Very often the psychosomatic equivalent of stress is depression, anxiety neurosis and frequent expressions of rage (McEwen & Stellar 1993).

People can be classified into two main categories depending on how they respond to stress: Those who are affected to a high degree respond intensely and there are those who are less affected. The first category is considerably more serious and influences from stress presents greater increase of heart beat, blood pressure, catecholamines and a type of T-lymphocytes. Whereas, those responding less to stress, exhibit low or zero impact on the above parameters (Manuck et al 1991).

In 1974, Friedman published the results of ten years of research on cardiologic diseases. He reached the conclusion that a person's behaviour is indicative as to whether or not he was prone to coronary disease. Based on the collected data he distinguished two type of persons, type A and type B. According to his findings type A was three times more prone to develop coronary disease (heart) stroke. The characteristic features of a type A person are the following:

Insecure with respect to his general condition.

Feels that he has not accomplished enough to secure his future.

Feels that he is always running behind developments.

Feels entrapped by the circumstances of life.

He is very aggressive. This type of aggressiveness that springs from his desire to conquer, prevail, and establish his social status.


CANDIDACY FOR HEART ATTACK
TYPE A (HIGH)
Feels constantly that he has not done enough to secure his future
Feels events pass him by
Feels captive of living conditions
Feels intensely aggressive and possessive
Feels quarrelsome
Feels unsatisfied
Feels constantly over-tensed
Feels he is in a rush all the time
Feels he has reached his limits and will break down
Feels he is about to fall sick at any moment
TYPE B (LOW)
Feels more confident of his skills
Gives himself time
Works carefully and diligently but gives up when he gets tired
He adapts more to the present time rather than the future
He allies with time and conditions
He avoids reaching his limits
He tries to maintain moderation in his life
He feels more easily a sense of satisfaction

He is quarrelsome. There is anger lurking inside him, triggered off by small, everyday incidents. He feels dissatisfied. He is always uptight.

He is always in a hurry. He tries to squeeze into his time as many things as he possibly can. He is always rushing and there is never enough time.

Most of the time he feels that he has reached his limits. He feels he will soon fall sick, that he will collapse and exerts an enormous effort to not break down. However, he doesn't spare a moment to rest or take a break, he is pushed by his strong, overpowering sense of insecurity.

In summary, the type A person can be characterized as a person entangled in a constant struggle to survive.

Conversely, the type B person represents the following features:

The ability to have a long-term view of life.

He is more realistic.

He doesn't pursue illusive goals.

He has more confidence with his skills and time. Speed is not his main objective. He is the person who will leave something to do tomorrow. He is very careful and diligent in whatever he does: he is industrious, but when he gets tired he quits and goes for a drink.

He feels unique.

He is more certain about himself and although he does not wait for other peoples' appreciation, he does not underestimate it, or not welcome it. What matters the most to him is what is going on now, rather than what must be done in the future.

He has a sense of moderation. He tries to find a balance by investing time on his aspirations.

Most people are somewhere between these two types, combining features borrowed from both types in various ratios leading them closer to a type A or B person. People falling under type A are more inclined to stress related diseases.

If you have discovered that you are a type A, then it is time to decide to review some of your ideas and behaviors. It is time to get rid off some cognitive stressors which may drive you to your limits.

"Being stuck" causes serious damage to one's health

The "fight or flight" response mobilizes your body. The arousal of the sympathetic nervous system tonus activates some physiological functions. The heart beats faster, respiration gets faster and shallower, blood pressure rises and blood is directed from the extremities and internal organs to the muscles. On the other hand, the muscular tonus increases to minimize the risk for ligament destruction, cortisone blood levels and coagulation factors rise to accelerate healing processes in the case of one being wounded. Cholesterol and triglycerides stream out in the blood flow as do energy sources. The body is entirely mobilized to tackle the immediate danger.

If you have survived the first moments of the danger, then panic is not the best state to be in, thus the parasympathetic branch of the A.N.S comes into play to restore physiological systems to their regular functional status and hands over the control to rational thinking and action again.

Remember the dogs or cats or wild animals in the movies? They may be completely relaxed and resting or grazing,

When danger has passed you should be able to feel relaxed again, keeping only a memory of the stress you have undergone, without letting stress being permanently imprinted in your body as "somatic memory" which is then conveyed as an upset stomach, tight muscles, tachycardia, etc.

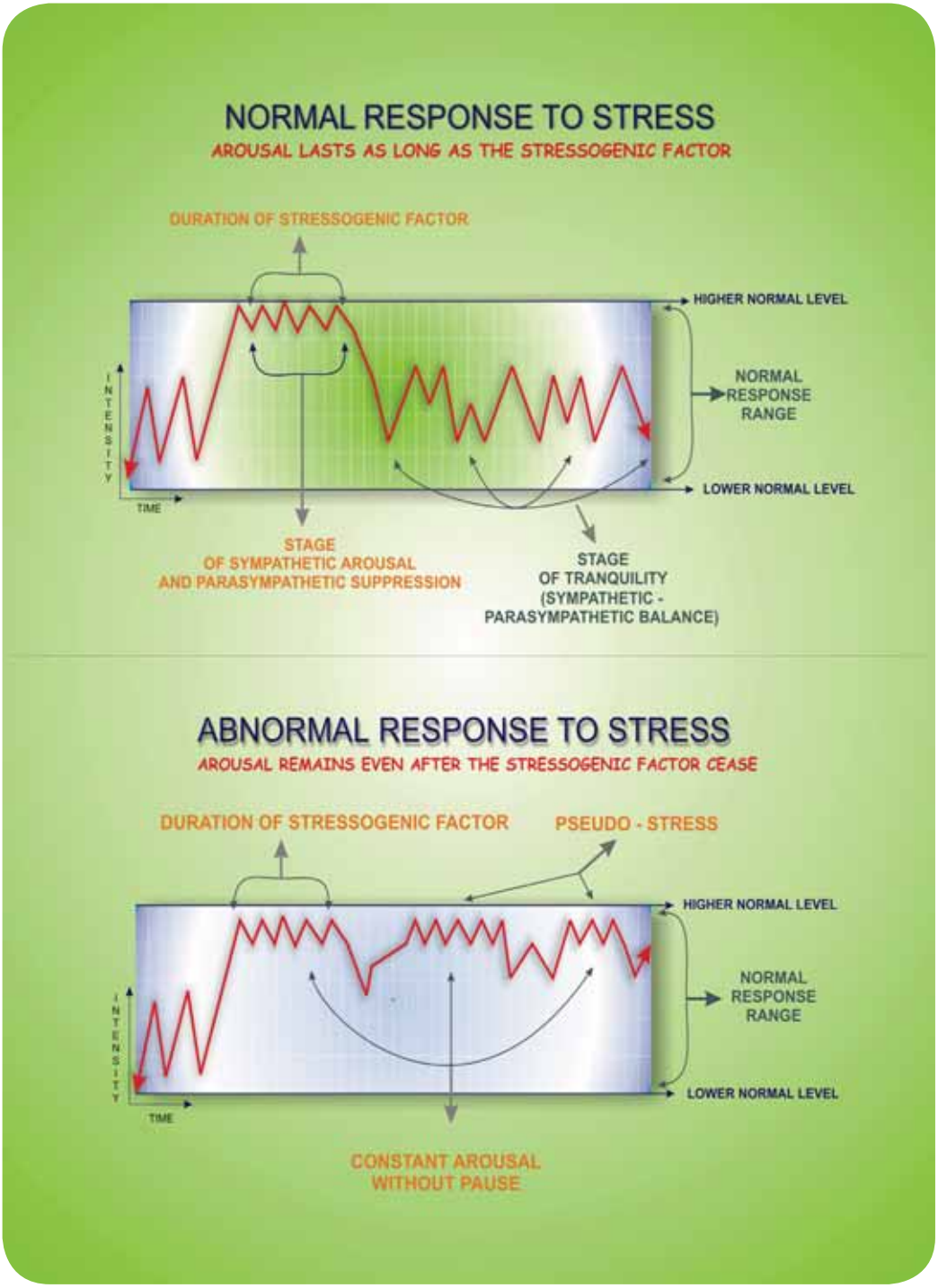
but as soon as danger appears, they are instantly mobilized for flight. The stressful presence of an enemy, a threat in the environment, activates their mechanisms and leads them to respond with flight. It is typical that when danger passes, they continue with their previous activities with the same calmness. Stress mobilized them, they responded, and after the extinction of the stressor returned to a state of calmness. This is the normal way stress performs. This is its normal action and usefulness. It is an automatic mechanism, without which one would need much more time in order to react, which may prove fatal.

Whether fight or flight prevails in the organism depends on the gravity of the threatening situation the organism encounters.

The vast majority of people adopt towards even minor stressors the survival response; as if they were facing a great natural danger, and furthermore remain anxious and upset over these events for the entire day.

In this way however, they mobilize their entire body chemistry and force their organism to operate for long periods of time at its higher functional levels. The chemistry of the body changes. The energy balance of the organism changes to adapt to the stimuli received. For instance, cholesterol level rises and triglycerides are released in the blood flow, however, the latter cannot easily be reabsorbed and are deposited on vessel walls, leading to arteriosclerosis. This encoumbers the heart to work harder in order to keep the blood flow steady.

The factor, ultimately, regulating your responses and behavior is whether threat or stress has a real or imaginary hypostasis. Each time the latter happens, you need to be de-sensitized from the cognitive stressor. You need to retrain how you deal with yourself.


NORMAL RESPONSE TO STRESS
AROUSAL LASTS AS LONG AS THE STRESSOGENIC FACTOR
DURATION OF STRESSOGENIC FACTOR
HIGHER NORMAL LEVEL
NORMAL RESPONSE RANGE
LOWER NORMAL LEVEL
INTENSITY
TIME
STAGE OF SYMPATHETIC AROUSAL AND PARASYMPATHETIC SUPPRESSION
STAGE OF TRANQUILITY (SYMPATHETIC - PARASYMPATHETIC BALANCE)
ABNORMAL RESPONSE TO STRESS
AROUSAL REMAINS EVEN AFTER THE STRESSOGENIC FACTOR CEASE
DURATION OF STRESSOGENIC FACTOR
PSEUDO - STRESS
HIGHER NORMAL LEVEL
NORMAL RESPONSE RANGE
LOWER NORMAL LEVEL
INTENSITY
TIME
CONSTANT AROUSAL WITHOUT PAUSE

How is anxiety and fear generated?

Anxiety is the peculiar unbearable internal discomfort (dysphoria) provoked by an indefinite internal threat. Since this threat does not have specific hypostasis the person is incapable of avoiding it and eventually gets exhausted.

Every time you sense an external threat which acts as a stressor you have the opportunity to respond with fight or flight. However internal threat is created and stems from your own personal psycho-mental functions and processes, which is then a fabricated threat of cognitive nature from which you can neither escape nor fight, if you are ignorant of the required fight type, or with the flight type because you cannot get away from yourself. Your entanglement in this situation is experienced as dysphoria which is defined as anxiety. Anxiety is the unbearable discomfort ensuing from the effect of cognitive stressors.

Anxiety generating factors are characterized by the stressors which induce anxiety via the above mechanism. In other words, anxiety is usually the psychic equivalent of a cognitive stressor.

When anxiety becomes chronic and overwhelms the entire personality of an individual a range of psychosomatic symptoms are produced which is typical of anxiety neurosis.

You get stuck in an anxious state, which in time will develop into anxiety neurosis, mainly on account of the cognitive processes which entrap and confine you. Disentanglement from the anxiety state may be attained via the biofeedback training processes, which aim at re-educating you in order to cope with facts through new cognitive processes, which


STRESS
IS: PHYSICAL RESPONSE
TRIGGERED BY: STRESSOGENIC FACTORS
CAUSES:
DILATION OF PUPILS
ACCELERATION OF HEART RATE
INCREASE OF BLOOD SUPPLY
DILATION OF BRONCHIOLE
CONTRACTION OF SKIN VESSELS
DILATION OF MUSCLE VESSELS
SUSPENDS BOWEL MOVEMENT
RAISES HAIR
INHIBITION OF ERECTION AND ORGASM
AIMS AT: ENABLING ORGANISM TO ADAPT TO A NEW FIGHT OR FLIGHT SITUATION
FEAR
IS: EMOTIONAL RESPONSE
TRIGGERED BY: PHOBOGENIC FACTORS
CAUSES: THE SAME AS STRESS
AIMS AT: THE SAME AS STRESS

will prove more beneficial and homeostatic for your overall balance. Nature has foreseen that sympathetic arousal lasts as long as the stressor and in succession gives priority to the parasympathetic activity in order to re-balance the "seesaw" between the sympathetic and parasympathetic branches. Your cognitive intervention is what gets in the way of this normal function, subverts the equilibrium, and lets the "seesaw" sky-rocket or lower to the ground: one of the two branches of the autonomic nervous system. Consequently, this generates and adds anxiety.

Fear constitutes an emotional response, abrupt and spontaneous, towards an external specific danger taking the organism into a useful alarm-state that enables the familiar fight or flight response.

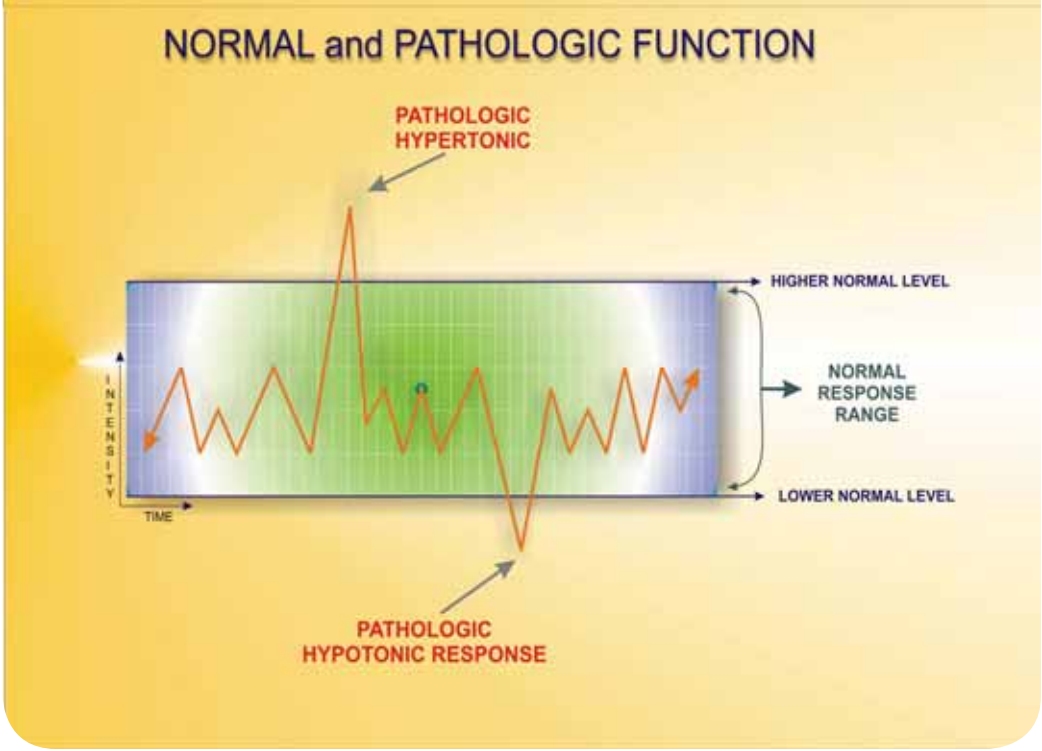
It becomes evident that stress, anxiety and fear share certain common characteristics and have a common origin.

Stress and fear are natural conditions which mobilize the organism to respond to a specific stressor following the classic physiological fight or flight path. If a stressor is causing fear it is called phobogenic. Anxiety, however, is an pathologic type of response.

Stress mobilizes the organism. Fear is the emotional equivalent of natural stress which also contributes in mobilizing the organism. Anxiety is the psychic equivalent of cognitive, meaning not natural stress, which if prolonged leads initially to phobic neurosis and eventually to psychosis.

Stressogenic factors cause stress. Stress, through the sympathetic nervous system "arousal", brings about physiological response, and in parallel stimulates the emotional mechanisms responsible for the emotion of fear. In succession, this adds


ANXIETY
IS: A PSYCHIC EXPERIENCE
TRIGGERED BY: ANXIETY INDUCING FACTORS
CAUSES: UNBEARABLE INTERNAL DISCOMFORT
LEADS TO: ANXIETY NEUROSIS
RESULTS: ANXIETY PSYCHOSIS


NORMAL and PATHOLOGIC FUNCTION
PATHOLOGIC
HYPERTONIC
HIGHER NORMAL LEVEL
NORMAL
RESPONSE
RANGE
LOWER NORMAL LEVEL
INTENSITY
TIME
PATHOLOGIC
HYPOTONIC RESPONSE

to its emotional participation in the fight or flight mechanism. Stress and fear are natural reactions and do not cause pathological conditions when the duration is normal, that is, as long as the stressogenic or phobogenic factors occur.

When, you comprehend clearly the mechanisms we have explained, assisted by repetition and multi-leveled explanation, you will have covered half the understanding on your way toward desensitization and the adoption of type B behavior.

Biofeedback and stress

Biofeedback training's purpose is to help you normalize your responses to stress and avoid all the adverse effects. The biofeedback process follows a specific protocol taking into account the criteria determining the normality of a physiological function.

The three criteria defining normal functioning are:

A. Duration

With the aid of biofeedback training you learn to release tension and remain calm whenever you encounter a stressogenic stimulus in your environment. You learn to respond with the least possible intensity and highest efficiency, and to regain relaxation and balance immediately after the stimulus extinction. You retrain yourself to adopt a new view and behavior, which despite being natural inherent elements of your existence, have perhaps been forgotten or ignored.

B. Intensity

How quickly an organism will collapse under the pressure of increasing tension depends on how often one is exposed to environmental stimuli, as well as on how one rapidly and effectively releases tension after each stimulus.

Biofeedback training aims to remind and re-teach you the normal response path dealing with stress. Normal response is instinctive material, part of your genes, which however has been forgotten and replaced by other more damaging responses within your homeostasis.

C. Susceptibility

Susceptibility towards stressogenic stimuli is defined by two factors:

a) The combined influence of duration, frequency and intensity of the stressogenic stimulus.

Biofeedback assists you to restore the responses to a normal level by limiting the duration and diminishing the impact of the stressogenic stimulus. Additionally, through the desensitization process, you strengthen your character, enhance your capacities and overcome many factors which previously provoked stress.

b) The conventional limits the human mind sets:These are plasmatic (in the sense that they are not set by nature but by the mind), poles apart from reality, confining and suffocative. The degree of susceptibility is estimated by the smallest stimulus able to trigger a response. Thus, the narrower the boundaries your mind sets, the more susceptible you become.

For example, if your mind defines as a “regular” temperature range for you 17 to 25 degrees celsius, then you will be very sensitive to both cold and heat and suffer most of the year, since such temperatures are observed only during a few spring or autumn days. The limit in this case is the “desired” temperature zone which was set by a cognitive factor and not by your innate predisposition. Actually, it is the temperature you wish for in order to feel comfortable. The temperature regulatations your mental greenhouse prescribed so as to “have a good time”. You will pay a heavy toll on the pursuit of the ideal temperatures and the construction of your private shelter. When your temperature limits are exceeded, your mind will instruct your body to get sick. In the opposite case, if you accept temperatures ranging between 5 and 35 degrees as normal for you, then fluctuations will rarely act upon you as stressogenic factors.

Biofeedback helps you to get to know truly and essentially yourself. When you recognize and respect your real natural limits you feel happier, full of euphoria, energetic and gain substantial freedom. A sense significantly superior to that you usually try to achieve with your mental structures.

Chapter 3

What is biofeedback

- The definition of biofeedback
- Historical review and definitions
- Is biofeedback a common phenomenon?
- Take the information and understand it
- Is the information from objective or subjective sources?
- The feedback mechanism
- The biofeedback devices
- Before anything else understand yourself
- Exploit the information
- Is biofeedback meant for me?
- What should I learn?
- How long will it take?

The definition of biofeedback

This book set an enormous challenge for me. I had to present in the most simple and comprehensible manner for everybody, all that I had learned and researched. I balanced on the edge, trying to translate the medical terminology into colloquial language and illustrate issues vividly, nonetheless preserving their scientific nature. Each time I encountered such difficult terrain I resorted to narration. I let nature itself narrate and explain the notions employing real incidents of our everyday activities. Besides, I, like the rest of you, use biofeedback daily; although some of you have not yet realized it. Let's peek into some moments from the life of a young woman in her forties and let this picture of reality teach and explain.

Today, Christine, the star of our story, woke up in a great mood. It is the first morning after many hard working months that she has decided to have some fun. She woke up around ten, although she had gone to bed early the night before. She had just finished and handed in a difficult job assignment to the construction company she works for. Now she had twenty vacation days and she wanted to give an exceptional gift to herself. She hadn't decided what it would be. She had a shower and felt invigorated from the cool water. Then she pulled back her hair. Wearing her bathrobe she passed in front of the big bathroom mirror and took a glance. Suddenly she froze. With her eyes wide open she started moving slowly to the mirror, as if trying to probe into this picture that filled her with questions and anxiety. Her face close against the mirror, she touched her forehead, driving her fingertips along frown wrinkles.

"My gosh!" she whispered, "how did I get like this?". She turned her right cheek slowly toward the mirror, turning her eyes along, unwilling to miss anything from this picture that filled her with such disappointment.

"My gosh!" she went on "My face is full of red blotches, spots and wide pores. I didn't know my skin looked so old!". She then turned to the other cheek, raised her head and touched the mirror with her chin, always looking out of the

corner of her eye, she focused again with unquenchable thirst on her reflection, not in the least a pleasant sight for her eyes.

She saw traced on her face, the signs of wear and tear which reminded her of her age: Fortyish. “How the hell did I ever let myself look like this?” she murmured. Then she detached her face from the mirror, she let her hands drop heavy and whispered with pity to her reflection: “Of course, what did you expect? How could you not end up looking like this, after abandoning yourself for so long, caring only for your job? Professional success has a price, lady”.

She took a deep breath. She had just decided what present she would give to herself. She pushed back her shoulders, raised her head, looked at her image and said in a decisive tone: “Girl, I’ll make you a doll again, as you were before and as you deserve to be now”.

She spent the next hour on the phone looking for the best beauty salon getting information from her friends and acquaintances. After only three days, she had started the first laser treatments. Meanwhile, she avoided looking into the mirror, afraid that there would be some redness, swelling and exfoliation.

She waited for three more days and then she stood in front of the mirror again; her palms covering her eyes. She stood with pride and started drawing slowly and steadily her hands before her eyes. She opened her eyes widely and gazed at the mirror with self-confidence. A broad smile covered her face, and after a look of surprise, a look of satisfaction followed. Standing loftily before the mirror and gazing at her image she addressed herself triumphantly: “I told you, darling, that I would turn you into a doll”. Then she frowned a little, a subtle expression of worry, she leaned closer to the mirror. She touched her skin again, her fingertips passing over the almost wiped out wrinkles, feeling the skin that was now firmer and rejuvenated. “Some job must be done here and I still need some help on this area. But I’ll make you a doll, baby”, she added and left the mirror.

The next days were dedicated again to working with herself. She worked in cooperation with the consultants she

had selected to help bring her face the desired changes, to make her prettier, more desirable, more like a woman. Besides, the mood she was experiencing was not irrelevant to the desire that she had been feeling the last months, she wanted to fall in love and enjoy the emotions she had pushed aside during the past years in favor of her career.

Her last inquisitive visit to the mirror filled her with satisfaction. She had fabulous results and felt she had completed this gift to herself.

The next morning we find her sitting among her friends in a fashionable coffee shop. They were all expressing admiration and genuine surprise for the aesthetic result. Now, they could understand her disappearance the past fortnight. Among her friends was a physician engaged in writing his latest book. When they asked her why she did it, she started telling her story; a gushing narration “You can’t possibly imagine the shock I had when I suddenly saw my face looking abandoned and a mess. I was so shocked that I thought: How on earth did I end up like this? Is there a way I can fix my face? I was almost disheartened but I decided to fight it. And here I am”.

Her friend, the doctor, seemed absorbed in the way she described the whole procedure with herself and the mirror. He started asking her questions as if he were a psychoanalyst. “And what did you see that moment… And what did you feel next… what made you decide… And what was the mirror’s role in that… And how much did the reflection from the mirror help you reach the final outcome… And how did this information affect your communication with your specialists…”. She broke into crystal clear laughter.

“Am I an interesting subject for psychoanalysis, Spiro?” she asked him.

“We are all great subjects for psychoanalysis” he responded in a calm and assured smile. “But now the treat is for me, because you just gave me the solution on how to make clear to my readers the process of biofeedback. And as you understand, I feel just as happy as you felt with your success”.

She took the bait and asked frowning with her eyes “What is biofeedback?”

“I will tell you in the same simple terms as I will explain it in my book”, answered the doctor and he continued: “you observed yourself in the mirror, right?”

“Yes” she nodded.

“As you were searching for flaws on your face, you were constantly watching the mirror, is that correct?”

“Precisely” she answered.

“So you used the mirror as a tool in order to get information relative to the functional condition of one of your organs, namely your skin”.

“Yes, that is the case” she said.

“Then, you used the information that you took from the mirror, in order to form the picture that shocked you”.

“Yes”, she replied.

“Didn’t that shock you? Didn’t it stress you?” he asked her.

“Yes, of course” she agreed. “My knees felt weak. I almost fainted”.

“You mean you become stressed too?” he asked in an inquisitive tone.

“Yes”, she said and went on “It’s not a small thing to see your face look like, you know, what a mess!”.

“And what did you do next?” asked Spiro.

“I decided I had to fight it, because I owed this much to myself” answered Christine.

“You mean, you chose to fight instead of flight”.

“Well, what else could I do?” she asked with interest.

“Another woman in your place could have chosen flight instead. Meaning, she could have given up even more on herself and fallen into a state of depression”.

“Oh no, not me darling, it’s not my style. I usually fight.

But what is the conclusion you draw from all this?"

"That I should present a biofeedback example in my book, exactly the way you narrated it to me".

"But what do I have to do with biofeedback, dear?" asked Christine smiling with curiosity.

"You, like the rest of us do everyday, experienced through a biofeedback process in the most simple, natural, and ordinary manner. You simply didn't know it was biofeedback, you did not identify with it".

"Come on, tell me more. It's getting very interesting. Explain more to me".

"It is quite simple", Spiro went on. "While you were observing yourself in the mirror, you were performing a biologic function. Simultaneously, you were using the mirror as an instrument to collect information about yourself and your biologic function. This means that you were taking feedback, and you were feeding information back to yourself. You sent your image to the mirror and it fed back information about the condition of your image. Therefore, the mirror was playing the role of a biofeedback device.

You, on the other hand, used the feedback information from the mirror to complete your picture, in order to make up your mind and change it.

Thus, the mirror, with the feedback it offered you; information feedback, assisted you in seeing how much you had neglected yourself and deciding that you had to do something to correct it.

If you didn't have a mirror, could this informational feedback process, with regards to your skin state, have taken place?"

"Definitely not" she replied with certainty.

"That's how a simple tool, like a mirror, becomes capable, after getting the picture of your biologic function, in transmitting back to you, to give you feedback with data relative to your condition. In succession, after this elaboration, you decided to proceed to corrective energies, to remedy your

skin damage. Then once again, you used the mirror to see the results, you drew feedback again on the outcome of the esthetic intervention, and decided on further restoring action. This entire process, where you do BIO, and your mirror playing the role of the biofeedback instrument, sends the information back to you, FEEDS BACK information relating to your BIO, which you exploit and utilize in order to attain changes that support your homeostasis. This is scientifically called BIOFEEDBACK. Don't you feel better now?

"Oh, sure, I feel great".

"Therefore, you indeed, utilized the information, the feedback, provided by the mirror to regain your homeostasis. This whole process is called biofeedback. It is a simple everyday process, one of which we all perform in many phases of our daily life. Anyway, all this time I was "having" biofeedback with you", ended Spiro.

"Hey, I hope you didn't get me pregnant." Christine teased him and burst into laughter.

"That's not impossible", answered Spiro, "now you might impregnate this idea to gain more consciousness of your functions and the biofeedback method, which could make you feel even better, because it would intervene aesthetically not only in the somatic level, as in your case, but also in the psychomental level where perhaps we need it the most".

The rest of the group were following the discussion with a great, silent interest. Then someone said: "We want you to tell us more about it. It sounds pretty interesting".

"Well, you'll read about it in my new book on biofeedback" replied the doctor.

Then the discussion changed to another subject and when they parted, the doctor left full of enthusiasm. He had found the solution he had been seeking. He had found the way to present the concept of biofeedback in his book in the most simple, ordinary and familiar manner for all.

Historical review and definitions

The science of biofeedback was born seventy years ago. Its roots stretch into the principles of learning and into the fields of experimental psychology and neurology.

Long ago, before it was established as an organized science, various scientists had begun to study the solitarily interaction between bodily and psychological functions. In the 1780's, Luigi Galvani had already figured out the important role electric energy played within muscle movement. He proved, with his experiments, that every muscular contraction is accompanied by an electric change of muscular activity, which can then be traced by a device, studied and recorded.

In 1890, the Italian criminologist Cesare Lombroso started measuring the blood pressure of suspects interrogated by the police. He was the first one to suggest that blood pressure monitoring could prove useful in interpreting the psychological processes taking place in a person.

In 1930, Edmund Jacobson used an electromyograph to investigate the objective effect of progressive release of chronic accumulated muscular tension upon the level of muscle activity.

Systematic research in the field of biofeedback commenced in the research laboratories in the mid 1930's. Around 1940, E.Green, H.D. Kimmel, Neal Miller and David Shapiro were among the first psychologists who treated the issue systematically. Biofeedback was initially used to explore animal and human capacity to control the progress of certain functions of the organism, functions which up to that time were considered not to be placed under voluntary control. The prevailing opinion at that time was that,

for instance, gastro-intestinal, cardiac and thermoregulatory functions were totally involuntary. Those early pioneers, hypothesized that if man could gain voluntary control over these functions, as well as others, it would open tremendous horizons for the treatment of several diseases. Those pioneers suggested that a person could learn to exert direct control over vasoconstriction (vessel constriction) and prove helpful in the treatment of vasomotor-type migraines. The continuous increase of biofeedback's applications in the control of many physiological functions, eventually led to the successful curative interventions in numerous disorders.

The term biofeedback is relatively new in medical science and means a way of providing the organism with information relating to a biologic signal that the organism has generated. The term feedback in mechanistic systems indicates a mechanism which receives information on the operation of a mechanistic system, then feeds back this system with information and, usually, also gives an order. For example, a system of this type is the organ measuring the temperature of the car radiator. It constantly receives information about this modality and as soon as the measurement exceeds a certain limit, it orders the thermostat to open and circulate the refrigerant in the system. This means that it receives feedback from the environment of the car and gives instructions according to its pre-set regulations.

Similarly, the term feedback is used when we discuss human organic systems or modern robotic systems which "duplicate" human functions. However, in this case information feedback does not imply a typical direct order, but the alteration of a function through voluntary behavioral change.

The term "feedback" was invented by a mathematician Norbert Weiner, who defined it as "a control method of a system achieved by re-entering to the system the results or outcome of its previous performance" (Birk, 1973). The physiological information fed back can either be realized or not. In either case, it is information fed back to the system.

Neal Miller, one of the scientists we mentioned previously, instrumental in the development of biofeedback, gives a descriptive definition:

"Biofeedback is the use of modern devices to provide a person with better moment to moment flow of information regarding certain physiological functions which, notwithstanding being under the control of the nervous system, was not until recently easily or at all perceived. In servo-systems terminology this information is called feedback. However, when this information refers to biological functions it is called biofeedback".

There are many definitions and descriptions of biofeedback. Those that define biofeedback with respect to the process adopted and those that define it based on the pursued goal.

In connection to its modus operandi biofeedback could be described as follows:

1. Swartz & Beatty, in 1977, defined: "Biofeedback is a term recently invented which refers to a group of experimental processes, where external stimulus is used to supply the organism with indications, or a picture of the condition of a bodily function. This entire process usually takes place during the effort to obtain changes in the measured parameter of the monitored function".

2. Gaarder & Montgomery, in 1977, specified: "The term biofeedback is mainly used to describe a process. A more accurate term would be external psychophysiological feedback".

3. Kamiya, in 1971, said this about biofeedback application: "Initially, the physiological function we wish to control must be monitored with great precision, so that the occurring changes can be followed moment to moment. The alterations of the psychophysiological modalities must reflect directly upon the trainee who endeavours to bring this function under his control. The person must learn how to affect the physiological changes he monitors".

With regard to the pursued objectives, biofeedback could be defined in the following terms:

1. Ray, Raczynski, Rogers & Kimball, in 1979, defined:

"The basic and primary goal of biofeedback is to promote and support the self-control of the individual over its physiological functions".

2. Brown, in 1977, defined: "Biofeedback is the process or technique via which one learns to voluntarily and automatically control the reflexes of the somatic functions he wishes to regulate".

3. Green, in 1977, defined:

"Biofeedback training is a tool assisting a person to learn to exert psychosomatic self-regulation".

Let's see some more general definitions:

1. Birk, in 1973, defined: "As biofeedback can be defined as a method employing devices, usually electronic, which detect and enhance bodily functions, in such a manner that deeper information regarding these functions, usually unavailable consciously, become accessible to the trainee and are fed back to him in the form of a reading".

2. Hassett, in 1978, defined:

"Biofeedback is the process during which the trainee becomes aware of the subtle changes in one's physiological functions, aiming at realizing the underlying mechanism and bringing them under voluntary control".

3. Basmajian, in 1979, stated: “Biofeedback can be defined as the technique usually employing electronic equipment to reveal to a person some of the physiological or pathological incidents taking place inside him. The revelation takes the form of audio or visual signals emitted by the devices, enabling a person to handle these incidents, which without the mechanical aid would remain imperceptible. Learning how to handle them is achieved by elaboration of the signals produced by the devices”.

4. Schwartz & Fehni, in 1982, defined: “Biofeedback uses sensitive electric or electro-mechanic devices in order to measure, process and feedback the ongoing activity of various bodily functions which a person usually ignores. Through this procedure the patient or trainee has an opportunity to alter his somatic functions or gain beneficial control”.

Conclusively, my definition for biofeedback includes:

Biofeedback is a scientific technical procedure aiming to train you to desensitize from stress and anxiety inducing factors and to gain control over certain functions of your body, so that you can develop your inherent potential or become released from health problems; and all this in a manner absolutely controlled by yourself and your goals.

Or more descriptively:

Once you become cognizant, with the aid of a device, of an internal function of your body of which you had been unaware of up to that moment, you get the chance to learn how to control and modify this function to a great extent with the purpose of reaching optimal competence and performance both at internal homeostasis and external activity. This entire process is called biofeedback.

Is biofeedback a common phenomenon?

If you look at your daily life, you will find that biofeedback is a phenomenon taking place much more often that you could have imagined. You will discover that it is directly interwoven with the evolution of mankind.

It is a phenomenon, a mechanism through which most of the functions of the organism are performed. The largest part of your endocrine functions is executed and controlled by the organism via feedback; information relative to the level and action of hormones traveling from the periphery to the endocrine glands.

A fundamental tool of biofeedback is the cognitive process which is accomplished through accurate feedback on the outcome of your BIO-efforts through all your senses.

As an evolving human being through biofeedback, you take from the incidents composing your everyday life, the material upon which you will rely on with the implementation of your future actions.

According to cognitive theory, biofeedback constitutes a type of operant of a conditioned cogntive process, through neuromuscular and autonomic activity. As a cogntive process, it is applied and affects your entire learning activity, meaning lifelong. According to cybernetics, biofeedback signals are sources of information participating in the completion of an external feedback loop towards the center which carries information of vital significance.

The regulation or control of physiological functions is attainable because when you are alert, you intake information relative to your physiological condition in a resting state or anxiety, every moment of your life. From the aspect of stress management, biofeedback is one of the numerous non-guided techniques that contribute to the achievent of your goal to improve your abilities and surmount stress. Consequently, it is a process reiterated as often as stress. However, we must

point out that it is a natural process which occurs automatically, beyond conscious control. In this case, you miss the opportunity to consciously elaborate the signals and benefit from the process.

Through biofeedback applications this automatic process becomes conscious and controlled. You get to be in charge and direct it, pursuing either cure or self-regulation.

Take the information and understand it

Let's see how all this is interpreted in terms of action: When you perform a biologic action, you participate in the first part of the function called biofeedback. You "make bio". Now, when you receive the information related to the biological function you performed, you participate in the second part of biofeedback; that is the "feedback".

Let's change our original story a little and imagine a man standing in front of a mirror and watching himself. He moves, watches himself, stretches his skin, makes faces, searches for blemishes or marks on his face and generally acts biologically. He makes BIO. At the same time, with the help of the mirror, he has a direct perception of his biologic actions due to feedback from the reflection of his biologic action of the mirror. Therefore, this person does BIO, meaning a biologic function and gets FEEDBACK, meaning information and messages in connection to this biologic action through his mirror. He gets information about the number of his wrinkles or blemishes, his skin texture, his eyelashes and eyebrow condition, etc.

This complex process when you get information relative to your biologic action via an object, device, or instrument like the mirror, or even through the behavior of persons in your environment, it is clearly a biofeedback function.

As you understand, biofeedback is a function taking place in many instances in our life.

When a mother tells her crying child who asks persistently for a toy: "How ugly you look when you sulk and cry!", she applies biofeedback to her child. The kid does BIO, namely cries and his mother provides the child with information upon his condition by saying: "You look ugly when you sulk and cry!". She gives FEEDBACK supplying the child with information relating to his biologic action.

When a business manager rushes into the meeting room unshaven, in a slovenly appearance, everyone looks at him and some reactions are smiles, frowns and finally expressions of rejection from his associates. This information or feedback from his environment with respect to his BIO-logical appearance comprise in this case a biofeedback process.

Similarly, you, with your presence, your movement, your appearance, make BIO and receive back, experiencing the persons in your environment, FEEDBACK.

Is the information from objective or subjective sources?

At this point, it must be emphasized that all scientists defining biofeedback relate it with the supply of information to a trainee in respect to his functions, with the use of ancillary signals from instruments measuring these functions.

In this way our attention focuses upon a section of the forest, that biofeedback represents and not on the entire forest.

I wish to point out once again that the feedback phenomenon is very common in your daily life, both in your inner and external functions.

Every time you receive information about your appearance, your actions, and your overall performance in life, when you are directly or indirectly praised or criticized, you participate in a biofeedback process.

Contemplate on how often this happens in your everyday routine. Think of how many occasions instigate modification of your beliefs and your overall presence in your external environment, subsequent to circumspection and resolution. Apart from the devices, an assortment of diverse external sources mostly from other persons, can play a role in your information provider with data concerning your BIO in a broader sense. However, the biofeedback phenomenon doesn't exhaust its boundaries here.

Each time you introspect and make a self-review, each time you recall information from your memory-space, for the purpose to revise or re-determine your actions in the external world or your overall presence in life, you again participate in the biofeedback process. In this event, the whole process is implemented by you and for your sake. You made BIO and now you use the material and the "measurements" recorded in your memory in order to modify your actions and change your external demonstrations. The entire process represents a typical and integrated biofeedback operation. Think: can you live, evolve or be happy with or without it?

The primary great and decisive difference between biofeedback based on measurements issuing from devices and biofeedback based on "measurements" issuing from other people or ourselves, is the objectivity of the measuring instrument.

The devices are characterized by an absolute objectivity, whereas the rest of the informational sources can often be characterized from complete subjectivity. On account of this,

the latter is excluded from scientific sources and the measuring of organs, however their use as subjective sources remains in your discretion, in conjunction with the emotional and moral charge these may carry. In such cases, the balance depends entirely upon you.

The feedback of a biological function can come from many sources.

The examples mentioned above point out that as feedback sources can be used in some cases as a mirror, a lifeless and inate object or from other instances as man himself.

In the case that you receive feedback from a fellow person, it is necessary before drawing any final conclusions on your condition or the course of your action and prior to modifying any activity or function based upon this feedback, to take into account many factors, mostly involving cultural, economic, social, religious and other influences. These factors comprise a subjective background.

Thus, it becomes evident that the feedback you get from the people in your environment is characterized by a subjectivity which can have huge dimensions. In other words, it is a type of feedback that cannot guide, in a completely correct way, your evolution.

For instance, when an unshaven man, in shabby athletic gear goes into a formal reception, where formal night dress code is demanded, the feedback he will definitely get from the guests' expressions will be negative. In the opposite case, if the same man appears in the same outfit in a casual party, where such appearance is considered fashionable, the feedback he will receive will be altogether different, because the socio-economic-cultural rules governing the two environments are entirely different.

This explains why feedback derived from other people involves a great percentage of subjectivity.

Conversely, the feedback you get from devices is downright objective and naturally the kind that scientists-trainers need in order to train people in biofeedback.


THE PHENOMENON OF SCIENTIFIC BIOFEEDBACK
OBJECTIVE PROCESS
HEADACHE
BIO
FEEDBACK
ELECTROMYOGRAPH
A. You perform BIO and receive FEEDBACK
You trace the muscular tensions causing headache
You
Yourself
B. You use the indications of the device and decide to get released from muscular tensions
HEADACHE
BIO
FEEDBACK
C. You accomplish release from muscular tensions and desensitize from stressors
D. You function in self-confidence released from your somatic disadvantage

The feedback mechanism

Nowadays, the cognitive-behavioral psychotherapy is regarded as a choice treatment applied in the majority of psychic problems. This therapy approaches and studies the patient's cognitive edifice, examines its connections with man's behavioral manifestations and intervenes by means of re-training techniques, with the purpose to redress the compatibility between those two. This treatment has an augmented role and supremacy over other therapeutic procedures chiefly accountable to the employment at its various forms and phases of the feedback mechanism. The latter forms the realistic bond between the cognitive edifice and behavioral structures. Is this notion a bit of a puzzle? Don't worry, I will explain it in simpler terms.

Let's get into an hypothetical scene: Dracula shows up over an infant's cradle. Leaning over the baby, he makes a threatening grimace showing his teeth. The baby, with curiosity and wonder gazes at him, then smiles puzzledly and opens its little hands to play with him.

Now let's imagine another hypothetical scene: A huge python appears over the baby's cradle. The snake slowly raises its head and sways before the baby's face. The baby claps his hands with joy and then stretches them to embrace this big toy.

Let's see a third imaginary scene: Dracula emerges above the bed of a sleeping woman. He pulls the bedcovers down ritually, she awakens, turns her head and she catches his sinister grimace the minute he stretches his hands to embrace her, flashing his teeth. The woman is frozen from fear, blanches, her face has an expression of the utmost desolation, agony and horror, her limbs become paralyzed, and though she tries to scream there is no voice coming out. Finally, she is paralyzed and faints.

Let's imagine yet a fourth hypothetical scene: A woman is lying on the bed, she is reading a magazine, half-turned

towards the bed lamp. Suddenly, under her bed creeps a big python, moving slowly along the bedside and pops up its head in front of her face. The woman for a fraction of a second freezes, her eyes wide open, pupils dilated, her face flushes, she opens her mouth slowly and lets out a scream of terror and agony as she jumps out of bed and runs out of the room.

In the first and second picture of the infant, the baby has an entirely different reaction from the adult in the third and fourth scenario. The difference lies in the fact that the cognitive structures of a baby have not yet added Dracula or a python snake as scary and dangerous beings. In other words, the baby has not yet learned, because it has not been taught and also because it has no previous relevant experience that these two beings could represent a danger or threat for its hypostasis. Its cognitive edifice is still vacant from such characterizations and notions in connection to these two beings. The baby doesn't know and has not yet learned that these beings possess the previously mentioned qualities. It is still in the phase where the whole world is full of roses and in the encompassment of it, things are either big or small toys. It is still innocent. It ignores the danger, thus, and does not get scared. However, in the third and fourth picture, the reaction and the behavior of the adult woman, corresponds and is analogous to the picture that she holds in her cognitive edifice regarding these beings, which denotes danger and a threat to her hypostasis.

Therefore it becomes clear that:

Your behavior towards various situations correlates to and depends upon your cognitive edifice, overall knowledge, your learned or taught structures by means of cognitive educational processes in relation to these situations.

This explains why adults of diverse cultural origins and educational backgrounds adopt different reactions toward the same things. The image you have for each being, notion or object correlates to your educational background, thus relate to the cognitive processes you have participated in.

Equivalent, your beliefs also result from your cognitive material, poorly or thoroughly elaborated by your mental and psychic organism.

Every time you receive objectively, through electronic devices, informational feedback in respect to your conduct, your evolution and the efficiency of your biological functions, new material is added into your cognitive edifice through a new learning path. This newly acquired material becomes the supportive basis for either modifying your incorrect conceptions, or creating new more objective, more realistic ones, more compatible to your homeostasis. In this view, education and culture in the broader sense, not only form the pillars and foundations of society, but further constitute the prime prerequisite for the well-being of its members.

What conclusion can you draw from a society letting its children play with Dracula toys, monsters, bloodshed corpses and similar stuff? How useful can this cognitive material be for the cognitive edifice? How vulnerable is a society when some of its young members regard, as a form of vengeance or punishment against their over-protective parents, a drug shot in their veins? The feedback a young person gets from how he feels when he watches the picture of a man's death struggling on account of a drug overdose could prove valuable material if properly utilized with the aid of a proper trainer leading the trainee to re-determine his beliefs in regard to such uses and abuses. So the cognitive-behavioral approach, especially when assisted by the persuasive mechanism of feedback, is transformed into a tool of psychophysiological reform, with all of the benefits and curative results this entails.

The information fed back often varies according to the problem treated. In psychosomatic problems, it is employed as feedback information relative to neurophysiological parameters which characterizes the examined functions. When there is a symptom, the cognitive and behavioral modificatons required for its treatment will rely on the feedback emanating from its biological substratum. This means, that the informa-

tion in connection to a biological mechanism, can form the basis underpinning the treatment or the cure of the disorder originating in this mechanism.

Whenever psychophysiological disorders, or according to older terminology, psychosomatic disorders are detected, the sympathetic arousal is implicated for their appearance or maintenance, specifically the arousal of the sympathetic branch of the autonomic nervous system.

The sympathetic arousal is not implicated arbitrarily. Its manifestations correspond to the manifestations of stress.

Whenever we are stressed, sympathetic arousal hapens, and vice a versa. When sympathetic arousal is noticed we find the organism is in a state of stress.

Normally, a sympathetic arousal should appear only when pursuant to stress, since the sympathetic arousal is prepared through our response towards stress, which is none other than the fight or flight response. However, since sympathetic arousal can also be triggered from mechanisms founded in our cognitive edifice and manifested through behaviors of the fight or flight type, very often the phenomenon of chronic stress and anxiety appears. This is man's sole privilege and a testament to the fact that the mind or intellect form a double-edged knife.

The arousal of the tonus of the sympathetic section of the autonomic nervous system entails a change from the usual and normal activity of the psychic, neuron and endocrine functions. This, in succession, leads along to pathologic functioning also various other somatic systems, such as the immune, cardiovascular, respiratory, and gastrointestinal, etc. On the the other hand, increase of sympathetic arousal tone brings about a state of intense alertness and stress.

From the moment you have the ability to experience, usually unpleasant imagery, you are capable of stimulating through this imagery sympathetic arousal and bring about sympathicotony, equivalent to great quantitatively and qualitatively stress.

Finally, this has great significance;

The sympathetic nervous system is subject to two kinds of arousal: One is stress arousal induced by a natural, external stressor affecting the organism, and the other is cognitive arousal, which is ignited when you adopt stress-generating beliefs amounting to an artificial or fabricated stress.

Each time you mentally experience an unpleasant, painful, or traumatic image you produce a cognitive arousal inducing sympathetic tone increase which, due to the symptoms appearing in your organism, makes you feel as though you actually experience this intense stress.

The main benefit of biofeedback is that it gives you the chance to personally control your specific neurophysiological behaviors associated with a problem.

We often notice people practicing yoga, meditation or other relaxation techniques, that while they ostensibly display great relaxation, tranquility or calmness, internally then retain high-tension levels. This fact is confirmed from the biofeedback instruments. This contradictory combination is accountable to the subjectivity employed by the person during the exercise in the specific technique. Such subjectivity is humanly impossible to be either controlled or measured by this person since it is part of the subconscious mind of the student. Furthermore, this subjectivity is expressed only in the form of psychosomatic deviations, which are not fed back to the student, thus giving the possibility for assess-

ment and re-evaluation.

Biofeedback is a method that excludes subjectivity, granted that it uses a feedback mechanism based clearly upon objective and impartial sources. The devices monitoring the psychophysiological, or according to the term of the past, are within psychosomatic parameters. This is a huge advantage ranking biofeedback first among the methods addressing cognitive arousal.

Lang, in 1970, asserted that cognitive functions affect physiological functions and bring about changes in their operation, and consequently also in behavior.

The sympathetic arousal, besides changing psychophysiological parameters, drives you further to adapt through the fight or flight response. As your organism is in a constant state of adaptation under the influence of stressors, either real or imaginary, itdevelops a psychosomatic syndrome simultaneously encompassing muscular tension (preparing you to fight or run and flight), vasoconstriction (to minimize blood losses in the case you are wounded in the fight) and acceleration of respiration (providing the oxygen surplus required in the fight). The same psychophysiological condition is generated within your organism even when stressors do not exist, because your organism habitually reproduces this state, as a form of expression which has been incorporated in its cognitive edifice, as cognitive behavior.

Eventually, you accept this particular psychophysiological (psychosomatic) image or state as part of your overall homeostasis and reproduce it “voluntarily and circumstantially”. We too often meet people who, although they suffer the negative impact of such behavior on their organism, nevertheless do not know how to release this accumulated tension to relieve their constantly stimulated muscular or vascular system, and thus avoid the risk of breaking down their psychophysiological mechanism. When people learn a way to release tension, or try to direct their active attention towards this purpose they obtain various results, however the rest of the time they are still under the influence of the habitual spontaneous and uncontrolled response of their

behavioral pattern.

Now, if your self-observation leads you to the conclusion that you are falling under this category, you must learn how to loosen the piled-up tension, and indeed follow a process employing a mechanism which you can personally control. The objective control mechanism that you will use will be that of feedback, offering information that will support realistically the revision of your stress-related convictions.

In order to revise your stressogenic convictions you need to know the harmful impact that they bear upon your organism. The largest part of your corrective intervention is accomplished by becoming aware of the mechanisms that such detrimental interventions involve. If you do not know, you cannot act.

Following this process, you change and abolish bad habits adopted in your “infancy”, when as you were young and innocent, you viewed all your habits like a “rose-garden” and “games”.

The biofeedback devices

In biofeedback, devices are used which can provide a stream of information about your biological functions.

You can use one device at a time or a combination of the devices (in special cases), during your biofeedback training. A special electronic thermometer able to monitor both an increase and decrease of your temperature instantly can give readings in tenths or hundredths of a degree. This is a basic biofeedback instrument.

With this thermometer, you can measure the temperature of certain body parts and observe under which psychomental conditions your temperature raises or falls to what degree, thereby draw valuable conclusions regarding the

operation of your thermoregulatory system.

An electromyograph is a device measuring muscular tension appearing in some part of your muscular system. This is another useful device in biofeedback training. This device allows you to locate in which body part, you develop tension during your activities.

A demographer, showing the changes occuring in galvanic (electric) resistance of your skin (which are directly contingent upon your psychomental state), is another basic biofeedback tool and gives information about your psychoemotional state during your actions.

An electroencephalograph, a device that records the operation of your brain during your activities is yet another instrument used in biofeedback.

A simple medical manometer measuring your blood pressure during your activities can also be a useful biofeedback tool.

A device monitoring your pulse can also prove valuable in biofeedback training, because it can provide you with information on heart beat variability, such as tachycardia, slow heart rate or arrhythmia, which may occur during some activity.

Every device measuring the biological processes and parameters in the human organism can be utilized as a biofeedback instrument and be included in biofeedback protocols. This depends on the problem we tackle.

Before anything else understand yourself

Prior to any exercise, come into contact with your biological functions with the assistance of an objective device that monitors your biological activity. This enables you to better realize your state of existence. Realization is the first and basic step leading to self-knowledge. You must know and clearly understand the mechanisms in yourself responsible

for its responses and actions. You must know your “type” or “model” and how it works.

You cannot intervene correctly upon your functions unless you comprehend their pathways, what they affect and how they do it. You don’t need to become a medical doctor. It is sufficient to understand the physiological mechanisms of your organism in simple terms.

Today, not even car mechanics undertake the service of a car if they have not been specialized on the particular model.

This does not mean that you will have to become a doctor. You do not need anatomic or other medical knowledge to understand the principles governing the mechanisms involved in your biological functions. Not every driver is an expert car mechanic, however, if he knows the operational mechanism of brakes, he can use this knowledge rationally and avoid falling over a precipice by stepping immediately on the brake and blocking the wheels.

Biofeedback with its equipment, is a serious electronic counselor on the side of a man whose homeostasis, somatic or pshychomental relationship has been disordered.

The basic material used in biofeedback training is composed from the information you collect as a trainee in relation to your biological activity at a given moment (with the help of biofeedback devices). In order to operate any device, not only operate it, but really exploit its optimal potential and specifications, you must first get to know it. For example, if someone wants to be able to work with a power tool, he must first learn how parts are made, how it works and how its operations can give the best possible outcome.

The same stands for your organism.

In order to operate yourself with peak performance, you must first get to know yourself.

Learn from what elements you are made of, learn your components, your specifications and potentials. This will help you use them in the ideal manner when needed.

You are comprise of a somatic and psychomental entity. Unfortunately in our age, too many people lack the knowledge concerning the structure, the specifications and the operation of this somatic (body) and psychomental entity. It follows that they challenge themselves either bodily or psychomentally, and eventually end up sick; that is, they damage their somatic or psychomental organ.

You usually realize your limits only during effort, which means that most likely your effort will not yield the expected results since your organism has reached its limits.

And when these limits are over-stepped, almost always disease ensues.

Through biofeedback you come into direct contact with the functions of your somatic and psychomental organ and gain valuable knowledge to their operation. The bodily functions that are monitored and measured refer to neuromuscular and visceral activities, innervated either from the central nervous system or the autonomic or both.

Thus, you can use two elements in the best possible manner; you can protect them and benefit from their optimal performance.

Exploit the information

No doubt, information alone without action will have no value, it would be useless material.

The information you derive from the biofeedback process is, in succession, exploited in order to modify certain functions for the purpose of adapting to the new environment.

In this manner, on the one hand, you are rid of the disease afflicting you on account of this malfunction and on the other hand, you discover, develop and exploit your capacities to the maximum. Nothing can be achieved without this valuable information, as nothing can be achieved without scientific organization and exploitation of this information which is targeted at your improvement in any desired section and most important, in your desensitization from the anxiety-generating and stress-generating factors.

Seven decades of clinical and researched biofeedback experience have convinced us that this method is not just another form of treatment, but should rather be viewed as a training tool which, with proper handling, can bring results dependant significantly upon the experience and judgment of the person handling it.

Certainly it is not an ordinary tool. It initiates a revolution in psychosomatic medicine, as did the stethoscope in cardiology. It is an extremely accurate and fine tool purposed for both general and specific use.

One of its main uses is to assist you in dealing with stress and anxiety without loss, by promoting your homeostasis both on the somatic and psychomental level.

For every bodily action there is a parallel emotional action. And vice versa, for every emotional action there is a somatic equivalent.

The interdependence and interaction between the somatic and psychomental organs is now accepted by all scientists. This interaction precisely employs biofeedback as one of its primary principles.

A fundamental feature of biofeedback lies in providing you with direct, accurate and important physiological information. Accuracy in measurements, thereby in information, is absolutely essential. Signals, enclosing information are fed back to you for the purpose of allowing you to play a more leading role in your training or cure, as compared to other training or

therapeutic approaches. Indeed in the case of a cure, “the patient is no longer the object of treatment, but the treatment itself” (Brown, 1977). The role of the therapist is different because he often becomes a coach or a trainer.

Is biofeedback meant for me?

Biofeedback, as a natural and physiological function, is meant for all of us. Viewed from the angle of the offered benefits, biofeedback concerns those who deem it essential to use their entire potential and to be freed from stress and anxiety.

It is taken for granted that every biofeedback protocol is based upon your potentialities and needs. It essentially represents a tailored suit. How well it fits depends on the tailor; your trainer. But let’s review the issue in a more detailed manner.

The definitions and analysis referred to above make it clear that practical and applied biofeedback is divided into two large sections, depending on whether it serves as a therapeutic or regulatory purpose. The first category refers to therapeutic or clinical biofeedback and the second refers to regulatory and preventive biofeedback.

The first category of biofeedback applications encompasses the therapeutic treatment of illnesses and syndromes. The second category engages in the regulation of the organism, enabling us to normalize some of our physiologal functions leading to disease prevention and to optimal performances, therefore being dually beneficial. Often, biofeedback application is combined and everything depends upon the needs of your organism.

Your trainer or therapist will evaluate your needs and suggest the suitable program.

You, therefore, decide on what category you think you belong.

* Are you a person presenting some torturing psychosomatic symptoms, wishing to get rid of them?

* Are you a stressed and anxious person, realizing that you are on the edge of your resistance and in need of regulations in order to endure?

* Are you a college or university student with high aspirations, who has to read many books in a short amount of time in order to avoid failing the semester?

* Are you an administrative executive close to losing your job from explosions of rage?

* Are you a student? Do your studies seem to be too much for you? Is anxiety pinning you down? Do you think that no matter how hard you try, you will accomplish nothing and thus feel like quitting?

* Are you a promising athlete who aims at peak performances?

* Are you a journalist living in the confusion of everyday life, news and deadlines?

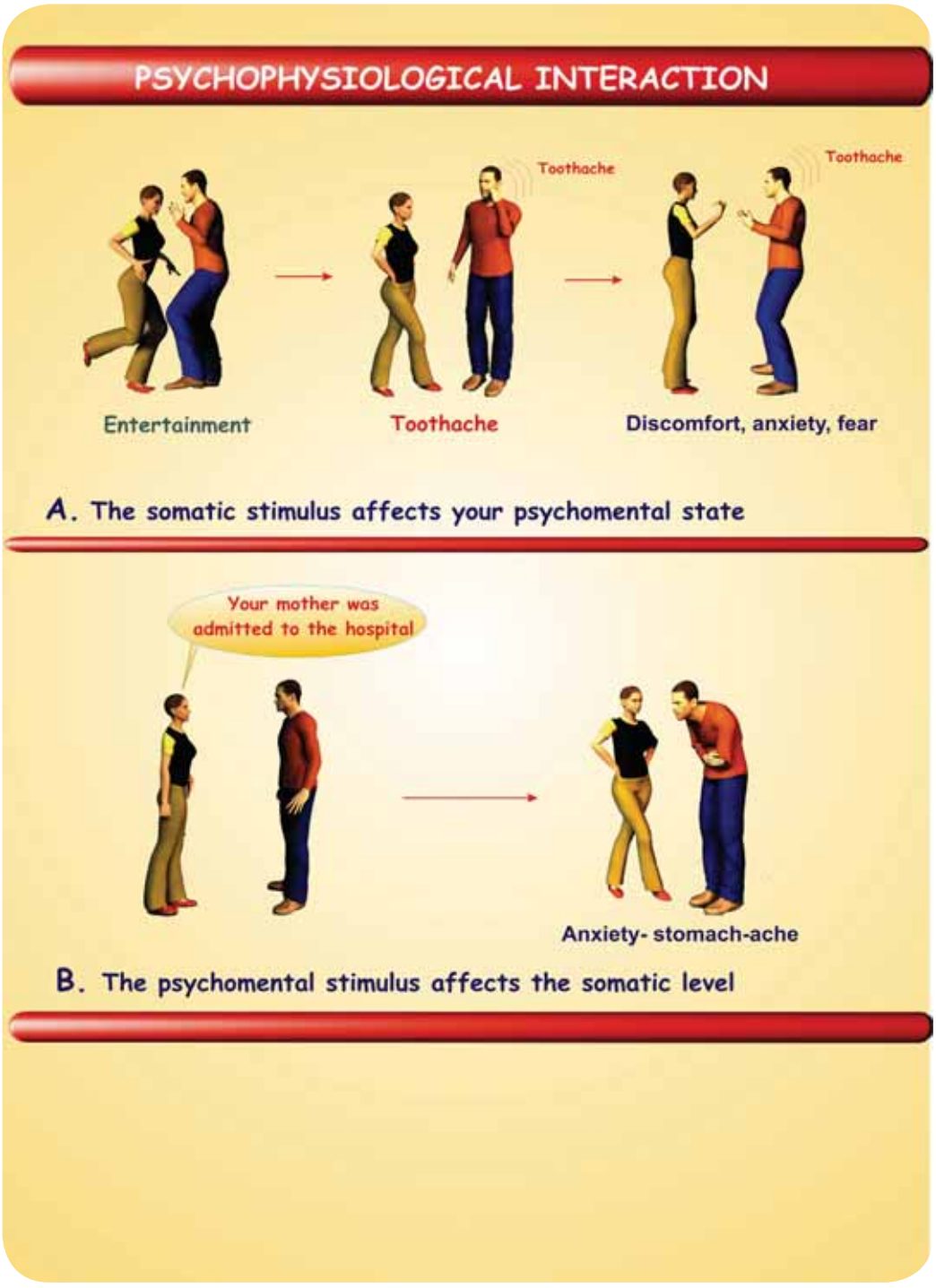
* Are you an actor who wants to get established in the broader public or to an audience that adores you? Since you can be in one circle, why not in others as well?

* Are you an administrative director loaded with responsibility? Do you have to successfully settle many projects, and smooth out complaints and conflicts?

* Are you a driver in a city and must always be “on alert”?

* Are you a woman with two school-age kids, who has a job, wakes up at sunrise and stays up late at night, who cooks, who returns from work and must study with the kids, play “taxi” to and from out-of-school activities, who seems to need a thousand hands?

* Are you a career woman, who works around the clock to make ends meet, who finds out that there is never enough time to arrange work and take good care of yourself?


PSYCHOPHYSIOLOGICAL INTERACTION
Toothache
Toothache
Entertainment
Toothache
Discomfort, anxiety, fear
A. The somatic stimulus affects your psychomental state
Your mother was admitted to the hospital
Anxiety- stomach-ache
B. The psychomental stimulus affects the somatic level

* Are you in a trade or in a business struggling daily with expiring cheques, living the stock market's frenzy and competition, organizing and supervising your personel?

* Are you a manager, insurer, or business executive who must be flexible at every moment so as to use make the most of your potential?

* Are you a salesman filled with anxiety about your presentation and its outcome?

* Are you in the teaching profession and have to deal daily with "sweet monsters", and "win them over", inspire and drive them to learning and moral direction? Does this task seem tough in our age?

* Are you a scientist working under harsh realities with financial restrictions, incommensurate to your work, a burden of which you cannot unload?

* Are you an intern or hospital doctor working exhausting hours, facing desperate relatives or emergencies which call for all your body and soul reserves, and demand instant composed action?

* Are you in a private practice overwhelmed with survival anxiety or the desire to move up in rank in your professional field?

* Are you an employee and everybody is pressing you? Does your boss take it out on you?

* Are you getting along with your job, but feel "stuck in the groove" and this "gets on your nerves"?

* Are you involved in public affairs? Besides feeling stressed from your unavoidable public exposure, do you also worry about how you will survive and prevail over possible rumors or intrigues?

* Are you a judge who must rule fairly due to circumstances? Does this fact raise a lot of stress?

* Are you an attorney, fighting with daily adversities?

* Are you a person without occupational, family or financial problems? Everything is fine for you, however you worry about your health and wish to strengthen it?

If you identify with any of the above, then biofeedback is suitable for you.

What should I learn?

If one wants to learn how to operate a tool, he must be taught the way it works form another person. If he tries to learn how this device operates by experimentation alone, apart from running a great risk for accident, he will make some serious mistakes and pay a high “learning” toll.

As in every other method, biofeedback demands a special trainer who will teach you in a secure, reliable and fast manner the methodology and practice of this scientific system.

A biofeedback trainer must have some knowledge of human physiology and psychology, thus a scientific grounding in medicine and psychology.

The basic concept of biofeedback training is that one uses sensitive laboratory devices in order to observe directly what is going onto a person on a biological function level. It is very difficult to manage without the aid of monitoring and display devices.

For example, is your heart rate ascending or descending right now? It is difficult to know, unless you use biofeedback instruments. The same stands true in considering blood pressure, muscle tension and many other functions.

Let’s suppose that you want to examine muscular tension:

What you must do, is place electrodes on the muscles you are interested in so as to receive the tiny electrical signals

produced by the muscles. In succession, the biofeedback device called electromygraph measures the muscular energy in a very simple manner. For example, the movement of an indicator or a sound informs you the exact level of your muscular tension: when a muscle contracts, there is a high pitched tone and the indicator moves up on the scale. The visual or audio signals convey exactly if you are on the right track, that is, whether you are controlling the tension.

To know whether you are headed in the correct direction has important significance in any type of training since your subjective sense or estimation is often mistaken. The feedback signal monitors and shows each moment that your muscle is tensed or relaxed. Thus, you accomplish your goal much faster.

Essentially, your biofeedback training consists of an investigative, analytical process and a compositional process, through which you learn to exert control over some of your physiological functions.

The objective of biofeedback training is to develop and increase your awareness with regard to your internal physiological functions, as well as to enable you to gain control over these functions, to expand this control from the training workshop to your everyday life, and focus your attention in your mental and somatic integration and evolution.

For example, biofeedback is applied in numerous diverse categories. At a university, the biofeedback devices and its applications may be utilized within the departments of experimental or clinical psychology, counseling, physiology, biology or health services. Biofeedback is also applied in various hospital sectors, such as that of natural medicine, private clinics, groups for education and self-awareness, psychotherapeutic exercises and elsewhere. It is increasingly expanding with growing enthusiasm, especially after it has been proven that through the study of biofeedback, the distinction between mind, consciousness and body had been on purely theoretical grounds and can now be revised.

This mind-body dissociation has its deep roots in western philosophy from the time of Descartes. Descartes' "dualism", the separation of the psychomental organ from the somatic organ has dynamically affected the health-approach of modern medicine and psychology. Society gradually assigned the physician with competence in respect to the human body from the neck below: the psychiatrist and psychologist concerning the neck and above and the researcher-esoterist with whatever lay beyond bodily confines. The correlation between mental, emotional and neurological processes becomes more and more integrated.

Biofeedback is at the disposal for every person with the purpose of re-training in a combined function of body, mind and psyche (soul). Much more important, the role of biofeedback assists you in realizing that you must take into your own hands the processes relative to the maintenance and control of your personal health and quality of life.

The philosophy underlying biofeedback training is based upon the psychophysiological principle formulated by E. Green and his collaborators in the first to biofeedback research at Menninger Foundation in Kansas. According to this principle, every change in a measured parameter of a physiological function is accompanied by a change in mental and emotional condition, either conscious or subconscious, and vice versa. The comprehension of this principle is the starting point for probing deeper into biofeedback.

The technical equipment used in biofeedback constantly monitors the psychophysiological (psychosomatic) changes occurring inside of you. The biofeedback equipment, used as a unified tool, plays the role of a "psychophysiological mirror" which feeds back to you a stream of information about physiological changes. A neutral physiological message is intensified by the biofeedback devices and fed back to you through one of your senses. In order for you to learn to successfully control a physiological function you must monitor it continuously and the feedback signal must be directly displayed to you. Further more, you must be shown in an appropriate manner how to use the messages-information transmitted by the devices. By exercising and using this

information you gain insight and experience in recognizing your own physiological processes and internal conditions, thus acquiring both self-awareness and self-control.

As a research tool, biofeedback can be used to study issues like the control of the bodily biological response, self-regulation of the Autonomic Nervous System and the interaction of biological functions on the basis of cybernetics. Therefore, either solely or along with other methods, biofeedback provides the ground for more research processes. In addition, it is particularly employed for re-training a destabilized system, for example neuromuscular re-training pursuant to accidents or illness. On other occasions, biofeedback can be used to demonstrate a principle; for instance, certain emotional states correspond to certain somatic responses.

We could unreservedly assert that biofeedback relies upon one's personal experience. It is impossible to teach a child to ride a bicycle merely by describing a personal experience. The child must have his own personal experience and contact with the bike, develop the sense of balance on two wheels, and relying on the biofeedback theory, verify it personaly in action. The entire approach is completely empirical.

If you are still wondering what you should learn in order to apply biofeedback, you probably have not understood that the biofeedback process presents an astonishing resemblance to a modern electronic game. In electronic games you have to face a rival, who usually has many lives, lots of weapons and a great mutant capacity. You must study your opponent, his weapons, his capabilities and weaknesses. Then, you must beat your rival using and exploiting all the information you gathered from observation while moving through the various terrains of the game. The biofeedback process you undergo is nothing but a similar game in which you, playing the part of the "good" and "homeostatic" self, must survive by beating your "villain" and "pathogenic" self, who afflicts and threatens you with diseases and extermination due to to all the bad, useless and detrimentalhealth convictions he has acquired.

In biofeedback training you are connected to electronic instruments: myograph, thermograph, dermograph, encephalograph and others, and observe how your previous "bad" self, functions and acts. Watching does not suffice. You must analyze the information you acquire through observation and comprehend its "habits and manners". You must comprehend the mechanisms through which your are trapped within pathogenic convictions. Besides, what would be the point of feedback if it left un-evaluated and un-exploited the information fed back? So, learn to exploit it. Once you exploit it, you become competent to beat your "bad" self, not by killing it, but by replacing its previous and harmful beliefs with new, more correct and useful beliefs for your survival and homeostasis.

You will, eventually, realize that the biofeedback process does not develop into a game of self-hatred or self-extinction, but into a game of self-understanding and self-cooperation, based on novel models and novel convictions that better support your health and homeostasis.

Through the biofeedback process, which virtually constitutes a cognitive game of learning and re-learning, you are re-trained and develop your capacities efficiently in order to normalize your autonomic response towards stress and anxiety.

When you learn through biofeedback training to experience stress normally, when you learn to relax after the extinction of the stressors and when you learn not to create stressors in your mind, (cognitive stressogenic factors), then you will become the winner of this game we call life. You will not be transformed into a superhuman, but simply into a real person with unique and unprecedented specifications.

How long will it take?

You may have the impression that too much time is required for the acquisition of such skills, however this impression is completely wrong. The biofeedback science, technique and even artform has made great advances. The training workshops are systematized and yield prompt efficient practical results. You will not spend much time on other activities besides your current occupation. This is a rule that all people respect and try to abide by. With a good bike and a good teacher you can learn to ride a bicycle even in one day: provided that you have the desire and the incentive to do it. After that further training gives you more experience and skills.

With the adjunct of reliable and modern biofeedback equipment and the assistance of an experienced trainer you can completely upgrade your potential and unleash your skills within a few days; provided that you so desire.

Seize the opportunity.

Chapter 4

Get a picture of yourself

- *Your outward actions are determined by your inner values*
- *What are my limits?*
- *Who is to blame for my headaches?*
- *The mechanism of convictions*
- *Get an objective picture of yourself*

Your outward actions are determined by your inner values

Did you ever venture into exploring yourself? Have you ever realized what a valuable, complex and multi-talented creature you are? Have you ever wondered what you could accomplish for yourself or for others with your talents or inherent qualifications? Do you know, even marginally, how your organism works? Have you discovered the complicated mechanisms that it possesses? Have you contemplated on the philosophy and usefulness of the entirety of these mechanisms? Have you ever thought with much consistency and respect how you should treat yourself, in reciprocity and with gratitude toward the creation of being called human?

A basic feature shared by successful people in every field of life; science, art, politics, business etc, is that they have studied themselves. They know themselves certainly "know" about their talents and skills. They know who they are. They have defined their convictions and are sure about what they stand for.

Most people pass through life in a nebulous mood, circumstantial and "accidental". They follow a course, not often chosen, but they are rather drawn to the circumstances they encounter. They are neither aware of themselves, nor their qualifications, thus advance in ways which are not ideal for them until failure comes. Then they start searching for the reasons of their failure, and in the worst case, they withdraw exhausted. In the best case, they invest a lot of energy and effort and then discover that the outcome is too meagre, which leaves them feeling unsatisfied.

Leaders and achievers have set their goals, their values and ideals and head toward their accomplishments, based upon, and subsequent to, analysis and a good knowledge of their talents and capabilities.

It is not accidental that in modern societies thousands of consulting centers manned with physicians and psychologists offer a somatic and psychomental profile analysis and give people guidelines based on their talents and skills.

Career orientation for young people should be based chiefly upon the analysis of their qualities and capabilities, however, it relies upon current market needs and trends.

Your values comprise the core of your personality and are determined by the concept you hold for the world and yourself.

Your external actions are defined by your internal values.

The clear your internal values are, the definite, confident, effective, fruitful and successful your external actions will be.

Your success in your external environment ensues from your internal success in knowing yourself, your specifications and potentialities. Your external actions are determined by your internal values. Your thoughts, your mental associations and the image you have of yourself, is important because they determine your pattern of action and the emotions that you invest to your actions.

The contemporary cognitive-behavioral psychology school states that the problems you face originate in erroneous learning consequentially leading to wrong conclusions, on account of either insufficient or incorrect information. A common reason causing problems lies in failing to distinguish between what is real and what is imaginary.

As an overall outcome, your opinions and your convictions, especially those concerning your hypostasis, become rigid, exaggerated, absolute and eventually dysfunctional, even insofar

as to breed illness. When your personal experience follows the same path, you appear psychomentally inflexible and inadaptable. The inability to adapt leads to the maintenance of stress, anxiety or fear, even after the extinction of the stress, anxiety or fear-generating factor. This causes a continuous arousal of the sympathetic nervous system implicating problems regarding your psychomental and bodily health and balance.

Once these mechanisms are activated, a fact attributable to previous erroneous learning, you interpret reality based upon data received through a feedback process in respect to your behavior, which was rigid, dry, miserable, dysfunctional and disharmonic. It seems to follow that this vicious cycle continues, since this feedback, which actually reflects your own negativity and attracts similar behaviour from your environment, fuel the "vindication" feeling you anticipated in order to reinforce and consolidate your prejudices.

The deeper one falls into this pattern, the more his cognitive organ gets inundated with negative thoughts, even when nothing in his environment really justifies them.

This vicious circle must be broken. You must get an accurate and objective picture of yourself and your biological functions. You must be objectively informed about the mechanisms produced by the erroneous learning, which consequents erroneous convictions and evaluations. Thus, you will acquire material subsidiary to the correct learning, which will capacitate you to normalize your reactions and will desensitize you from stress, anxiety and fear-generating factors.

What are my limits?

Why do I easily fall ill while others don't?

How do fire walkers manage to walk on hot coals? Could I do it too?

How did Bill Gates start from a garage and then manage to build an empire and become the richest person in the world?

How can some businessmen speak on three cell phones at the same time and run their enterprises without having a nervous break down?

How do successful obstetricians manage to avoid a nervous collapse when they interrupt even… their own wedding to deliver an emergency labor?

How do certain journalists manage to sustain the incessant pressure of publicity with so much stress and anxiety?

How can successful lawyers memorize the details of thousands of cases and keep unremittingly fighting for their cases, without losing their minds?

Why are some children more apt at learning than others?

What kind of memory does a successful and well-paid private secretary have in order to remember the details of the cases she handles and attend to all contacts?

Why is my friend so skillful and mends all minor home repairs, while I call for every little thing and the repair-men take a fortune?

Why does my friend, who is the same age as I am, look like my son, while I look like a mess?

Why does he always attract beautiful women, whereas I am a miserable loser?

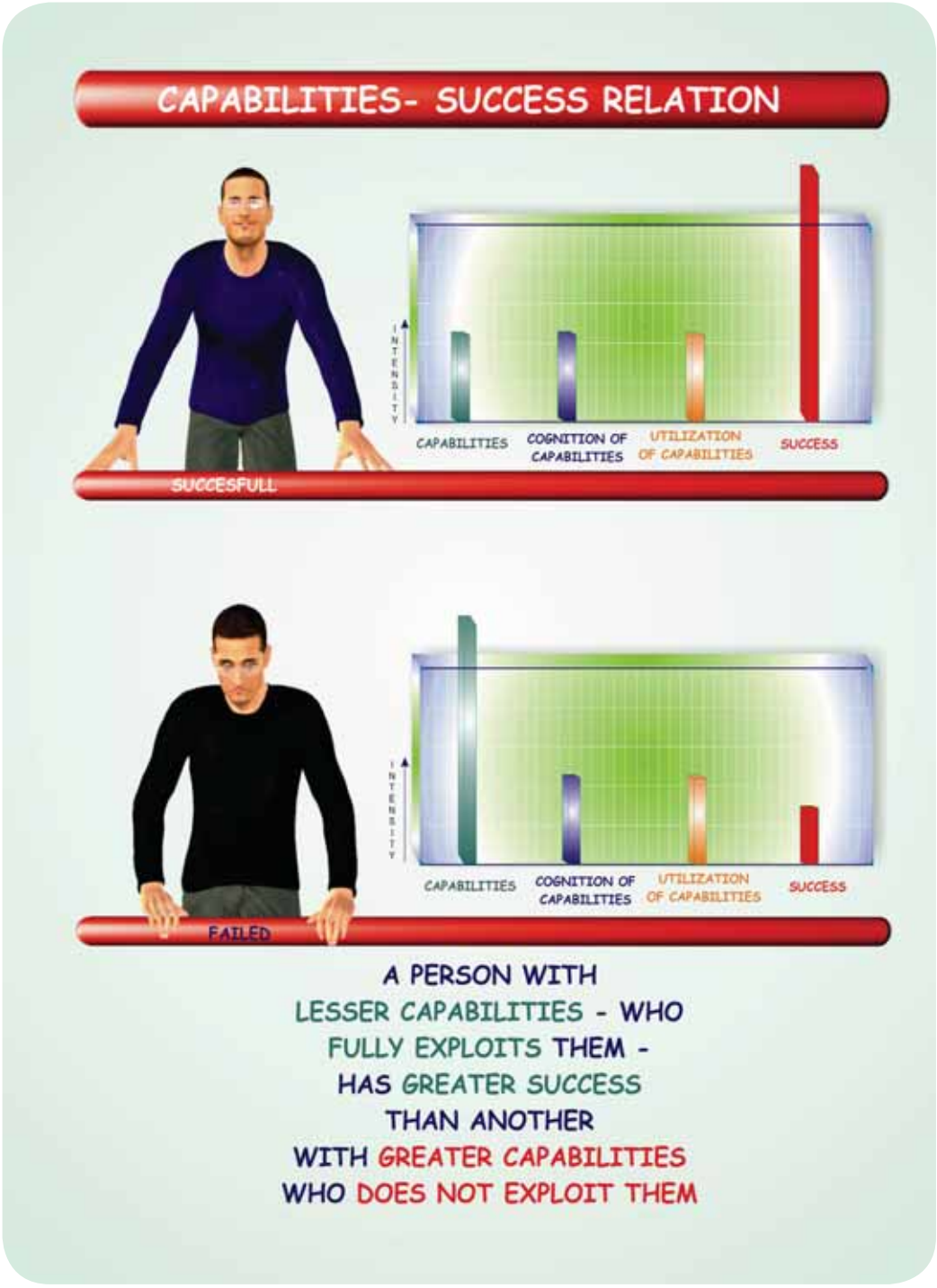
Is there a price on their health that all these people pay? Could I also do something like them?

Why do I feel jealous of other people being successful and having a yacht, when I only have a motorbike?

Why do I want to believe that circumstances were in their favor and not in mine?

If there are certain favorable circumstances, why are they only in their favor and in not mine? What did they do to deserve favorable circumstance?

Why do I always see the glass half empty, whereas the successful see it half full? Does this make a difference or is this a joke?


CAPABILITIES- SUCCESS RELATION
INTENSITY
CAPABILITIES
COGNITION OF CAPABILITIES
UTILIZATION OF CAPABILITIES
SUCCESS
SUCCESFULL
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COGNITION OF CAPABILITIES
UTILIZATION OF CAPABILITIES
SUCCESS
FAILED
A PERSON WITH
LESSER CAPABILITIES - WHO
FULLY EXPLOITS THEM -
HAS GREATER SUCCESS
THAN ANOTHER
WITH GREATER CAPABILITIES
WHO DOES NOT EXPLOIT THEM

If this is not a joke, how do I find the way to change it?

Thousands of questions linger: Today, the answers to all of them can be found. However, before answering, I have to ask some questions as well:

Did you ever ask your mom why she wrapped you up in so many clothes to avoid catching a cold? Surely, somebody must have taught her to do so?

Did you ever read anything else except the sports newspaper, to learn that your mind and your beliefs regarding your sensitivities, affects your immune-system and your susceptibility to disease?

Did you ever ask a teacher about your thoughts on things or did you avoid it, afraid that you would be laughed at by the other students?

Did you ever wonder why you get drunk drinking alcohol but not by eating French fries?

Did you have athletic activity in school or did you always sit on the bench pretending to be sick?

Did you study at school or spend most of your time trying to find ways to cheat in the exams?

Did you perhaps adopt from an early age on the opinion that studying tires the brain and physical distress is for dumb people?

Did you always have a criticizing and reproachful disposition towards everyone without ever taking a look at yourself? Did you always find people stupid and insignificant who did not acknowledge your values, even though you never did anything to project or promote them?

Did you always believe that everything is predestined and it is not worthy to put any special effort into anything?

Did you ever wonder why you keep being stuck on some TV-shows and have never looked for anything else?

Did you always postpone your actions until the time comes that “you’ll see what you will do”?

Did you always seek for the “inside person”, the “middle

man" in order to accomplish something?

Could it be that you were never engaged in exploring your faculties and true limits, so as to utilize them?

If you answered "yes" to most of the questions, don't be disappointed. Thousands of other people do the same. However, now is not the time to blame yourself. Beyond your responsibility for not reacting, for not searching for solutions and methods, lies the greater responsibility of everyday life which keeps us entangled in countless superficial engagements, and fills us with clichés, consolidated views, dogmatisms and aphorisms. Nevertheless, this is reality.

All of the people undertaking a positive role in society endeavor to change this reality for the better; each in his or her own unique way and by their own means. You, however, as one in many thousands of people who meagrely manage and are unhappy, should not simply survive but evolve and be happy.

From the aspect of natural destination we come into this life to experience happiness in a homeostatic environment, however we too often turn our environment into a living hell and live in total unhappiness.

We must never stop the effort to alter these negative conditions. Besides, life encloses this challenge; to learn it, to survive, to adapt, to support it, to respect it, to win it over, to enjoy it. It is never too late for a new start. No matter how difficult or complicated things may seem, there is always a way out. There are always those who have and can offer you ideas, solutions and help.

Start with biofeedback. This method dealing with reality and objectivity, on account of the machines it employs, will convey to you your real self, your true limits.

You will be surprised by the vast unexploited energy and capacity reserves you possess.

In succession, with your trainer's aid, you will learn in an objective manner how to exploit your capacities and make them work for your own sake. You will learn to set your goals and aim to implement them. Finally, your trainer will teach you how to desensitize from stress and anxiety-generating factors; how to cut loose from the anchors pinning you down in pre-fabricated limits and to turn into, not somebody else, but to implement yourself, your true potential and boundaries.

And when you hear about training, don't imagine years and years. The science of biofeedback has greatly progressed and with the assistance of highly advanced technology, coupled with your psychoemotional mobilization and involvement, a few weeks usually suffice.

Who is to blame for my headaches?

You should fully comprehend that whatever takes place inside you, which can be expressed in the form of illness with certain symptoms, has an underlying mechanism depending on you and controllable by you, as medical science has proven.

The notion of psychosomatic illness is simple and concise;as simple and concise as is the relationship existing between your body and psychointellect organ, namely the psychomental organ. These two constituents or entities are interdependent and inter-influenced. Whenever we find body activity and expression, the mind and the soul meet with their own expression. The one function or expression affects the other. A strong headache will change your temper and psychological disposition, will abate your mood for study or fun, or will shift you to more miserable or aggressive inclinations depending on your idiosyncrasy. Conversely, an anxious situation that fills you with agony, apprehension, fear or pessimism, bears its corresponding somatic equivalent, expressed with stomachache and constriction, perspiration, tachycardia, mouth dryness, difficult respiration and others.

The World Health Organization declares that today 70% of diseases are psychosomatic, meaning that they constitute and represent the somatic equivalent of a psychomental reaction. Research psychiatrists are reaching the conclusion that even cancer is a psychosomatic disease. As for stress's impact upon the immune system, with whatever it implicates, this is also well known and is described in detail in a following chapter.

The proponents of more extreme medical views tend to embrace that even a fracture can be regarded as psychosomatic disease, if it originated in the reckless or thoughtless conduct of a person under the influence of stress or anxiety generating factors.

If your headache, after completing the clinical or laboratory examinations, is proved not to be related to a specific pathological cause, but instead appears each time you experience an anxiety provoking situation, then it is characterized as a tension headache and clearly falls under the therapeutic competences of biofeedback. Your trainer or therapist will explain to you the pathogenic mechanism of your problem, in a manner compatible with your understanding and education. It is imperative to comprehend how you yourself create this headache, through the arousal of your sympathetic system, which is induced by your own emotional expressions occurring under the influence of factors, viewed by you as stressors/stress-generating.

Finally, yes, you are to be blamed for your headaches and not your boss who is stressing you. Well, don't take it to heart, if you don't do it consciously. You learned to react like this, when you adopted certain routes to loosen your tension, routes that were not centrifugal but centripetal oriented. In other words, you mobilized your neuro-endocrine mechanisms leading to the contraction of certain muscles, the end result of which is always headache.

You have learned to treat yourself in a unfriendly manner inducing sympathetic arousal in your nervous system and continuously increasing muscular tone, which after exceeding a certain level breaks out in the form of an intense and torturing headache.

You learned to adapt in a dysfunctional manner to a stressful environment, building up muscular tension, which culminates into a headache, the latter being a type of chosen or learned manner used to convey your discontent or other unpleasant emotions.

But, you are not alone. Most people, more or less react likewise. One person has gastritis, someone else has asthma, another has allergies, another colitis, another insomnia, another frequent colds or infections along with numerous other psychosomatic maladies. Because all of these people have learned to express their negative emotions in the wrong manner, they are ignorant on how to modify their attitudes. I always refer to the psychoemotional sphere, towards the anxiety generating and stress generating stimuli of everyday life.

However, now, is the time to “un-learn”, to desensitize from this pathogenic mechanism. Your trainer will show and disclose the entire pathogenic mechanism. He/she will unveil it before your eyes, nail it to the counter, and enable you, after giving it a reproachful look, to step on it with contempt and adopt other means of expression more compatible with your health, homeostasis and happiness.

All of this is achieved with your trainer in the role ofyour guide and the adjunct machines as your assistants, displaying on the computer’s screen the complete picture. But mainly, with you as the leading star, who by receiving feedback, relate to the way through which stressors bring about illness and disharmony in your organism, and eventually desensitize from them.

You can let stressors become a memory of the past that made you wiser, strengthened your self-control, enriched self-knowledge and ultimately enabled you to unfold your capacities and succeed in whatever you desire.

The mechanism of convictions or beliefs

Quite often you repeat: "I think that…" Other times you say: "I believe that…" And yet another: "I am convinced that…" Each phrase encloses a unique dynamic, has a unique meaning and a unique value.

When you say "I think that…" you express a hypothesis, an assumption. You have a viewpoint, but you are not absolutely certain about it. You leave room for the opposite as well. Your opinion results from some information you have gathered, nevertheless you feel that you need more information to be sure. There is a degree of uncertainty in your viewpoint.

When you say "I believe that…" you express a viewpoint which is consolidated upon faith, meaning upon an idea which you adopt without being able to prove; simply and only because you deem it as your inner dogma. Your faith is not an issue in question, one for which you ask for proof, instead you accept it as if you have learned it, as if it was taught to you, as if it was presented to you.

What you believe is not susceptible to dispute. It is so, because you believe it so. Believing in something means that you follow a dogma, a principle, an idea, a notion, a system which is not subject to dispute, nor to refute, but is engrained deep in your soul accepted as it is, because you adopted it. A doctrine is the end result of some peoples' teachings and from your learning. A teacher teaches you the doctrine and you learn it, you accept it and incorporate it as part of your faith.

When you say "I am convinced that…" you consider that you have an opinion, a view point, a picture or a concept about facts, theories and mechanisms which was formed based upon material provided to you by your own senses, material that you have further elaborated upon with your own mental mechanism to reach your singular, personal conclusions.

Your convictions enclose what you have learned, however percolated through your personal filters, corresponding to your education, age, social level and your general psychobiological condition.

A conviction is a personal matter, something that belongs to you, because the material you assembled through the cogntive (learning) process was in succession evaluated by you, using criteria you deemed as more objective, for the purpose of consolidating it as your own conviction.

Your conviction is the result of internal processes, in which, apart from knowledge, the mental and psychic organ participate as well. In order to form a conviction with respect to an issue, the processing of your cognitive material by your internal evaluation mechanisms precedes. Conviction is something that belongs to you.

An assumption can turn into a conviction when ripened inside you, enriched with fresh material processed by your personal filters, which, among others, rely upon the elements comprising your personality and moral hypostasis.

Your convictions express what you really are, what really underpins your personality and moral hypostasis.

Your convictions are founded upon what you know, have learned, been taught; upon everything you have been taught and explained by your educational cores.

Educational cores, as was previously mentioned, are your family, your school, your friends and acquaintances, television, mass media, as well as the books you read. They are the sources from which you derive ideas, views, style and material to build your cognitive edifice. And since the wise old saying “like master like man” always has unremitting value, it explains the ordinary phenomenon each person has explaining and construing facts, and of course adjusting his behaviors towards these according to what he knows in relationship to the factors participating on the occasion.


THE MECHANISM OF CONVICTIONS
I think that....
• You hold and opinion, however presently it leaves room for modifications since you have not fully completed its exploration and underpinning process. It can change in the future by new evidence.
I believe that...
• You hold an opinion, however presently it leaves no room for modifications since it relies on dogmatic belief. It is so, because you believe so. It may change in the future on the basis of new internal processes.
I am convinced that...
• You hold an opinion, however presently it leaves no room for modifications because you have fully completed its elaboration and underpinning. It may change in the future by new evidence

A farmer regards rain at the proper time as “God’s blessing” because he knows; he has learned that at this time rain is good for his crops.

A tobacco-grower who has lined up tobacco-leaves to dry in the sun or a raisin producer who has spread raisins under the sun for the same reason, regard the same rain as “God’s curse”, because the have learned; they’ve seen and have established experience that this rain will destroy their harvest.

In these examples, the element of realism exists. It means that the conviction of certain people results from what they have learned, and further processed, and have thus conceived as personal experience. Simply... “it is so, because it can’t be otherwise”. The same rain in the first case is beneficial and in the second case harmful. It has been objectively proven.

When you, as a husband, hold the conviction that you can no longer co-exist with your wife because your behaviors are incompatible on various levels, you adopt a conviction which is definitely based on what you have learned about your wife, what she herself and your living together has taught you; what life itself has taught you. However, if you are not aware of some means of a psychological approach that could defuse the tension in your relationship; then your conviction about separation is erroneous, is misleading.

If you have not learned about crisis management techniques, in particular on family relations, your conviction about divorce is premature and frivolous. You, deep inside, feel, regard and therefore decide that you cannot co-exist with your wife, notwithstanding all the positive emotions you may feel for her; or perhaps she holds for you, because, however, you don’t believe that these can compensate for the negative ones.

Your cognitive edifice with respect to inter-personal relationships presents deficiencies. Perhaps you haven’t learned, therefore you don’t know the deeper character and the psychological needs of your wife. Perhaps you lack cognizance on how to react positively and peacefully in an argument with your mate. You haven’t learned; therefore you don’t know how to be more sensitive and delightful during sex, during which tensions often get worked out, communication reaches an ul-

timate level, dramas resolve and relaxation follows. And if you haven't learned these, not solely on your account, but chiefly on the responsibility of a learning or else educational system, which bear deficiencies in regard to its contents; has left you from a gnostic and cognitive aspect incomplete and exposed. Your individual responsibility lies in the belief that you grasped on those few facts you knew to be true, and didn't seek for professionals, proficient at expert knowledge; to teach you by enriching your cognitive edifice with new and improved components. This is the way to address a crisis occurring in your inter-personal relationships or anywhere else.

Your convictions, especially those connected to biofeedback, are those that have to do with your outlook, your potentialities, your capabilities and your limits.

Before you learn and evaluate your living environment (or others), self-knowledge and self-evaluation should have preceded. You must have formed, even in a general outline, a definite and complete understanding of your self-image. Naturally, it is not necessary to read and learn massive amounts of information on physiology, anatomy or pathology; however, it is essential to roughly learn the operational mechanisms employed by your organism and the influence they bear upon each other.

You should be aware of the role your convictions play in your biological functions.

When you hold a conviction, when your limits are narrower than the real ones, it follows that, on the one hand you confine your sphere of action, and on the other hand; each time you encounter an obstacle "bigger than your powers", you experience a state of anxiety, which arouses the tone of your sympathetic system and causes symptoms in the immune, cardiovascular, peptic, respiratory and rest systems.

Meaning; you get sick. You get sick because you bear the

conviction that the specific oncoming threat exceeds your limits, your strength and endurance. However, this is a faulty and mistaken conviction. You have learned likewise following a deficient or erroneous learning process. That is what you were taught and believe; nevertheless this does not apply to reality. You have accquired a mis-conviction which makes you sick. If you learn your true self-limits, then you will see the majority, or perhaps all of the occasions you had considered as insurmountable crisis` lie within the context of your powers of confrontation and are capable of generating only temporary, creative stress which is required in order to solve your problems.

Prior to entering the re-training procedure for the purpose of altering some of your convictions in connection with your self limits; before entering the desensitization process from stress-generating factors, you should pin-point and ground yourself in who you really are. What are your faculties, your potential and your psychophysiological boundaries?

This entire process is based on the feedback mechanism, which is the re-supplementation of data collected from your biological functions. This enables you to possess the material and the proof which will support your new, clearer conviction and be rid of the past/bygone and mistaken.

The great advantage of biofeedback is that it feeds back objective information emanating from your organism and informs you face to face, thus enables you to be solely responsible for your convictions and to decide how you will handle future crisis.

Get an objective picture of yourself

When your insight and opinion about yourself relies upon realistic and objective elements, then your personality will incorporate similar elements and your adjustment in the social environment is facilitated.

Holding the correct opinion about yourself is very important for the development of your personality. True knowledge of yourself determines your convictions and viewpoints with regard to your limits and your potentialities.

Who will speak to you about yourself? Who will provide you with an objective portrait of who you really are? People are often willing to help and share the image they hold of you. However, every person sees things from a different angle. Thus, the image he/she holds encompasses distortions produced due to his/her point of view.

Have you, however, thought about something very important? Has the person who provides you with data about your image, passed himself through an objective process to get to know himself?

Does he know himself?

He may like or dislike you instinctively, without realizing or being able to explain it. This affects the image he has for you. Will he be objective and unbiased enough to provide you with a real picture?

As you know, your parents are usually prejudiced towards you either positively or negatively, because you are their child; because they have a strong emotional attachment. Most of the time it is positive but quite often it is negative. If they are optimists, they will project an optimistic and rather overrated picture of you. On the contrary, if they are pessimists, they will reflect a miserable and underrated picture of you.

Your friends; those who love and admire you, will offer a sometimes superlative, positive picture about you. Your enemies or those who dislike you, will “bury you under the ground”; indeed, in a very persuasive manner and plead with “arguments”, to show you that you are not highly qualified and will advise you not to have big dreams, so that you can avoid being hurt. They will assure you that whatever they say is for your own “good and protection”.

After gathering all these views and information, you are

now more confused than before and certainly more skeptical. If you stay at this level, take a cleaning action by discarding whatever doesn't suit you and sticking stubbornly on what does serve you. You may come out of the standstill, however you may not be sure that you are on the right track, or that you have an objective picture of yourself. If, on the other hand, you let pessimism and gloominess overpower you and drive you to a surrender or become introverted beyond redress; then you restart your life from a wrong basis. This is a moment when you wonder in desolation: "How on earth can I get an objective picture of myself?" "I am burning with desire to know myself, my inherent qualifications and unleash them into seizing success. What on earth do I have to do?"

Don't get nervous. Solutions can be found. Think, who can supply you with an objective picture of yourself?

The biofeedback machines, surely. These tiny faceless judges of your capacities, which notwithstanding, they never use emotional language simply to "cover" your needs but nevertheless constitute your best and most sincere friends.

Biofeedback equipments are the most trustworthy information sources on what is going on inside you: the mechanisms involved in your responses, your stamina, how to modify and improve whatever isn't working according to your capabilities, the optimal way to exploit your faculties and the way to get the maximum out of what life has destined for you according to your talents and capabilities.

They will tell you everything. Simply, easily, comprehensibly. Such information will constitute your valuable consideration enabling you to form the picture of yourself, to define your values, to build your personality, to set your priorities and define your external actions. In other words, it underpins your great success. Nothing is required from you but your intention to know thyself. Your biofeedback trainer and the machines undertake all the rest. Good luck.

Chapter 5

Progressive release of chronic accumulated muscular tension

- Historical review and definitions
- Realize the tension to reach relaxation
- Don’t create ghosts with your mind
- Meet your awesome “machine”
- The secrets of image sensory recall
- Truth and myths about muscular relaxation
- What is the benefit from progressive release of chronic accumulated muscular tension?

Historical review and definitions

In the mind of some people, the notion of muscular tension release, which encloses the notion of muscular relaxation, is identified with inactivity or inertia, slackness and passivity; this is a complete misconception.

Muscular relaxation and stress, in our world of duality, should succeed each other in a natural way. However, contemporary man, caught up in the gears of artificial needs and an unnatural way of thinking, spends 99% of his time in a state of unnecessary tension, harassing and unbelievably tormenting his organism both physically and psychointellectually.

If this is your case, you need to train yourself in the technique for the release of muscular tension through relaxation, or to be more accurate, remind yourself of this process.

In 1908, Edmund Jacobson of Harvard, asserted that low levels of muscular tension and anxiety are incompatible states. Jacobson also beleived in the conviction that at the deepest muscular relaxation level, both anxiety and tension are non-existent notions. He published his first book on Progressive Muscular Relaxation in 1938 and mentioned the 15 major muscular teams which participate in body tension and relaxation.

In the decades between 1920 and 1930, Jacobson started laying the foundations of the term “systematic muscular relaxation”, based upon the electromyographic data he had collected with his electromyographic devices (Jacobson 1929, 1934, 1938, 1939). Guided by the information he gathered from his patients, he formed a protocol on the application of systematic relaxation in a variety of psychoneurotic diseases. Other researchers also designed systematic relaxation protocols (Schultz, 1939, Schultz & Luthe, 1959), thus significant material emerged in the service of psycho-

therapy. Research at that time pointed out that when a person is informed of the tension existing in his muscles, he is motivated to dismiss it, however protocols had not yet been drawn regarding the management of pathological conditions. Theories supporting feedback derived either from visceral functions or muscles could no longer, under the influence of the central nervous system, prove helpful in the treatment. For example, neuromuscular disorders was still viewed with skepticism by the medical community. The outlook from the cognitive fields were very pessimistic (Schlosberg 1937, Skinner 1938, Mower 1950). After a few years, results from the Rockefeller University laboratory were announced (Miller & DiCara 1967, 1968, DiCara & Miller 1968a, 1968b, Miller, 1969).

Laboratory research proved that autonomic nervous system functions can be influenced by voluntary control via cognitive processes (DiCara & Miller, 1968).

This catalytic probative force of strictly scientific research proving repeated success, was responsible for convincing the medical community to broadly adopt and apply biofeedback protocols and propelled the immense enthusiasm of biofeedback results into the present day.

Jacobson mentions that progressive release of chronic accumulated muscular tension lowers the heart rate per minute, the blood pressure, the electrical skin conductance, the respiration and cardiac rate, the muscular tension and the subjective sense of tension.

Low muscular tension levels and anxiety are incompatible states.

At the deeper levels of muscular relaxation, anxiety and tension do not exist.

The autonomic nervous system functions can be influenced by voluntary control by means of learning processes.

Progressive release of chronic accumulated muscular tension is attained objectively and measurably via biofeedback, which is the pinnacle of man's attempts to handle stress and overcome its harmful implications.

Realize tension to reach relaxation

Often, in order to achieve the relaxation state and the complete release of muscular tension, one must first provoke muscular contraction on command.This contraction is controlled and usually progressive.

The purpose of provoked muscle tension in the training prior to relaxation is to lower the level of regular muscle activity below the level of the pre-training muscle tension we ordinarily have in everyday life. This process, despite its short duration, fully reveals the amount of tension your muscles carry.

The information you receive when exercising this technique, guided by your trainer, becomes your first feedback and assists you in getting a clear picture of the condition of your muscular system. You often discover that some of your muscles are so stiff that they cannot be further tensed and realize that they function “over the edge”. Thus, you start to unravel a string of negative ramifications eventually revealing an entire mechanism which based on this excessive tension conspires to and undermines your health.

A very important issue is that you are unaware of the existence of this muscular tension. You simply learned to live with it. However, you realize the discomfort, ailments and disharmony you experience daily, ensuing from this muscular tension which affects numerous physiological systems in your organism.

When contraction and relaxation succeed each other, the electrical activity of muscles increases above the daily level. However, a sudden dismissal of provoked increased muscular contracion releases tension and muscular activity drops much below its daily adaptation level. This technique resembles a pendulum when moving away from the center. This phenomenon leads to profound muscular relaxation and consequently releases of muscular tension. Therefore, you have the opportunity to realize and identify the sense that fills your somatic and psychomental organ has when your muscles are in deep relaxation.

This alternating contraction-relaxation allows you to perceive these states first hand and also to compare them, by evaluating the differences in the emotion accompanying each one. This method uses the level of muscular relaxation of the previous muscle group as a reference point for the relaxation of subsequent muscle groups. You compare them with the already relaxed muscles so that all muscle groups reach the same level of deep relaxation and complete release from muscular tension in the end.

You learn to relax using a method similal to that employed by Pavlov in his experiments, in the sense that relaxation becomes a conditioned reflex for you.

The nervous system controls all physiological functions of the organism and given that illness is a disorder of physiological functions, the nervous system regulates as well all pathological functions.

The nervous “traces”of the disordered pathological functions which lead you to an illness, are established in the organism through time, via the mechanism of conditioned reflexes as response to the various stressing situations in your life.

As mentioned before, muscular relaxation does not coincide with passivity. On the contrary, it means normal, natural vigilance, spherical conceivability, inner calmness, tranquility

The response you once adopted toward a stressor eventually becomes your only prototype and bonding response towards this.

If you usually respond with muscle contraction when facing stressing situations, you finally end up producing muscular tension each time you encounter similar situations, even if there is no justifiable reason for muscular tension.

Deep muscular relaxation offers you the possibility to learn how to release accumulated muscular tension and change your response pattern toward stressing situations.

and a capablility for an instantaneous response to every external stimulus.

This condition is experienced to a great extent by animals, and in particular those living in their natural environment. If you check the laxity level of the limbs of a cat or dog at rest, you will find that they are in a state of complete muscular relaxation. Nevertheless, if a sudden incident occurs and stimulates the animal, it will jump up in a flash and perform with maximum muscular capacity. From a phase of complete muscular relaxation it will shift, in a split second, to a phase of complete muscular tension. This proves that although animals rest in deep muscular relaxation, they are not at all passive.

Likewise, the same state reaches through karate training or martial arts. While being in combat anticipation, all muscles, with the exception of those supporting body posture, are relaxed. At the moment of the attack the muscles contract, reaching instantly maximum tension and performance levels in minimum time. In succession, they relax again in preparation for the next attack.

The deeper the muscular relaxation is at the onset of a

karate strike, the more rapid and penetrative. The enormous and impressive result of a karate strike with which a man of medium physique manages to break cement bricks is not attributed to his muscular strength, but to his competence to give enormous explosive power to his strike, starting from a state of complete muscular relaxation and reaching full muscular tension within minimal possible time. The more one's muscles are tensed while venturing a strike, the more the strike will bear the features of a push, rather than penetration.

Furthermore, recent research conveys that neurochemical activity can be transformed through practice in muscular relaxation. In research carried out at Stanford Medical School (2000), six patients who had suffered a heart stroke were observed. Subsequent to their training in muscular relaxation, five out of six patients (83%) presented reduction in serum norepinephrine levels. The norepinephrine decline was more intense in patients who significantly lowered their heart rate during muscular relaxation, the ratio between cardiac pace and norepinephrine was 0.71.

Another study at the same university (2002) referred to measurement of lipids in blood circulation. Twelve people with high cholesterol blood levels exercised daily with the technique of muscular relaxation in order to extinguish muscular tension for a period longer than eleven months. At the end of this period the results showed there was a cholesterol decrease of 11% in these patients, as compared to the 2% obtained in other patients who had followed other control techniques.

This was a significant finding since cholesterol blood level is considered to be directly linked to sympathetic nervous activity. Luthe (2003) used autogenic training techniques to lower blood cholesterol levels and confirmed the same results.

It has been proven that muscular relaxation processes can be adopted as a method for the repression of hypothalamic hyper-activity and the elimination of stomach overfunctioning. Another serious element in deep relaxation

state is the sense about present place and time.

Ackerman & Turkoski in 2000, employed the progressive release of chronic accumulated muscular tension in the treatment of myalgy (muscle ache) and anxiety neurosis, as did Ahsen A. in 1993, to treat alcoholism and substance abuse.

Antall & Kresevic treated elderly patients with myalgias and rheumatoid-arthritics with biofeedback techniques (2004), and also Baird & Sands in 2004. Baumann applied it in pediatric migraines in 2002. Castes M, Hagel I, Palenque M in bronchial asthma in 1999, Esplen MJ, Garfinkel PE, Olmsted M in nervous bulimia in 1998 etc.

When you are deeply relaxed, you no longer cling to the past nor worry about the future. You literally live in the present. When you are in a state of deep muscular relaxation the way you mentally approach facts changes.

Don't create "ghosts" with your mind

Many people suffer from problems caused by anxiety, usually with a plethora of symptoms, such as headaches, indigestion, insomnia, restlessness and so on. However, which of these ailments come from natural and which come from unnatural, artificial, and cognitive stress?

It has been proven that cognitive stress represents 40% up to 85% of daily stress depending on the person's idiosyncrasy and education. Now is the time to learn the most peculiar secret:

The system of beliefs you have adopted functions like a computer. It does not judge nor question what you input. It simply accepts what you insert with your thoughts as real, as paramount truth, the only truth for your organism.

Therefore when you have ideas of defeat, rejection and failure, you will be automatically inundated by a load of negative feelings. The internal threat these produce paramound is the same of stress, cognitive stress, which breaks down your organism. Continuous thoughts of apprehension, anxiety and fear perpetuate an on-going stress that mathematical precision leads to panic attacks and depression.

It must be understood that anxiety does not cause problems to only a single body part but activates an entire line of responses.

Anxiety makes the muscles contract without reason, elevates the cardiac rate, rises blood pressure, increases glucose blood levels and starts off several reactions. At the same time, the internal homeostasis of the organs is destroyed. However, each and everyone of us displays this emergency reaction: We were born with it and it constitutes a fundamendal survival response.

The problem is that some people maintain intense responses even after the removal of the stressor which initially induced this response. They don't know how to relax and dismiss the residual tension.

In a person suffering from headaches due to muscular contraction, the muscular tension increases dramatically when under the influence of an anxiety generating factor. This person learned to respond to stress in this manner and now this responce has taken the form of conditioned behavior various. Anxiety generating factors can act within situations; such as a friction at work, an undesired meeting, the feeling of boredom in a social assembly with strangers or indifferent people, or as simple as being upset or moved from watching something on TV, etc.

The basic idea is that when you learn to deeply relax, the results are the opposite from those produced by psychological stress, this means that there is a balance.

PROGRESSIVE RELEASE OF CHRONIC ACCUMULATED MUSCULAR TENSION

ACTION RESULTS

- It is the basic antipode of stress.
- Performs preparatory regulation of systems in the organism.
- Helps trace the disordered function.
- Prepares the organism for desensitization from stressors.
- Reveals the spontaneous psychomental and somatic memories which are the source of numerous problems.
- Confirms the current desensitization level from stressors.
- Exerts preventive and therapeutic regulation to the organs.
- Solves the problem of silent muscles.
- Establishes and enhances the mind-body communication.
- Proves the connection that thoughts and emotions have to physiological bodily functions.
- Evidences the ability to control your physiology.
- Affects blood glucose levels.
- Affects blood pressure.
- Affects heart rate.
- Assists the action of the immune system .
- Lowers norepinephrine in blood serum.
- Lowers cholesterol levels.
- Reduces stomach acidity.
- Relieves tension headaches.

Relaxation, in the sense of dismissal of muscular tension, is the basic antipode, the diametrical opposite of stress.

You waste great energy amounts to preserve useless and excessive muscular tensions in your everyday activities, such as driving, walking, running. By utilizing knowledge aquired through biofeedback, in conjunction with progressive release of chronic accumulated muscular tension, you can learn how to achieve low tension levels in muscles which do not participate in a specific activity.

Chronic tension gradually aggravates or can even bring about natural symptoms of a disease which in succession can affect the organism in an accumulative way. The training in progressive release of chronic accumulated muscular tension drives away the ongoing tension from your body and all its harmful consequences, that is issued from the provoked function of the sympathetic branch of the autonomic nervous system.

When exercising your capacity to maintain low levels of sympathetic arousal, you increase your capacity and willingness for communication with yourself as well as others.

If you are often under strong tension your communication with yourself and others, especially in relation to the probable tension causes, is difficult or even impossible.

In this event, your behavior toward yourself, as well as others, is disordered and becomes inappropriate, which means that you can neither sort things out with yourself, nor with others.

It is clearly a supportive subservient technique for persons having problems in expressing their psychic idiosyncrasy. Progressive release of chronic accumulated muscular tension alters psychological and metabolic activity and allows stressed individuals to enhance and control this activity.

Meet your awesome "machine"

In the medulla oblongata, an area of high significance is found. It is called R.A.S (Reticular Activating System) and plays a key role in your ability to determine states of consciousness and vigilance. This system helps you manage your consciousness in order to be direct and selective as opposed to consciousness simultaneously diffused to all the stimuli you receive.

RAS is an extremely complex net of nervous tissue situated in medulla oblongata. This nervous tissue, not bigger than your smallest finger, is the basis of your consciousness of the world. It is also the centre of your faculties connected to thinking, learning and acting. Without the messages sent out from this specialized organ, which is in part of your nervous system; consciousness is impossible.

The faculty itself to think and conceive has its position on the brain cortex, along with superior brain centers. However, the cortex can neither think nor conceive unless in a state of alertness.

Studies in individuals under the influence of anesthetic medication have proved that stimuli reaching their brain cortex are not able to wake them up. Therefore, a signal traveling through the senses to the cortex during anesthetized sleep passes unnoticed. Something else must bring the cortex into alertness. This is RAS, as Mongunan and Moruzu had discovered in 1949 in North Western University.

RAS is like an alarm system. It responds in the same manner toward all sensory stimuli, irrespective if these are triggered by heat, sound, visual perceptions or other sensory causes. RAS's response to these stimuli aims simply and solely at bringing the brain to an alert state, however it doesn't provide any further information about the stimulus identity. Thus, when a signal reaches the cortex, the brain is in a position to identify the nervous signal and respond instantly towards it.

RAS is selective. A mother can be startled from the slightest sound her baby makes, whereas the father may continue sleeping. This does not mean that the father is emotionally insensitive. Simply, he knows that she will wake up, and this sets his mind at ease and does not insert an alarm of this type in his RAS. A farmer or someone living in the countryside may wake up from the bark of his own dog, but when in town he learns quickly not to wake with other dog barks.

Similarly, when you are awake or vigilant, RAS allows you to ignore the majority of stimuli which otherwise would draw your attention and instantly mobilize you so as to focus your attention on what has special significance to you. RAS's operation explains the phenomenon in which although the electrodermograph may convey great alertness and conception as responses to a special word, nevertheless sometimes you might deny hearing it. This means, that RAS acts as an alarm system keeping in its memory records of all the things you declare that interest you, and at each relevant encounter RAS notifies you to pay attention and activates your alertness.

On the occasions that you are inclined to ignore, repel or repress subconscious certain notions, which nevertheless are registered in RAS, thus, they generate responses in your organism, conveyed through the electrodermograph device, notwithstanding that later on you may have no recollection at all of hearing them. This happens when you subconsciously use repression mechanisms as a defense mechanisms in your psychic organ.

For example, if the notion "divorce" is too traumatic for you, it may appear as a repressed phenomenon during your training with the dermograph. It seems as if you have not granted yourself permission to conceive it, to hear it; because it hurts too much. As we too often say: "Don't talk to me about it. I don't want to hear a word".

Additionally, RAS has a function with special interest in regard to muscular relaxation. The French psychologist Jouvet discovered in animal experiments, that RAS is responsible for controlling the levels of dream states. These dreaming states can be identified from the Rapid Eye Movement generally referred to as REM. It is as if the eyes are trying to follow

the dream plot.

Jouvet's studies also proved that RAS simultaneously also inhibits motor neuron activity rendering the body incapable of functioning during sleep; unable to act or move physically as it would have done in reality if experiencing the same action scenes awake. The deepest stage of sleep is characterized by this inhibition of motor neurons and thus REM is known for its relation with "paradox sleep".

It is a paradox that during sleep the mind retains full activity by making vivid, fictiuous dreams, wherein the body remains relaxed, motionless, and has absolutely no participation. This is because RAS inhibits the activity of motor neurons.

This explains the significance of the fairy tales we read to a child to get them to fall asleep. They faciliate muscular relaxation. The visualization, imagery or image-sensory recall advance muscular relaxation and mental well-being. The same mechanism is also attributable to the phenomenon of falling asleep while watching television and waking up when it is turned off. On account of this and with the same mechanism as image sensory recall is applied in muscular relaxation.

Also at the state of alertness the body can remain very relaxed and calm, while at the same time the mind is hyperactive, engaged in learning processes. This technique is fully exploited in biofeedback to attain speed reading and speed learning.

The secrets of image-sensory recall

The central idea justifying the scientific application of image-sensory recall lies in the fact that research and clinical experience has proven that the brain holds the same response in the case that you live in your imagination something as real, and in the event you experience something in reality.

It has been proved that the brain treats both types of information in an identical manner thus both events bear upon your body similar physiological responses.

Scientists agree that this is done via neurological and biochemical mechanisms.

Significant methods for accomplishing the release of muscular tension used in conjunction with progressive release of chronic accumulated muscular tension, during biofeedback training are simple imagery, guided imagery and autogenic training.

Imagery is the language the mind uses to communicate with the body. Simple imagery is a technique that utilizes creative imagination to help you reach a state of muscular relaxation.

You let yourself experience with all the senses and not merely to imagine, a picture of calmness and relaxation which can be different for each one of us. For example, pictures a sunny beach, sitting next to the fireplace on a winter evening, gliding on a lake between the mountains, daydreaming in the arms of your sweetheart, gazing at a beautiful sunset etc. You learn the technique in order to experience your relaxing picture as vividly as you can, using all the senses, vision, hearing, taste, smell, touch. At the same time, the biofeedback devices record the level of muscular relaxation you have reached and give you feedback (depending on the stage of

THE IMAGE SENSORY RECALL MECHANISM

A. Experiencing reality with all the senses

B. Image sensory recall employing all the senses

- Whether you experience a real situation
or
re-experience it by imagination using all your senses,
its impact on the organism is completely the same.

training).

In guided imagery, you enter the feeling of a specific relaxing scene, using again your creative imagination in a similar albeit not precisely the same manner. This method is used often in athletics and in creating leading business executives, since it substantially contributes in the creation and materialization of their higher goals.

In autogenic training, the process of muscular relaxation is promoted by means of a series of specific words, phrases or sentences which encompass special meanings related to your needs. Autogenic training, in other words, has the feature of specialization.

The techniques of simple imagery and autogenic training have been promoted by scientists H.H. Schultz and Wolfgang Luthe since 1920. Their clinical research documented the therapeutic capacity of imagery in diverse acute and chronic diseases; including asthma, headache, backaches, arthritis and also the particular effect in various physiological functions such as blood pressure, heart rate, brain waves, peripheral temperature and glucose blood levels.

Subsequent research was conducted by Chlomo Breznitz at the Hebrew University and Nicholas Hall at the George Washington Medical Center demonstrating the positive impact imagery-technique and autogenic training coupled with progressive muscular relaxation had on the immune system.

In 1970, Simontons initiated the above techniques in the treatment of cancer patients, in parallel with the usual medical therapies and obtained very significant improvement in the pain and life quality of his patients.

Again, the use of imagery during biofeedback training was introduced by Erik Peper, Stoya and Budzynski in 1980. Many theories exist on how the techniques of progressive muscular relaxation, imagery and autogenic training help the organism.

From a neurological aspect, it is well known today that nerve fibers stemming from the brain wire the thymus gland,

spleen, lymph glands and bone marrow and act as transportation vehicles carrying the response of the immune-system from the brain to the body. Additionally, the brain produces substances which impart messages to the body and induce its response both in a state of stress and relaxation. These substances transfer the information from hypothalamus to the pituitary gland and from the latter to the main endocrine glands of the body. There are also neurotransmitters, which are released by the nerve cells, and transmit the information to other nerve cells.

Emotions, thoughts and images can bring about the production of all these substances; such as serotonin, endorphins, dopamine, adrenalin, noradrenalin, acetylcholine etc these in turn stimulate senses and ignite changes in the immune system via multiple biofeedback systems.

Consequently, your emotions, thoughts, and mental images can trigger all these mechanisms which via neurological and biochemical processes mobilize the immune system and the other systems responsible for the defense and homeostasis of your organism.

Truth and myths about muscular relaxation

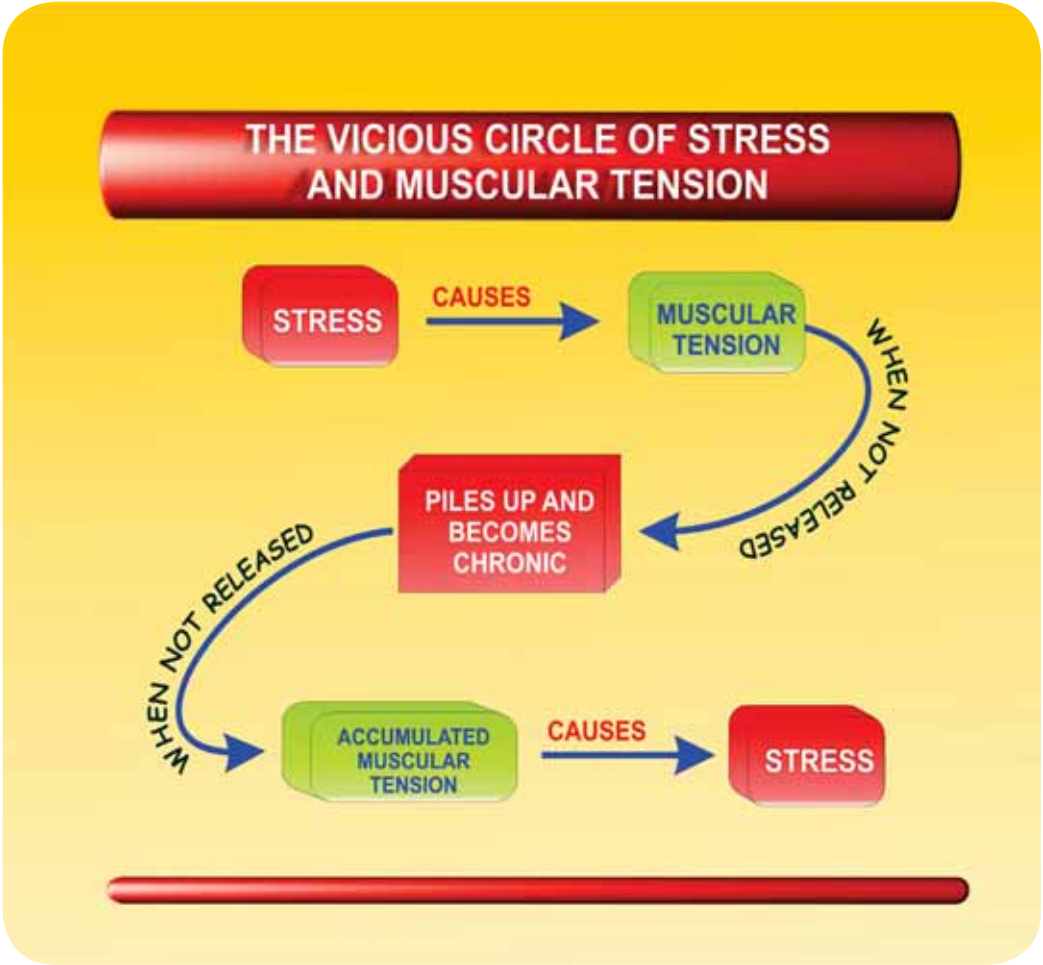
Your biofeedback training gears at teaching you how to control your autonomic nervous system, thereby balancing the “seesaw” connecting sympathetic and parasympathetic branches. When stress exists, it provokes sympathetic arousal with all its somatic and psychomental components. The biofeedback protocol shows you how to lower this sympathetic arousal and as a result, the parasympathetic is activated and the balance is redressed. Let’s give an example:

When you experience stress accompanied with the ensuing sympathetic arousal, among its other consequences,

sugar and cholesterol levels in the blood increase, because these substances constitute the organism's fast and slow combustion fuels required in order for fight or flight. Simultaneously, muscular tension is induced; which is the result of an anxiety or fear factor affecting you at that very moment. The process of muscular tension takes place automatically and subconsciously, without being realized. Once the stressor has passed, sugar and cholesterol blood levels drop tending to normalize, provided that no cognitive stress steps in or acts, which would make them soar up again.

But what happens regarding the muscular tension? The latter, since it was instituted in the muscles subconsciously without being conceived, requires a different process, one with conscious character indeed, in order to be released. Imagine what is going on in the muscles when this same stress generating procedure is repeated thousands of times in your life within a decade. Some part of this tension will be passively discarded during sleep, due to the muscular relaxation brought about, depending always on the quality and depth of your sleep. The biggest portion of this muscular tension remains and piles up in your muscles until a pathological state is produced, usually with painful symptoms. Then you realize that you got sick, but you are neither cognizant of the disease mechanism nor of the etiological way to treat it: you recourse to pharmacological medicines. However, the solution virtually rests in training in the progressive release of chronic accumulated muscular tension. This is a conscious function gradually releasing the accumulated muscular tension and it's outcome is your liberation from perilous symptoms. This is the reason why a biofeedback protocol starts with progressive release of chronic accumulated muscular tension. It is in a sense a way of cleaning your muscular system which is one of the primary targets of the impact of stress upon your organism. When you are aware of the mechanism you can select, the training method that you will follow.

Often, the trainees in muscular tension release programs express some questions or ideas about it. Some of them are discussed below:



1st: Muscular relaxation is a natural process and requires no practicing whatsoever.

This is both correct and incorrect. It is correct in that muscular relaxation is an inherent process like walking or speech etc. It is incorrect in that it does not require exercising. Look at a young child who has not yet developed the skills of walking, speaking or even whistling and you will realize that even a natural process needs to be exercised. Practicing activates neuromuscular synapses. The more neuromuscular synapses are activated the closer we are to achieving perfection and plasticity in the movement. Muscu-

lar relaxation is an skill that needs to be learned, precisely as you learn any other skill, that is, by practicing and gaining experience.

2nd: If I allow myself to completely relax, is it possible that I may not be able to recover from this state?

False. There is absolutely no way you could “get stuck” in muscular relaxation. The latter is an automatic process instantly transformed into a valuable experience signifying what it means to shift from a relaxed state to an alertness and vice versa. This takes place each time you fall asleep and each time you wake up. Some people may have insomnia because they don’t allow themselves to fall deeply into sleep because they are afraid they may not wake up. When someone expresses the fear that, if he fully relaxes, he will not be able to get out of this state, he probably has other unexplained fears, conealed in this manner. In such a case, a discreet exploration on what he thinks might happen if relaxation is imperative. Sometimes this is a fear of relaxation or sleep sometimes camouflages the subconscious fear of death or a loss of control, which can be traced and cured. A person might worry about something more specific, for instance that, “my headache will get worse” or more undefined such as “I might loose control”. Such fears do not correspond to reality and can go away if there is a sincere, open discussion with the trainer regarding the kinds of emotions and sensations one can realistically expect when letting go of muscular tension, which is always beneficial.

However, sometimes this fear indicates a person’s incapability to be separated from this symptom because it is closely interwoven to his inner-self, even to the extent that he cannot imagine his life without this specific torment.

Some individuals are accustomed to their ailments and symptoms which have become part of their lives, character and behavior. They believe that if dissociated from their symptoms, they will no longer be themselves and fear of losing the privileges of advantageous treatment and care from those around them.

Of course, this case refers to individuals who have virtually lost their autonomy and prefer to persist masochistically in maintaining an assortment of problems, receiving certain "rewards" from their environment, such as attention, and attendance, etc, rather than be dissociated from these problems and become independent individuals and personalities.

Besides, they have an alibi, it is often suggested by various therapists who advise: "You must learn to live with your symptoms". And one instantly wonders: "Since I must learn something, why not learn to live without my symptoms, something that biofeedback can teach me anyway?"

3rd: If I manage to learn how to release my muscular tension, then all my problems will disappear.

Unfortunately, this is not so. The release of muscular tension is not the "magic touch": It doesn't transform you. Biofeedback does not wipe out all the problems in your life. However, it gives you the ability to solve them much easier and faster, and most considerably increases your stamina in adverse circumstances.

4th: Learning muscular relaxation is similar to learning anything else; it requires work and effort.

This sounds almost right, however he who believes this, will never learn to relax.

Releasing muscular tension does not demand work or effort, but mainly practice and experience.

This is more than just a verbal evasion; it means a different attitude in approaching the whole issue, which your trainer can teach you.

Work and effort require being active and exerting energy. Releasing muscular tension is precisely the opposite. When you relax you are calm and tranquil, but not inactive or apathetic.

Releasing muscular tension does not require work but a little time and exercising. Exercising includes initially relaxation and in succession experiencing the sensation and benefits of relaxation. Many people name as pathetic or passive attention the self-permission to let ourselves relax, meaning to free ourselves from the repressive bonds of erroneous habits. However, some people who are antagonistic both with themselves and others on momentum react, and this makes it very difficult to learn to let themselves relax.

5th: As things are at the moment, “I do not have enough time to do all the things I should do”. Releasing muscular tension is a waste of time that could be spent more productively.

Production is an operation requiring time and efficiency. Releasing muscular tension really does need some time in order to be trained in the method, however, in parallel it does not harm your productivity. Quite the opposite, it enhances it, given that when you are refreshed and relaxed you are more efficient in your job. The verity of this remark however does not persuade the wild and impetuous technocrats of our age, who intend to invest their last second in the pursuit of their goals, however in erroneous and in an often self-destructive manner.

Such people often recourse to a biofeedback program because their job performance has started suffering losses. They need help in order to realize that letting go of muscular tension is a permissible, pleasant, beneficial and healthy way to spend some time and nonetheless multiply their efficiency. It is the trainer’s task to handle the matter properly and change the negative attitude toward release of muscular tension that may be viewed as a waste of time, since no one can relax within time saved and half heartedly.

Many times I came across university students who were literally up to their neck with their studies and had no time for biofeedback, although they eagerly longed for it. However, their problem was immediately solved once they had tangible evidence that some training hours spent in speed learning through biofeedback would enable them to cover their assignments and still have spare time for sports or entertainment.

I like to tell a story which is quite typical of my experience,

and was inspired from my indulgence in books of eastern philosophy. In 1976, I was serving in my medical practice in the countryside at the mountain villages of Tzoumerka in Epirus, and daily passed a spot where two old folks were slicing timber out of trees they had cut with a two-meter long hand saw. They stood in opposite sides and pulled it back and forth. One day I stopped a moment and noticed their saw was blunt and did not cut well. This delayed and tired them. I suggested they sharpen it in order to save time and labor. They had a stereotypical reply: “no time for such things doctor, we are in a hurry”. Soon after, one of them was injured and came to my practice. I attended his injuries and despite his wishes, told him he had to stop working for three days. In the meantime, I found his partner, unable to work on his own and prompted him to sharpen the blade. He accepted and when they started working again the job was done in half the time and with much less effort. So, every time I came to the that spot, they invited me over for a cup of coffee. They had already “sharpened their saw”.

To invest a little time in biofeedback is equivalent to “sharpening your saw”. That’s why I keep saying:
SHARPEN THE SAW!

6th: If I learn to relax, I won’t be able to react effectively in the occasion that requires me to be angry.

There is a misunderstanding that lies in the misconception that muscular relaxation is equal to passivity. However, being relaxed does not in the least mean that you are passive. Instead, you are more competent to do whatever you really want when you are relaxed, because:

(a) You will have more energy. Tension consumes purposeful energy. Preserve your energy for the truly great things in your life.

(b) You will not be sick or paralyzed from agony, so as to be unable to think clearly and act in an appropriate manner.

Instead, you will be able to think and choose calm and swift alternative options that are the most suitable for each occasion.

Your body is constructed in such a way that it can endure even great stress, however not ongoing incessant stress, because chronic stress affects the autonomic nervous system and brings about diverse and serious changes in your organism.

The antipode of stress is dismissal of muscular tension, this inverts the chemical reactions caused by chronic or prolonged tension.

What is the benefit from progressive release of chronic accumulated muscular tension?

If I had to speak about the progressive release of chronic accumulated muscular tension in terms of computer science, I would say that relaxation is the antivirus system in our organism. The brain keeps constant connection, communication and discussion with the muscles. Each time a cognitive factor generates stress, a virus, worm or a Trojan horse is installed in the brain. Every cognitive stress can be identified as one of those undesirable tiny programs which “hijack” our mental function and produce muscular tension. Thus, the path of neuromuscular synapses is ruled by the virus, its normal function is altered and muscular tension emerges, piles up and completes the vicious circle: stress-muscular tension-stress. Neuromuscular pathways work in both directions. Therefore, while stress generates muscular tension, muscular relaxation, on the other hand brings forth desensitization from the stressor, not via the cognitive path, but through scanning, locating and isolating the cognitive stressors in the same manner an antivirus system spots and isolates or exterminates viruses from your computer’s software.

There are several essential reasons to incorporate muscular relaxation in biofeedback training aiming at the release of muscular tension, such as:

1. It proves the intrinsic capacity that you have to control your physiology. Thus, you get definite proof of your potential through the release of muscular tension.

2. It exerts preliminary regulation of an organ or system appearing to have problems and prepares the ground for the main biofeedback modulation.

3. It helps you to spot the function which, on account of unnatural activity, meets the greatest difficulties and becomes the source of most of your problems. Almost always this mechanism was unknown to you before.

4. It gives you the opportunity to have prophylactic, supportive and preventive treatment for your most sensitive organs and systems.

5. It solves the problem of "silent" muscles, muscles which due to over- contraction are incapable of giving normal indications to the myograph, in other words they are "petrified" or "burned".

6. It enhances the body-mind dialogue, and in case of absence of this dialogue, it initializes it.

7. It demonstrates the relationship between thoughts, emotions and physiological body functions, in an impressive manner.

8. It brings into play and reveals the spontaneous psychomental and somatic memories constituting the source of many problems.

9. It gives you the possibility to desensitize yourself completely from all the factors which caused you problems and makes you durable to future circumstances which previously would have triggered off problems.

10. It gives you the possibility to objectively see this desensitization via the indications of the monitoring devices.

11. You have the possibility to confirm your level of desensitization and independence from the stressors, assisted by an absolutely objective organ.

Your trainer, by applying relaxation for the purpose of progressive release of chronic accumulated muscular tension, assists you in directing your attention to the diverse rich "view" and "field" this method offers and helps you realize the emotions accompanying the variability of muscular or general tension.

Enjoy it.

Chapter 6

The biofeedback process

- Your relationship with the devices
- Your relationship with your trainer
- Your relationship with yourself
- Detach yourself from the circumstances
- Objectivity makes the difference
- The advantages of spherical attention
- The law of inverse effort
- The personality of the immune-potent type
- “Do it yourself” and “helter-skelter”
- Choose your trainer

Your relationship with the devices

Through your training in biofeedback you get the chance to create deep friendships. Your first reliable friend in biofeedback is the device you use. It is a tiny "electronic friend" who will stand by your side for a certain period to assist you in making your observations. It monitors your reactions and in succession provides you with all the information and all the "advice" necessary to solve your problems.

In training, you are connected to the biofeedback devices and while you relive or recollect the various pleasant or unpleasant moments of your life, the devices monitor and record almost instantly all the changes occuring in your organism during the experiencing process. These readings are highly significant. If you did not have access to these you would be unable to exercise in biofeedback simply because you would lack this information about yourself-imperative for your biofeedback training.

The human body and the mind are linked. Every change in the body brings about a psychomental equivalent and every psychomental change has a relevant impact upon the body or a somatic equivalent.

This trusted friend will escort you for as long as you need to develop the ability to perceive the alterations taking place inside you. The role the device plays in biofeedback training is fullfilled once you have the information that will lead you to your desensitization.

When your reach this stage, the friendship and co existence comes harmoniously to an end, without leaving behind any attachment. Henceforth, you have acquired all the pos-

sible experience the device and its readings could provide; you have the possibility to enter into different phases, pursuing results altogether desensitized from the factors which up to now disorganized you and destroyed your inner homeostasis. Your small electronic advisor has equipped you with all the information that will help you to reform your internal activities.

What essentially interests you is to reach the desired psychomental state in order to attain your goals. Most of the time this begins with dismissal of muscular tension, in other words, by discarding redundant tension.

The fundamental biofeedback principle in simple terms states: when you become aware, assisted by a device, of an internal function in your body, which up to that moment you ignored, then you have the opportunity to learn to control and modify it to a greater extent with the purpose of attaining inner-homeostasis and outer-activity skillfully and very efficiently.

The first step in learning to control your body and mind is to define precisely what you need to learn to control.

You are not seeking how to learn to control the movement of the device pointer, nor how to raise or lower the acoustic signal, because these are just indications helping you to realize and affirm the proper response the moment you succeed it. To be certain that your mind has correctly correlated the visual or acoustic feedback signal with the situation causing it, it is necessary to be positive that once this situation changes the respective feedback signals transmitted by the device cease. This way, you complete the identification circle of the feeling you experienced, meaning you take the specific feedback from the device and experience it consciously, hence obtain the ability to reproduce it anytime you wish. Likewise, the identification of the emotion-indication/reading dipole regarding all biofeedback devices is achieved.

Some people occasionally keep a competitive attitude to-

ward training devices, which most of the time is attributable to a misunderstanding the role the device plays in the training. This antagonism can be held accountable to learned conditioned reflexes the individual holds toward devices. This case refers to individuals having excessive defences, who usually adopt rigid and inflexible attitudes toward most matters in their life. The solution to this problem will be provided by the trainer who will explain the phenomenon and select the most suitable practicing manner.

The relationship with your trainer

In all cases, the information provided to you from the devices must be properly evaluated and interpreted, so as to clarify and identify the way your organism operates. It is at this point that a trainer's assistance is necessary. The trainer, strictly relying upon scientific protocols and with the adjunct of his experience, will interpret the information fed back from the devices and enlighten you on the manner you respond to stimuli of either internal or external origin.

The training period, during which the one is the trainer and the other the trainee, is actually short. After this period you become independent, since you no longer need translations or interpretations and you rely solely on the "signal" language of the devices. The trainer-trainee relation can be warmed-up occasionally during your biofeedback training each time you encounter a problem and seek for solutions or help.

The trainer must provide the conditions favoring a relationship in equal terms with the trainee. An equal relationship aims at freeing your actions from the "static" interferences due to the trainer's presence, which often makes you

feel a bit embarrassed.

If, while monitoring your experience, you sense the presence of your trainer next to you, a reaction will probably emerge that will modify the reading due to the tension caused by the sense that somebody is watching you. However, if your best friend was watching you, you would surely not react at all, since you are used to sharing with him your experiences. Besides, what does companionship mean other than the exchange of experiences between friends, usually conclusive in providing mutual interpretations and advice? Clearly this is a spontaneous biofeedback process. Only in this event the feedback is emotionally tinted and almost always subjective.

You are accustomed to regard your teachers at school or your professors at university as expert authorities and adopt certain behavioral patterns towards them, which may vary from the altogether dogmatic acceptance almost barren and unlimited controversy. Therefore, when you are in front of the biofeedback trainer, and you know that he masters a very fine science and technique, it is natural for you to view him from the same perspective; to place him among authoritative ranks and regulate your behavior in the same manner you used to do in the past.

At this point, your trainer will offer his/her first substantial services and explain to you how you will function in cooperation. Simultaneously, the trainer will help to obliterate the reaction syndrome against authority which subconsciously lies hidden in almost every trainee.

Your trainer, as a person, has also his sentimentality, his personal excitements and human expressions sending an assortment of psychoemotional messages. Nevertheless, during training time the trainer should remain neutral as much is possible. This means that he should not permit his emotional messages to intrude into the training atmosphere. Some people, for example, often use funny expressions. However, trainers who tend to joke during sessions must eliminate this inclination because their humoristic manner intervenes and alters yours psychoemotional response. You get carried away in internal conditions different from those

we need to examine.

Let's imagine an anxious or melancholic type who tries to probe into the cause of his problems. If during the session the trainer often makes jokes, the trainee gradually tunes up to the humoristic mood, forgets his problems, leaves the state of spherical attention and eventually misses the opportunity to view himself in his natural psychoemotional dimensions.

The trainer's role is neither to make jokes and bring fun to the workshop, nor should the trainees seek for fun during their training. Besides, this is best accomplished by another professional, an expert in this art and at another place. The role of the trainer is to maintain a neutral atmosphere that will facilitate you in approaching yourself objectively and correctly.

On the contrary, if the trainer is too introverted, withdrawn in himself or melancholic, then he will transmit signals-"waves" of introversion in the environment. It follows, that the trainee will respond in a similar manner to the one prone to introspection. In this event, the melancholy or introversion of the trainer seems to act as an amplifier of the trainee's melancholy and introversion. Thus, the trainee is lost deeper in his problem, reaches a psychoemotional standstill and the training does not yield as should have been expected. Therefore, the trainer must keep his psychoemotional expressions at a neutral level and be neither excessively extrovert and expressive nor too introverted. He should also not transfer his problems into training. Either being sad or not, the trainer must be calm, affiable, cooperative, friendly and balanced. Thus, biofeedback is a valuable adjunct for the trainer too, provided he is thoroughly trained and sufficiently experienced.

It becomes evident that this condition requires special education and skills from the trainer. The trainers, during their long-term training in biofeedback, have developed the aptitude to restrict or reinforce their expressions whenever and wherever needed, always keeping them within the normal range ideal for the atmosphere that should prevail during sessions. Surely, the trainer should not be aloof or reserved nor too accessible or over-demonstrative.

The trainer plays the role of a thermostat which regulates the temperature of the workshop at its optimal functional level. The trainer must able neither to overheat nor freeze the atmosphere.

The trainees often imagine and prefer a particular manner of expression on behalf of their trainers. This shows that they are used to certain ways of communication with their teachers and trainers. They keep in their mind a special model regarding their relationship with the trainer. However, the biofeedback trainer should not be confined to this framework or pattern. Additionally, the biofeedback trainer plays the role of the observer during the entire training period. He is by your side during all training phases, especially those concerning your active self-observance with the aid of devices. In this case, the trainer becomes the observer who spots and interprets, on your account, the elements emerging in the process. The interpretaton must not be arbitrary nor subjective, contingent upon the trainer's evaluation. It must be strictly restricted in providing explanations based on the meaning of the various indications and readings based upon the substantiated research protocol.

There is no room for subjective opinions or interpretations at any stage of biofeedback. Everything is based upon objective biofeedback protocols which the trainer must apply with absolute consistency and reverence.

The elements a trainer observes are crucial, because it will enable him/her to assist in your evolution offering the greatest possible assistance. The trainer is present during all the processes and participates quietly, although at certain phases gives the impression of a plain viewer who holds no active role. The biofeedback trainer must be alert,

full of vitality and dynamic, aware of what an apparently quiet trainee may hide. He must constantly observe and be certain that the quietly passed training time is beneficial. The trainer shares a large part of the enthusiasm you show the moment you discover something important for youself; especially when this discovery sets the starting-line for the solution to one of your problems or desensitization.

The trainer should also have the capacity not to swerve or zigzag during the training session into excessive and lengthy explanations on the various phenomena observed in training.

Once you notice a phenomenon in a session, you immediately ask your trainer to provide the how and why. You will most definitely get an answer, however your trainer should not show eagerness for an in-depth analysis, even if you are insistent at the moment. Some trainees are inclined to endless discussions and lengthy explanations which de-tune and divert the training from its primary target. Biofeedback training is a downright practical and realistic procedure. It does not rely upon theories or assumptions but on objective findings and realistic manifestations. The target at this stage is not the analysis, but factual observation. At this point, you are not directly interested on why the phenomenon occurs, but on what the phenomenon is and how it takes place and unfolds. There is a special time allocated for discussions with your trainer. There will be an explanation about the how and why of things that are solved in your final queries.

Excessive mental activity, scrutinizing the how and why of phenomena, distracts you from the state of global attention and relaxation, disrupts your direct contact with reality and shifts your focus on problematic imaginations or memories. Consequentlly, your alertness decreases and you have emotional ups and downs, which at this particular training stage are undesirable.

At this phase you are not interested in explaining the nature of electricity, but to press the switch and turn on the light.

Your relationship with yourself

Apart from your friendly relationship with the biofeedback devices, equally substantial is the development of friendship with yourself. As a biofeedback trainee, perhaps for the first time, you come into close contact with yourself, your functions and responses.

It is the first time that you allocate some time for the sake of self-knowledge, to study yourself with the purpose of a successful inner and external homeostasis.

You must realize that in order to obtain effective self-control, it is imperative to set aside the active or energetic attention and the possessive will and shift the control to the auto-regulatory biological mechanisms of global attention and natural will. The latter are primordial mechanisms developed and evolved through centuries of mankind's evolution, which can modulate with admirable precision the organism's physiology.

As soon as you reach a satisfactory aptitude level in relaxation and feel comfortable, the second stage of biofeedback training opens up before you. You must keep in your mind right from the start that feedback, the information transmitted by the devices, will project exactly what affects or doesn't affect you and that it is irrespective of the suppositions or hypotheses made: the final outcome is what feedback points out.

Since only feedback can objectively portray the functions of your organism like an electronic mirror, you should exploit that information by letting it guide your efforts during training.

It is possible that while training you will discover some malfunctioning activity patterns in your organism. Such insight is precious, because it will enable you to correct these patterns and become desensitized from their influence.

BIOFEEDBACK PROCESS

PRACTICING PROGRESSIVE MUSCLE RELAXATION

PROGRESSIVE MUSCLE RELAXATION

- REMOVES THE DAILY STRESS
- RELEASES ACCUMULATED MUSCLE TENSION
- PREPARES FOR THE FOLLOWING BIOFEEDBACK PROCESS
- BRINGS YOU IN CONTACT WITH YOUR BODY
- IMPROVES SLEEP QUALITY
- FACILITATES THE COMMUNICATION WITH YOUR ENVIRONMENT

STAGE A'

LEARNING STAGE

The trainer teaches and you learn

The purpose of monitoring various physiological parameters and self-observation is to find out and comprehend the reaction pattern of your organism. Each time you ascertain that its response tends to overstep normal limits and create problems, you record the phenomenon and use this piece of experience to accomplish desensitization.

Each time you realize through your biofeedback experience that you can, up to a point, exert control on your physiological "involuntary" bodily functions, the image you hold for yourself is concurrently modified, since you get to know your organism objectively and discover its deep and quintessential nature.

This process encloses satisfaction springing from self-communication, which is an unprecedented experience for you, and leads to the discovery of your own self. This process is the main and secure route to knowing and loving yourself; to "be in good terms with yourself". Self-knowledge evolves in your possession and indeed in the most safe, objective and scientific way. It is your property, mastered subsequent to the observations made with your own eyes, your own senses and the personal conversation you had with yourself. This type of knowledge is the key for your individual progress, for your personal happiness.

In 1970, during a biofeedback exhibition, one of the shareholders of the Menninger Foundation was connected to a thermographic device in front of trainees and autogenic phrases were dictated to him, which is one of the methods employed in accomplishing release of muscular tension and thermographic training. When hearing the phrase "my hands are warm" his temperature started to drop and within minutes significantly lowered. He was not informed, intentionally, for this reduction until after the completion of the exercise. When he was asked what emotions he had experienced during the session, he replied that his fingers had started aching mildly and that this reminded him of a meditation exercise he had practiced several years ago, during which his fingers became a bit numb. He had thought "they have warmed up enough so as to feel slightly numb". The trainers explained to him that he was wrong. In this

case, mild numbness denoted cold, as the thermograph had objectively measured. His subjective estimation was false, deviating from an objective reality. The picture he formed about his experience was totally converse to the real one, due to the moment thrust accountable to his previous engagement in meditation techniques. Appropriate instructions were provided to help him approach his functions objectively, and three weeks later, he sent a letter to the trainers. He mentioned that these 15 exhibition minutes were among the most important in his life. Up until that time, he wrote, he had not genuinely believed that he could control anything. But in the past three weeks he had managed to follow for the first time in his life, a systematic diet and lost 26 pounds. Now he was able to sort-out his mail correspondence every morning, whereas in the past he lacked the power or the discipline to achieve it. Can you, however, imagine where this trainee would have been led, had it not been for the objective measurement from the thermograph?

Changing the impression you have of yourself is not a rare occasion in biofeedback training, even if it may sometimes initially escape your attention.

Many trainees are assisted by biofeedback to reorganize their lives, since when accomplishing a change, for example warming up your hands, even though it may not be necessarily desired, gives you a sense of self-mastery. This sense enables you to keep a positive attitude toward yourself in various ways. In other words, the benefits of biofeedback are not solely physical. You also have psychomental benefits because biofeedback develops your psychic and mental skills by liberating and unleashing your psychomental potential.

At many phases in our lives we treat ourselves with great hostily.

By smoking, staying up all night, using toxifying subtances, torturing your body by various means, you manifest an abu-

sive attitude toward your own self. Other times, when you let rage, hatred, anger, jealousy, self-inferiority or other negative feelings overwhelm your emotional world and poison it, you demonstrate brutality toward yourself in a different manner and on a different level.

Your engagement in biofeedback initiates a deep and unshakable friendship with your deeper self. This friendship is evolving and never remains static.

More and more new elements, new emotions and fresh positive experiences emerge from the friendship with your deeper self. As this friendship advances in deeper levels of consciousness, the emotions of satisfaction and completeness grow stronger and steadier. Many trainees assert that they found in biofeedback the most practical and functional gift they could offer themselves, because it affords a drastic and specific way to solve problems: A way that can be completely controlled by you personally.

Man, under the load of various problems, often is burdened by the feeling that he is incompetent to react, bringing onto the surface emotions of pessimism and hopelessness. However, every psychomental state has a direct impact upon the body. Once your mind is filled with negative emotions, the body becomes virtually unable to cope with the situation, which further fuels and justifies the existence of such negative emotions creating a vicious circle. Biofeedback can break apart this vicious circle of despair and pessimism by offering you something specific, direct and drastic that can be employed in order to utilize and activate your potential, so as to find solutions for your problems.

Biofeedback offers you the chance to view the problem from a new perspective and develop the special defenses and dexterities indispensable for its solution. When you are instructed to pay attention to the relation between the emo-

tions or senses you experience and the feedback given to you by the devices, you are asked to observe yourself, to be simultaneously the observer and the subject of observation. In such circumstances you can draw unhindered your conclusions, without interventions of any factors irrelevant to your will.

Once you have mastered, through training, how to maintain a relaxed, nonetheless dynamic, attitude toward the function under observation, you move on to the next stage and learn how to utilize the same function in order to keep some emotional distance. This is a defense tactic that can be employed during your sessions to set a safe distance from the emotional and physical pain your obsessions and compulsions may have caused you until now.

Many people exhibit a certain rigidity, a type of spasmodic defense coupled with fear, or many times, with hysteric reactions if their well-planned and consolidated, however not homeostatic, psychophysiological balance is disturbed or overthrown. They try to protect this equilibrium by following stereotypical habits, forming eventually the bases of an acquired (in the sense of not inherent) “addition” to their character which becomes the target of wild fires from their environment. Man, then, feels insecure and tries either to fortify these stereotype accessories or in other occasions, to find environments where these accessories are more acceptable.

Biofeedback offers such individuals the ability to gain a safe experience, regarding their actions and responses against diverse factors, emerging from training and self-observation with ancillary biofeedback devices. In succession, after understanding in depth their means and ways of action and reaction, they can increase their behavioral resilience, find the courage to start revising their stereotypes and adopt action patterns more supportive of their homeostasis definitely safer and more useful for their survival and eventually for their happiness.

One of the reasons man often behaves brutally to his somatic or psychomental organ is that he is not aware of the small messages these transmit.

Through biofeedback you can become an excellent and sensitive receiver of the warning signals transmitted by your body or psychomental organ. Thus, you have the possibility to act with more respect and understanding toward yourself.

From such an action many pleasant feelings and emotions of satisfaction can spring up, constituting essential nutrients of your psychomental organ.

Biofeedback does not aspire to create super-humans, because there are no super-humans, nor can one be constructed, at least not through biofeedback. It creates self-conscious people, individuals who have realized the complexity of the entity called man, as well as the positiveness that may emerge from the countless capabilities that man possesses.

From the moment you find inside you, assisted by biofeedback, the key for the exploitation of these faculties, you will function at a definitely highly superior sphere than before.

Since in biofeedback training your attention focuses on your inner world, you become aware of your alienation you had up until now from your body and psychic organ.

Every patient, either suffering from chronic or acute or even a final stage of a disease, becomes aware of his complete lack of control over his body and feels as if his body has turned against him. This isolation from your own body can cease once you realize, aided from biofeedback, the cause between your thoughts, emotions and pathological processes appearing in your body.

The discovery and cognizance of this interaction is the beggining of a road that ends at a cure and the overall redress of somatic and psychomental health. Following this path, with the

adjunct of biofeedback, you become capable of tranforming negativity into positivity. You stop feeling like a stranger within your body, wherein lies a terrain where health-related phenomena transpire is irrespective of your personal will.

You can also discover whether or not annoying implications are induced from an unreciprocal love you may devote to others. At this stage you need considerable help to disencumber yourself from this negative experience. Once relieved of this factor, the chances to establish a harmonious and pleasant communication with your body rise significantly. Biofeedback, as a scientific method, is considered by all scientists as the medium returning to the hands of the trainee the joy and satisfaction related to the regulating or cure of the organism.

Rosseta and Stone, via biofeedback, opened a window allowing the observation of psychosomatic functions in childhood. Many predispositions, mainly for psychoemotional diseases, originate in early childhood experiences. In this age consciousness is dominated by sensory or purely mechanistic processes and not from mechanisms connected to speech or intellectuality. At this phase the infant correlates its sensory, mechanistic and cognitive experiences in a clearly empirical and instinctive manner.

When sitting in front of your biofeedback device you recognize experiences and incidents. Through them, or in parallel, you try to act. And your action, based upon standardized manners, often ends in failure. However, even such failure is a positive experience because through it you learn the alternative correct action mode. This process brings about a substantial opportunity to come into contact with the sources of your psychosomatic functioning.

Everything you have wrongly learned in your childhood can now be remedied, since during your biofeedback training the inherent mechanistic empirical phase of your childhood is re-approached in a functionally similar manner, however this time it is under your conscious control, guided from your trainer and benefited from the knowledge and experience you have so far gathered.

Observing the functions of your organism with biofeedback opens a considerable number of paths. You can walk on these paths with your own initiative. As you progress in biofeedback you explore your internal, sensory or perceptory and emotional world in such a way that eventually capacitates you to successfully handle the finest functions of your organism.

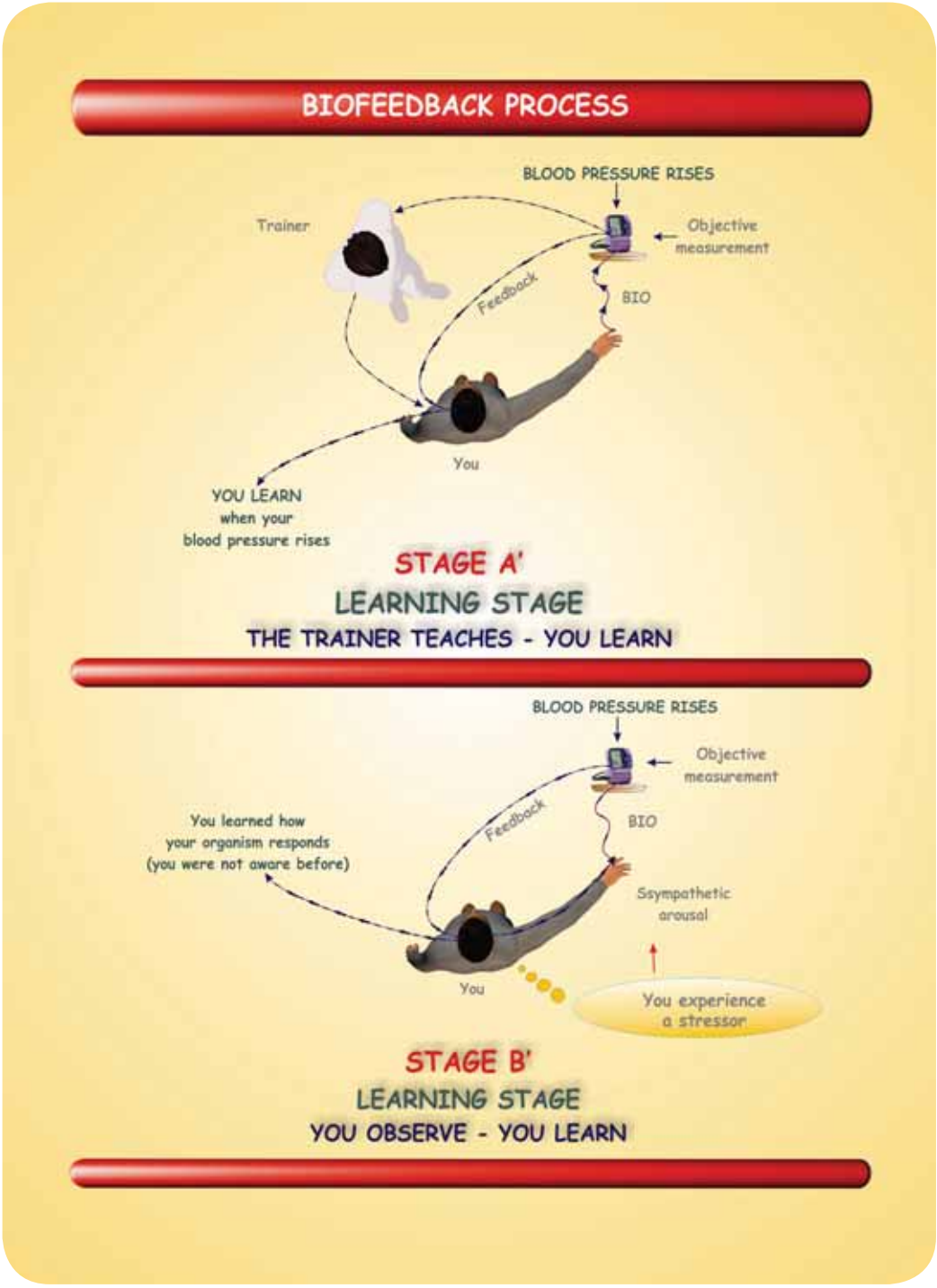
When you reach higher consciousness levels regarding the mechanisms which affect your psychomental organ and the repercussions which actually constitute the symptoms of your problem, then you are capable of following the processes of systematic desensitization. Systematic desensitization is one of the fundamental goals pursued in biofeedback. At this stage the triptych of the biofeedback training steps is introduced:

1. Training in muscular tension release.
2. Exploration of yourself.
3. Systematic desensitization.

Initially, you learn how to release accumulated muscular tension, an accomplishment granting yourself the ability to be in a relaxed state while you will be observing yourself. Relaxation is essential for both objective observation and for drawing correct conclusions.

Next, at this point in biofeedback observation you “learn yourself”. You start to enhance your self-knowledge. You notice how your organism functions and responds toward the diverse stressors or anxiety generating factors of everyday life. In succession, you use the gathered knowledge and experience to succeed systematic desensitization from all the factors you discover that play a destabilizing role for your psychic or somatic homeostasis.

Systematic desensitization is a precise technique that enables you to better endure the stress and anxiety generating factors, of which, not so long ago, you had been the prey.

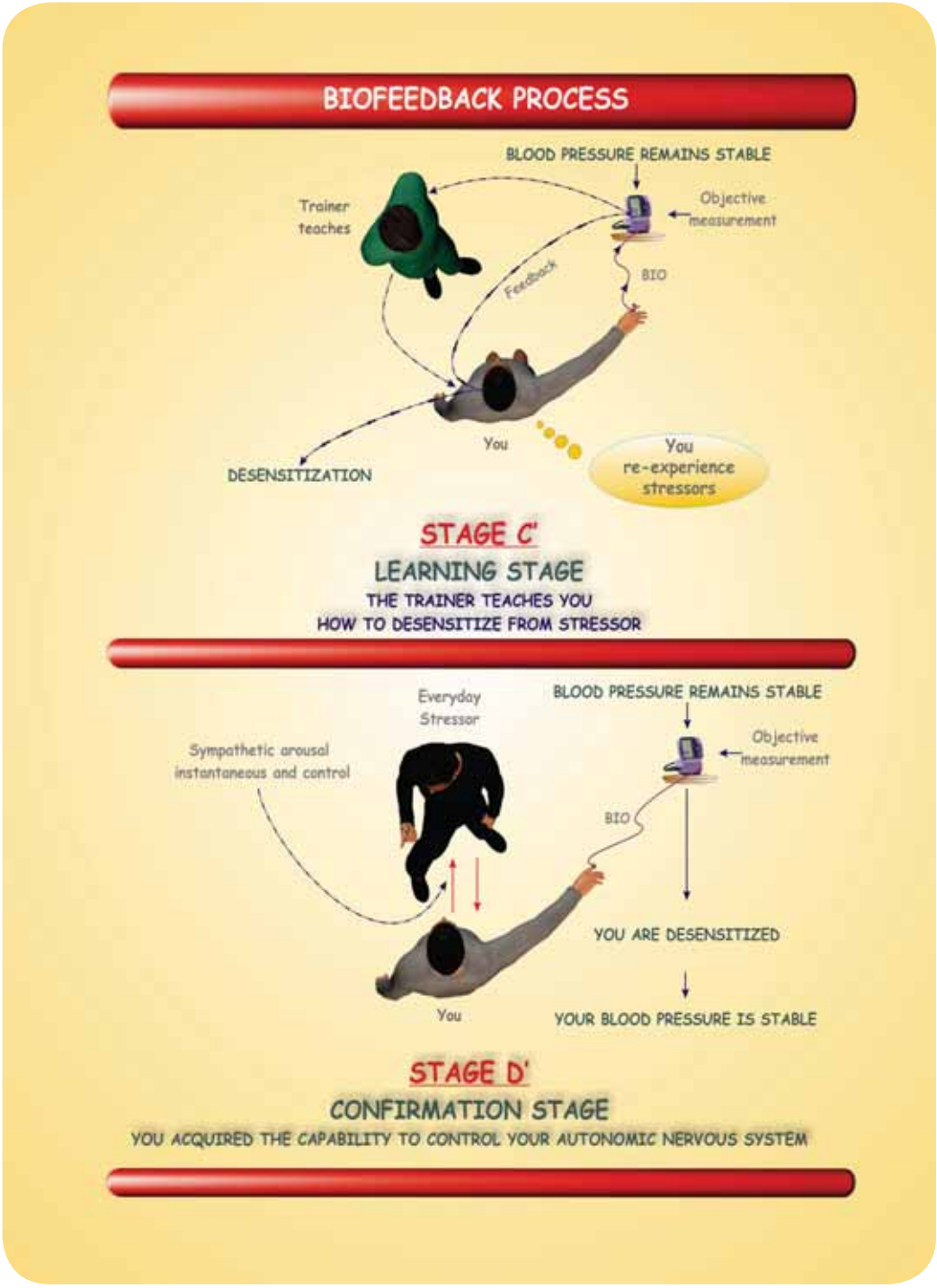

BIOFEEDBACK PROCESS
BLOOD PRESSURE RISES
Trainer
Objective measurement
Feedback
BIO
You
YOU LEARN when your blood pressure rises
STAGE A'
LEARNING STAGE
THE TRAINER TEACHES - YOU LEARN
BLOOD PRESSURE RISES
Objective measurement
You learned how your organism responds (you were not aware before)
Feedback
BIO
Ssympathetic arousal
You
You experience a stressor
STAGE B'
LEARNING STAGE
YOU OBSERVE - YOU LEARN

For example, consider a mother who feels the desire to beat her child when it is naughty. She has two possible options of reaction: either spank the child and calm down, which implies the respective psychological cost for both of to them, or avoid spanking it and further repress her desire. This was the case of a young mother, age 35, who was treated with biofeedback training.

She was suffering for more than a year from intense pain; starting from her right shoulder and extending down to her right elbow. She had presented tremendous aggravation in the past months and felt her hand becoming paralyzed from pain. She could not find a comforting position and large doses of painkillers brought only temporary relief. She was examined thoroughly but no pathological cause was found justifying this painful rheumatic-arthritic syndrome.

Her blood tests were normal, apart from a small increase in sedimentation rate. The pain receeded only during sleep and started again when she awoke in the morning. Electromyographic biofeedback was applied and excessive amounts of tension were detected on some muscles at the painful body area. At this stage of exploration, it was revealed that she was dealing with a 5 year old “Denis the menace”, a child restless, aggressive, naughty and stubborn often jeopardizing his bodily integrity. Specialists had not succeeded in calming down this child. She was feeling the irresistible urge to strike him, because she was often driven to desperation. She had reached the point of raising her hand but never continued, facing her oncoming action with a sense of guilt which ended in long hours of self-reprimanding.

Through biofeedback training the mother soon realized that she had developed a hysteric “painful hand syndrome”, imitating serious arthritis, which had almost reached the stage of complete paralysis, in order to give herself a strong internal and external excuse for not hitting her child. This woman had subconsciously chosen this specific way to escape from a dead-end in her psychological conflict. From the moment she became aware and comprehended the underlying pathological mechanism her improvement began. She also treated the child with biofeedback training and the problem was solved


BIOFEEDBACK PROCESS
BLOOD PRESSURE REMAINS STABLE
Trainer teaches
Objective measurement
Feedback
BIO
You
DESENSITIZATION
You re-experience stressors
STAGE C'
LEARNING STAGE
THE TRAINER TEACHES YOU
HOW TO DESENSITIZE FROM STRESSOR
Everyday Stressor
BLOOD PRESSURE REMAINS STABLE
Sympathetic arousal instantaneous and control
Objective measurement
BIO
YOU ARE DESENSITIZED
You
YOUR BLOOD PRESSURE IS STABLE
STAGE D'
CONFIRMATION STAGE
YOU ACQUIRED THE CAPABILITY TO CONTROL YOUR AUTONOMIC NERVOUS SYSTEM

at its root. Today they are both happy and co exist harmoniously.

There are subconscious action mechanisms which activate this entire reactive mechanism, which can eventually end in a serious “painful syndrome” or even total paralysis. The person, of course, ignores these subconscious mechanisms and remains the victim of an uncontrolled physiological process, that befalls him despite his will. In this occasion, the support provided by biofeedback, already starts from the first stage which is the training in the progressive release of chronic accumulated muscular tension.

The mother in our example, with the aid of relaxation, learned to significantly defuse her physical and to a certain extent her psychomental tension provoked from the child’s naughtiness. She also developed more patience and a deeper understanding for his behavior. Therefore, she was able to be more dialectical and conciliatory with the child. Opening a dialogue with the child smoothes out the relationship and consequently the child calms down. His naughtiness as well as his reactionary conduct is eliminated.

At the second stage of biofeedback training, the mother had the chance to encounter face to face all the mechanisms involved in producing the pathological syndrome and to start controlling them.

During the final training stage of systematic desensitization, the mother learned to control all the psychomental tensions which brought forth the pathological problem and became invulnerable to the mechanisms perpetuating and magnifying the problem. The end result of these processes is the complete restoration of a harmonious mother-child relationship, as well as the ability of the mother to teach simple techniques and ways to her child, so that he becomes able to deal with his own tension. This is accomplished by using the experience she gained from her biofeedback training coupled with maternal instinct and motherly love.

It is well known that when fathers and mothers are capable of seeing themselves and their children objectively, they perceive realistically the dynamics governing family intraperson-

al relationships and become competent healers in some of the ordinary behavioral problems in a family. The therapeutic intervention of a parent toward its children is incomparably more efficient than that of a respective therapist, provided of course that the parent's intervention is attempted by relying upon realistic and objective evaluations, subsequent to careful investigation and scrutiny.

Detach yourself from the circumstances

Training conditions in biofeedback should resemble the normal conditions of an ordinary neutral everyday environment, in which the trainer and the trainee live, usually without peculiarities that could draw the attention or create mental encumbrance.

As we know, many people, in order to relax and drive their tensions away, need to lie down on a quiet beach. Others need to recline in a magnificent forest, others lie comfortably on a soft chair in a beautifully decorated room, others take sips of a favorite drink, others need to be massaged, caressed, or receive expressions of love or tenderness: Everybody needs something.

All these people have a certain need which, if satisfied, will bring about muscular relaxation, tranquility and peace. This is normal up to a point. However, from the moment it turns into a firmly rooted need; addiction or attachment sooner or later can breed some pathological condition upon your psychoemotional organ. We are well aware that, due to the pace of modern life, most people are unable to ensure the conditions in which they could relax or feel peace and serenity.

Many people attempt to relax and calm down by isolating themselves from noise. Nevertheless, the loud noise emit-

ted by a motorcycle's exhaustion pipe, penetrating all types of earplugs, harasses the man who, little by little, transpires such indignation for his own incompetence to preserve the "quietness" he set in order to relax, that eventually he quits the effort, exhausted and a nervous wreck. Nevertheless, this withdrawal means that the person experiences high tension levels which sooner or later could result to a sudden collapse caused by the permanent arousal of the sympathetic nervous system.

We also know too well, that it is considerably difficult to live on a daily basis in the ideal external conditions you deem necessary for your calmness and serenity.

It is of vital importance to be able to relax, feel calm and tranquil in your daily life and not exclusively under "greenhouse" conditions.

No doubt, if you try to relax and calm down in a factory or next to machinery, you will not succeed easily, nor would you attempt it next to a pneumatic drill or near an airport.

Biofeedback trains you to an extent that you are able to relax, be calm and tranquil in everyday life circumstances and enables you to expand your resiliance limits against daily adversities. You become capable, step by step, to maintain calm and serene levels despite encountering environments with inauspicious conditions. Ultimately, you become able to tolerate even extreme harassments, such as drills or airplane noises, preserving satisfactory relaxation levels.

Despite that you, as every other human being, try to build your inviolable personal refuge, impenetrable by others; biofeedback will teach you how to conceive, as your personal refuge, several places, areas and conditions prevailing in your everyday life and to stop being exclusively attached or dependant on one specific environment, instead of to a singular condition, of which you think that only in this condition you can function and relax.


BIOFEEDBACK PROCESS
Everyday
Stressor
STRESSING
SITUATION
You
YOU LEARNED HOW TO
CONTROL YOUR BLOOD PRESSURE
YOU BLOOD PRESSURE
IS STABLE
YOU NO LONGER NEED
THE DEVICE
STAGE E'
UTILIZING YOUR CAPABILITIES
You control sympathetic arousal and
consequently protect your organism
and exploit your potentialities.

This fact explains why biofeedback training is performed under ordinary conditions and in a normal environment. It is easy to insulate a room against sound or temperature and create the ideal conditions for a relaxing environment. No doubt, such conditions facilitate trainees to be relaxed and calm. However, what do you think would happen if the trainees attempted to reach lower relaxation levels at home or at work under ordinary living conditions? Surely, they would face a problem and want to return to the training environment to feel relaxation and tranquility. In this way, dependence is created in relation to the training place, which is undesirable in biofeedback training. Biofeedback aims at capacitating you to detach and be independent from such "addictions" which are only sources of anxiety or tension instead of relaxation.

You can be completely functional under any circumstances provided that these do not exceed the factual, realistic, and natural human limits.

You are human and of course you cannot become superhuman, but you can fully utilize your natural assets without being subjected to the limitations set by your cognitive structure.

The training program in biofeedback can be individualized if the trainee presents particular difficulties. In such a case the program escalates progressively from easier to harder, thus the trainee feels satisfaction at every successful step of his training.

Objectivity makes the difference

Biofeedback, as compared to other systems teaching some type of muscular relaxation; such as yoga, psychological or psychotherapeutic techniques, physiotherapeutic techniques etc, has a significant advantage: in biofeedback you can get the objective picture of yourself during relaxation. Assisted by the devices, relying upon their indications, you can actually ascertain whether or not you relax. Overall experience has conveyed that many people, who practiced relaxation techniques for many years, simply cherished a "relaxation illusion", while their muscles retained significant amounts of tension.

Measurements in this respect proved that 70% of the people exercising in release of muscular tension through some method for over 3 years, finally did not accomplish significant muscular relaxation and remained quite tense during practicing. Despite their systematic exercise they observed that the process followed for muscular relaxation came to a standstill and became monotonous. Eventually, they became disappointed by the outcome of their exercise and gave up a system which, in other respects, could have proven very beneficial.

In biofeedback practice you can control yourself directly. You have a direct perception of whether or not you relax, a fact pointed out with objectivity by the device. Additionally, you have the advantage to seek solutions in the case that you find out that something obstructs your relaxation.

At this stage, with the aid of your trainer, you will probe into the factors inhibiting you from approaching deeper relaxation levels and the solutions that will be provided to enable you to work out the specific problem.

It is evident that biofeedback is the most realistic and consistent methodology to implement profound and effective muscular relaxation and stress control.

The advantages of global attention

The objective of biofeedback is to offer you the opportunity to come into direct contact with your real-self. This explains why you must pass through the barrier of the subjective picture you hold of yourself. An accomplishment achieved through global attention and observance of yourself. It follows, that it is essential to fully comprehend the necessity of adopting global attention, since the latter enables you to make more intimate contact with yourself. And the role of muscular relaxation in attaining spherical attention is quite decisive.

Another sense or state you will reach through your biofeedback training is harmonization, meaning the ability to be in harmony with facts or reality. In order to face reality direct, you must be able to tune in harmony, to be in agreement with the faces of reality.

Most people have high defense levels against real or imaginary threats, consequently they are constantly uptight and in a state of extreme vigilance; ready to respond to such factors. Much like a person who is very tense and in constant antagony with the sea, a fluid element, who is unable to float or swim. This person is in a state of over-excitement, strives with hands and feet to take a hold of a fluid element. He incessantly struggles, over-consumes his powers for no reason at all. If this individual harmonizes with the fluid element and lets go, shows confidence in his relation toward it, he will instantly feel the force lifting him to the surface where he can lie quiet and tranquil, not running from the slightest danger.

Perhaps, we have all tried to teach swimming to someone and have discovered how hard it is to make the other person understand, in relation to the fluid element, this simple and

EVERYDAY PROCESS

YOU GET STRESSED (Sympathetic arousal)

↓

BLOOD PRESSURES RISES

↓

YOU DO NOT REALIZE IT

↓

BRAIN STROKE

↓

YOU REALIZE IT

↓

YOU RECEIVE TREATMENT

CASE A'

NATURE TEACHES - YOU LEARN

You had never before realized that a stressogenic factor raises your blood pressure.
You learn it by falling sick.

small truth of harmonization and letting go.

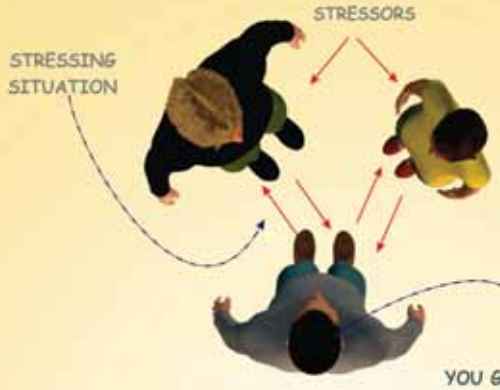
In many occasions in your life you react in a manner similar to your first contact with the sea. You struggle and strive to grasp something, to find supports and props when there is no reason justifying such extreme actions. Although you are in a situation offering you perfect safety, you consider yourself insecure and spend your energy on activities that could have been avoided.

Likewise, when one starts learning to ride a bicycle, the awe and excitement he feels before such a “magical” function and the possibility to ride unsupported on two wheels, bears upon his soul tremendous tension which is totally contradictory to the state of harmonization. With the “letting go” and the relaxation, learning how to balance the body-weight on a bike will come easier and faster.

Too often you use your past traumatic experiences as an excuse for the excessive tension with which you face many of your current daily activities.

In your relationships with other people, usually excessive tension prevails which leads to suspicion, taking measures in advancing and erecting needless defenses. Such attitudes towards an interlocutor breeds an atmosphere driving even the most well-aimed person to raise similar and parallel defenses, which eventually disfavors the intrapersonal relationship.

EVERYDAY PROCESS



YOU GET STRESSED (Sympathetic arousal)

↓

YOUR BODILY AND PSYCHOMENTAL FUNCTIONS BECOME DISORDERED

↓

YOU DID NOT REALIZE IT

↓

YOU GET SICK

↓

YOU REALIZE IT FROM THE SYMPTOMS

↓

YOU RECEIVE TREATMENT

CASE B'

NATURE TEACHES - YOU LEARN

The law of inverse effort

Let's think of a man lovingly embracing his sweetheart. If he starts having agonizing, compulsory thoughts about having the imperative of an erection to prove his virility to himself and his partner, then the result will definitely be negative.

Tell somebody: "you must get an erection right now" and you will succeed in making a positive outcome impossible. The intense and mandatory anticipation creates negative conditions for the implementation of the expected function. The same is also true for female orgasm. A woman cannot reach orgasm when the outcome is commanded.

Conversely, the state that will lead to a satisfactory erection is that of harmonization and "letting go", in which one lets himself be utterly free, completely relaxed and simply lives the pleasure, delight and positive emotions emanating from making love, from the erotic act with which he conforms in harmony.

Similar is the case of people suffering from constipation. They get panicked with the idea of ineffectual effort, strain and persist in ordering their bowels to function and evacuate. They go to the toilet and sit for hours, persistently commanding their bowels to evacuate. However, this intense and demanding anticipation for effect bears precisely upon the intestines a contraction or spasm, hence blocking evacuation. On the contrary, if they could adopt a state of relaxation and spherical attention, regarding the function of the large intestine, then they surely would have an effective and relieving evacuation.

We are all familiar with the nervousness of stage-fright and tension experienced by individuals appearing before large audiences, who perform an act which must yield a certain outcome. Nervousness does not spring from the action per se, but rather from the expectation of the result the person looks for-


EVERYDAY PROCESS
COGNITIVE STRESSORS
Your cognitive stressors
You
YOU GET STRESSED
YOUR BODILY AND PSYCHOMENTAL FUNCTIONS BECOME DISORDERED
YOU DID NOT REALIZE IT
YOU GET SICK
YOU REALIZE IT FROM THE SYMPTOMS
YOU RECEIVE TREATMENT
CASE C
NATURE TEACHES - YOU LEARN

ward to making. As a testament to this, artists, for example, get nervous on stage knowing that art critics are among their audience, since their future may depend on their reviews. Whereas they might exhibit zero-nervousness when performing before audiences regarded as not demanding,when they do not really emphasize the outcome.

These examples and hundreds of more that can be mentioned or sought in your personal life, accentuate that a strong expectance of a particular result when performing some action forms a negative influence on its outcome and its success. This phenomenon is explained by the law of inverse effort, stating that: each command to perform a function governed by the autonomic nervous system gives the opposite result. If you want to succeed in such efforts, then perform them without ordering the result, but by remaining absolutely confident and calm for the desired effect. Then it undoubtedly will happen.

When you give a command, the imperative character of the situation brings stress and sympathetic arousal, whereas the sexual functions related to an erection in men or an orgasm in women are ruled by the parasympathetic system. On account of the "seesaw" between those two systems, when there is a sympathetic arousal, the parasympathetic is supressed; thus an erection and orgasm is also suspended.

Biofeedback is the quintessential school where one learns to act according to the law of inverse effort: unselfishly, unprejudiced, through a sense of harmonization, letting go and global attention; these are the conditions that will lead to the maximization of the outcome of one's action.

The personality of the immune-potent type

Scientific research on somatic and psychoemotional interaction evidenced numerous correlations between personality characteristics and the functions of our immune system and our general health condition. Additionally, the inter-influence between the immune system and the psychomental system has been examined and identified. It was discovered that both systems share parallel activities and faculties.

For instance, both the brain and the immune system have the capacity to remember. The brain, and by extension our psychomental instrument, hold memory of facts, thus, apply the same responses or defenses in the event of similar cases. The immune system remembers the antigen identity of each invader and produces antibodies, the weapons in case of a future encouter.

Furthermore, both the mind and the immune system are designed to adapt. The psychomental organ creates the conditions needed for adaptation via its psychologic defense mechanisms. The immune system also creates adaptative conditions via its somatic defense mechanisms.

From a psychological aspect an individual adapts to environmental stressors while from an immune-aspect to environmental attacks.

Both the mind and the immune-system serve as defense functions. Psychologically, we defend ourselves against unbearable pain. Immunologically, we raise defenses against attacking microorganisms and other pathogenic factors.

In both systems, the mental and the immune, a decline in their defense mechanisms leads to pathological sensitivities. In each of these two systems, reduced defense capacity leads to disease. The lower and inneffective immune defense leads to allergies, while the decreased psychomental defense leads to neuroses.

In both systems, psychomental and immune, exposure to perilous factors brings about either immunity or over-sensitivity. When we administer consecutive allergen doses, there are two possible options: either immunity develops or an al-

lergy is aggravated. When we undergo strong emotional traumas, such as the loss of a loved one, we either respond with the power that a similar experience has bestowed us, or we get depressed. “I have passed through so much that I have learned to endure misfortunes”, says the successful battle-scarred champion of psychic ordeals.

A person with an immune-potent type personality has managed, by employing techniques that promote his psychomental and somatic organs, to attain the maximum performance of his faculties, which are shielded from external threats by a healthy and magnificently organized defense system.

These analogies emphatically assert that psychomental and somatic intruments are strongly interwined, inter-affected and inter-dependent. Research has now focused on controlling the relationship existing between the elements comprising a strong personality and a powerful immune-system.

The personalities that, through their behavior, exert therapeutic influence on their environment, almost always possess a healthy and strong immune-system.

Strong personalities possess certain significant qualities; dedicated and focused attention, expressive communication, and psychic and mental vigor; this vigor is not only well controlled but is also seeking an opportunity to be expressed. They further demonstrate dynamic social presence, confidence and are disposed to offer help and have an assortment of expressions and activities. Similar features demonstrate, proportionally and in its own jurisdiction; a potent immune system dedicated to the defense, protection, robustness, well-being and successful operation of the organism it protects and recognizes as its “own”.

These resemblances point out that the psychomental and immune systems are devoted to parallel and similar objectives and functions for the benefit of the organism. Both systems, in their own way, attend to the balance, harmony, communication and integrity of the organism.

In modern societies, a clearly distinct and new personality is named as the immune-potent personality.

Cognitive therapies, meaning those employing archetypical cognitive mechanisms in realistic and objective ways, enhance well-being by means of retraining the organism and by replacing harmful cognitive entities with other more positive and efficient entities for the organism. Biofeedback is a preeminent scientific application for succeeding forward this ultimate goal. Joint psychomental and somatic approach support behaviors which form a glass-house sheltering the growth of positive qualities, not only within the trainee but also within its social surroundings.

Both the psychomental and immune systems have activities which are of an altruistic nature and are dedicated to the service of a complex, multi-lateral and precious organism: the human organism.

A great idea is to bring man and his actions into a harmonious conformity with the social ensemble by imitating the natural actions of the psychomental and immune systems and offering altruistic work to society; aiming at the protection, support and preservation of homeostasis in our natural and social environment. Thus, a society is reproduced with the model of the immune-potent type: the person who does not teach with precepts or theories, but with his existence and by example practices all he has learned and now teaches.

"Do it yourself" and "helter-skelter"

It is a common secret that we are living in a country of "patents". We are in the "do it yourself" world. The expression "Oh come on, do it yourself", is common. This mentality emerged as a social phenomenon after World War II and a prolonged occupancy which had torn countries apart. However, it lingers on today as a dowry of the generation that still governs. As long as, for example, Greece remained isolated in its geographic space, avoiding direct comparisons and antagonisms with other societies, this phenomenon was deemed as acceptable, even necessary on certain occasions, for the survival of individuals or businesses. Nowadays things have radically changed. The mentality dictating the "do it yourself" or "helter-skelter" philosophies is not only obsolete and unrealistic in the vast field of the European Union, but moreover a peril threatening the survival of Greece as a nation. Especially, when this attitude alienates Greek people from the notion of competitiveness and productivity.

Such mental attitude may breed similar catastrophic results with respect to the administration of your internal functions and faculties.

Would you ever attempt to cross a vast forest or desert and reach your destination without a guide?

Would you ever face and improvise on a serious health problem without the aid of a physician?

Would you ever draw-up and improvise on legal documents essential for legal cases without the aid of an attorney?

Would you ever design and improvise on the mechanics of your home without the aid of a civil engineer?

Would you ever improvise on your tax returns without the aid of an accountant?

Would you ever pilot an airplane because you played with

a flight assimilation program on your computer?

Would you ever start using the biofeedback devices and trying to desensitize without the aid and guidance of a specialized trainer?

As a trainee in biofeedback, you will not learn to control your functions or liberate your capacities simply because you are connected or wired to the devices and above all you will not be cured solely on this account. As a biofeedback trainee you will not learn to control your functions or disentangle your capacities simply because you observe yourself. You must understand what you see, what it means for you and how to use it for your own benefit. If you take a look at your cat-scan or electrocardiogram, most certainly you will not understand a thing. However, if these records are explained to you, not simply by a doctor or psychologist, but by an experienced specialized physician, capable of interpreting and rendering them comprehensible to you - then you will gain precise and imperative information, required to move to the next step of desensitization or cure.

The use of the biofeedback devices per se, without the proper cognitive experience, instructions and guidance, does not establish a biofeedback process at all, since you can neither interpret what you observe nor apply it.

These may seem self-evident and perhaps you are wondering why I make such references.

I mention them because my eyes have witnessed plenty of self-made constructions and self-made methods, even in the biofeedback field: i.e. small devices with sound, color or music signals, flashing lights, desensitization programs limited to a photocopy escorting the “awesome machine” and so on and so forth. I have seen people who come to our biofeedback workshops so confused and disoriented from “biofeedback”, “relaxation” and similar methods that time the time was required to extricate and find themselves.

I have seen people as ostensibly calm as"Buddha" with red scale readings; meaning sympathetic over-arousal, as the biofeedback devices conveyed.

Therefore, I consider it my obligation to make some reference to these issues, since biofeedback constitutes a very serious, scientific and highly beneficial process. The scientific principles and scientific ethics must be piously adhered to and above all, the entire procedure must be governed with profound respect for the personality and idiosyncratic peculiarities of each trainee.

Among all regulatory applications, biofeedback is considered a form of training. From the point of view of several applications, biofeedback is a psychosomatic training. As in every training process its results are attributable to the trainer's knowledge, skills and personality, as well as to the attention the trainer affords to the trainees.

It bears special significance that the physician or psychologist conducting the biofeedback workshops is an integral part of the whole process.

Biofeedback, when employed in a clinical intervention, is considered as a treatment. As with every kind of treatment, its outcome is affected by the physician's knowledge, skills and personality, as well as the attention he/she affords to the patient.

Either applied as a treatment or as a regulatory training, the objectives sought and the amazing results are better accomplished with the assistance of professionals possessing high scientific standards and personality qualifications, who can harmoniously cooperate with patients or trainees who are well aware and conscious of their participation. A large part of

your mobilization is owed to your trainer. It is obvious that if the trainer treats you coldly or with reserved dry "scientific" behavior, lacking the element of personal contact and the knowledge of the mobilization "art" (which virtually gives creative impetus to the entire biofeedback process) you lose. You would remain a spectator of a science fiction play meaning nothing to you and even worse offering nothing to you.

This is not about assembling a cupboard, in which event, failure costs little.

When you venture into serious issues concerning yourself which involve great expectations, you definitely want to have the support of top scientists and tutors.

Through biofeedback you can change the way you view many of your everyday problems and especially yourself, in such a manner as to live in a more homeostatic environment. This indicates that it could be one of your most significant and remarkable activities.

"Helter-skelter" and "do it yourself" attitudes in biofeedback will yield nothing, because if you lack the assistance of an experienced trainer who can apply the proper scientific biofeedback protocol, you can neither objectively research nor objectively judge yourself.

Choose your trainer

Are all fingers alike?

Not all the fingers are alike, nor all biofeedback trainers the same.

The motto that "even if your teacher is not good, if you are patient and put up with him you will finally learn", can be true, for instance, in the case that you are taking driving lessons. In

the case of biofeedback this does not apply. In biofeedback, it is essential to keep an excellent relationship with your trainer, and of course, not only from a social point of view. Additionally, your trainer should be either a medical doctor or psychologist with special knowledge and experience.

The more "fashionable" biofeedback becomes, the more profiteers will sprout up offering "improvisations" in the cost of "heavy science".

If you merely put up with your trainer, instead of having the optimal cooperation and performance relationship with him/her, you risk dealing with yourself in a similar manner: you may simply tolerate yourself without ever achieving to understand or help yourself deeply and substantially.

Your precious relationship with yourself should be blessed with the best and most reliable scientific treatment in order to yield optimum results.

We often see short statured men or women, who surely have never been professional basket-ball players, coaching basket-ball teams. What makes them successful coaches is their ability to invent court-strategies and correctly match team players.

Such a coach, provided he is well-tolerated by the players, can bring peak performances.

We also very often see delicate or physically unfit individuals, who have never been boxers, coaching well-trained boxers. Their success is attributable to the fact that apart from teaching techniques, they further know how to boost the spirit and motivate the athlete.

This is not the case with biofeedback.

You cannot trust a stressed trainer; one who appears as an expert who will teach you how to control stress and anxiety, despite his constantly wet palms, his functional high blood pressure or tachycardia, the fact that he falters before an audience, his dyspnoea, his inability to have the faintest muscular sense etc, because all these unveil that the experience of stress control remains completely unknown to him.

You cannot, also, trust a seemingly placid “Buddha” who gets infuriated and has intense reactions every time you offend his egoism or question his authority.

You cannot trust a mountain guide who has merely studied the map and has not crossed the trek several times under diverse circumstances.

Biofeedback is one of the cognitive-behavior approaches. The cognitive-operation, with the adjunct of objective and correct knowledge, which must be accessible and comprehended by the one who receives it, provides material useful for the purpose of modulating your behavior so as not to be pathogenic, stop causing problems or disease, or else, stop “working” against you.

The biofeedback trainer does not simply carry information and instructions, but through his/her personal integrated knowledge and experience, guides you in the path for self knowledge and better exploitation of your abilities.

The trainer, through the communication he develops with you, will point out the information and analyze it, render it comprehensible and help you to alter the incorrect way you may interpret the incoming messages. Thus, he will empower you to correct the erroneous and dysfunctional views you hold of yourself and to your functions.

As a result, you acquire self-knowledge and self-confidence, you acknowledge your genuine abilities, you desensitize from stress and anxiety factors and furthermore you manage to employ all these elements to reach your goals and succeed inner and external prosperity.

Does this sound simple or superficial as to appoint it to someone not adept? Certainly, at some point you will no longer need your trainer, but by then you will have learned well the itinerary to your innerself and you can walk alone on the path and explore it.

Why does an athlete remain mediocre under one coach and become a champion under another?

Surely, their "chemistry" alone does not make the difference. When we are speaking about top achievements, wherein the slightest detail has enormous significance, personal sympathies must play some part, but the chief role lies on the trainer's knowledge, which can unearth and highlight the talent and potentiality of the athlete.

Most of the time, the athlete is unaware of his/her potential or even worse doesn't believe in it. A coaching connoisseur of biofeedback will use the objective portait offered by the devices to prove to the athlete his capabilities and through special training will convince him and make him believe that he can indeed make the best out of them.

When an athlete's performance is suddenly sky-rocketed, it is usually not because his/her training workout or physical qualifications has considerably changed. What has usually changed is the degree of self-confidence following a biofeedback course. He utilizes his ability to make better his physical and spiritual skills. This is different from dogmatic faith. It is the outcome of the processes which have truly persuaded the person that masters them and given them the required skills that can be unhindered and exploited for peak performances.

The art of biofeedback has the dynamic required to provide all the objective proof and methodology essential in reaching superior goals. In biofeedback, you do not develop a life-dependence on your trainer, as with a coach. Your ultimate goal is to maintain your physiological auto-regulation without taking feedback from external instruments. At this stage, you can support your physiological auto-regulation without your trainer's guidance.

From the moment you succeed auto-regulation you no longer need anyone else. You simply need to always keep an open dialogue with yourself. Necessity for the devices will

probably emerge circumstantially, in the event that you want to explore the role of a factor involved in your functions that suffers damages either on account of an accident or a sudden great stress unforeseen and unexpected.

Correct and efficient biofeedback programs include methods helping you to expand your acquired auto-regulatory capacities in order to become completely independent. Therefore, take good care in choosing your trainer.

Chapter 7

Electromyographic biofeedback

An essential device for myographic biofeedback applications is the electromyograph or myograph, or E.M.G. as is known worldwide from its initials.

In biofeedback workshops, a small portable high-tech instument is used, supplied by 3 volt battery, connected through optic-fibers to a special computer.

The electrodes of the electromyograph are placed on the skin, over the muscle under examination and monitor its electrical activity.

This minimal electrical activity exhibited by muscles is amplified and displayed in the form of either visual or acoustic signals on the computer screen. Depending on the intensity of the acoustic signal or on the visual reading, you have a direct perception of the amount of tension in these muscles, how contracted or relaxed they are.

Through electromyographic biofeedback, you learn to locate muscular tensions in your body and to release them before causing malfunction or disease.

You can also learn how to break the axon muscular tension - anxiety. This is succeded by learning how to release your muscular system from the impact of stress, originally accumulating in the form of muscular tension and in succession leading to various psychophysiologic problems, anxiety being the most torturous of all.

Electromyography commenced in 1929 when Andrian and Bronk published their first research. In the same year, Sir Charles Sherrington discovered and described the motor unit. Later on, after the end of World War II, around 1950, much research was carried out on electromyography, looking for solutions in the field of prosthetic extremities for amputat-

ed individuals. Thus, electromyographic kinesiology made a gradual progress and researchers finally managed to control the simple motor unit.

References to biofeedback were originally made by Borsook, Billig & Golheth in 1952, when they tried to replace a paretic muscle. In 1955, Marinacci announced the results from his clinical observations and research on various neuromuscular diseases. In 1960, Marinacci & Horande reported a number of cases treated via electromyographic biofeedback and proposed that biofeedback be selected as the chief intervention in the treatment of neuromuscular functions involved in several neurological illnesses. In 1964, Andrius announced an amazing scientific study which conveyed that electromyographic biofeedback, having been applied for 20 years on paralyzed patients, succeeded in restoring motion in the elbow area in seventeen cases. Similar research in great extent and diversity were conducted and reported by Basmajin, studying a large number of body muscles working to remedy neuromuscular problems.

Serious damages of the central nervous system have been restored with electromyographic biofeedback. In many cases, such as spastic diplegia, patients were trained through biofeedback to functionally move body parts.

The great plasticity that the central nervous system presents also plays a great role in this restoration, by permitting muscular groups which had fallen to disuse for a period of time in regaining their function, even if in some cases it had never been used before. Through this process, biofeedback has helped redress kinetic problems pursuant to brain stroke, cross-sections of spinal medulla, brain injuries, spastic hemiplegia diplegia, clerk's spasm, urine incontinency, etc.

The succession of processes followed in the electromyographic biofeedback training is as follows:

A. Initially, you are trained to realize the nature and the modus operandi of the function which must be restored.

You learn where the problem lies concering the specific function and the kind of dysfunction it brings about. You learn the “who is who” of your dyspragia (dysfunction).

B. In succession, you are taught how to voluntarily control this physiological function by receiving objective data regarding your efforts, via feedback.

At this stage, you must collect and interpret the data provided by biofeedback. It does not suffice to collect the evidence alone, you must further evaluate and utilize it so as to control voluntarily the physiological function requiring repair. To rephrase it; by utilizing the feedback data you must bring under your control the function being examined so as to stop causing the dysfunction.

C. Finally, through exercising, you consolidate the control you gained over the physiological function, reinforce and integrate it.

At the third stage, what you voluntarily succeeded through training is now taking place automatically and effortlessly.

Electromyographic biofeedback has played a great role and has offered significant aid in neuromuscular rehabilitation concering:

brain strokes
brain injuries and accidents
cross-sections of spinal medulla
torticollis (contracted neck muscles)
spastic diplegia
poliomyelitis
dislocation of tendons
Guillain-Barret syndrome
Clerk’s spasm
Parkinson’s disease

The electromyograph has been used as the main biofeedback organ in the treatment of numerous health problems such as tension headaches, urine incontinence, lumbar pains, chronic muscular spasm, physical rehabilitation programs, as well as in athletic training in order to improve performance.

Most people respond to stress by increasing muscular tension. This type of response, as is the muscle contraction, actually consists a preparation of the body to fight or flight, in order to avoid something unpleasant and to be ready to resist in the event of impending pressure or danger. Muscles accumulate remarkable amounts of tension. In the majority of people this muscular tension is rarely consciously recognized, particularly while the stress factor provoking this tension takes effect, especially when the stressor is psychologically camouflaged. Only when conscious attention is not misled or trapped from the prevailing situation which is causing stress or anxiety, can the muscular tension become realized.

Even if you have considerable tension, you may not feel it or be aware of it.

This can be understood if we remember that muscles consist of large bundles of muscular fibers and it is possible that a great number of these contract even before the phenomenon extends to the degree as to be perceived as spasm or pain. If one wants to justify the impact of stress on muscular tension, he must assert that he lives under social conditions imposing constant pressure or tension. In the opposite case, he should claim that he responds to social pressure too often, if not all the time. When tension becomes unbearable and the organism cannot sustain it any longer, a sudden spontaneous relaxation is observed, however, this is clearly an instinctive reaction that progresses very slowly. Sleep could prove a good antidote, but relaxation and release of tension should precede it.

If you are tensed when falling asleep you may wake up with even greater tension, since subconscious memories during sleep can keep muscles tense and dreams can further augment tension.

Considering that tension diminishes slowly, it can also soar higher if a stressful situation reappears too soon or if a new stress emerges.

If these situations are frequent or if you keep thinking, ruminating and recollecting stressful situations, then tension piles up and as a result muscles remain almost constantly contracted with all the ensuing disagreeable implications upon your health (chronic lumbar pains, neck pains, headaches, easy fatigue etc).

"Uptight" people usually get scared easily and react in an intense and spasmodic manner.

If muscles do not enjoy relief from tension through relaxation or a change in their activity, then muscular fibers naturally adjust to increased levels of tension. This state seems to derange the inherent regulatory system of muscles.

Continuous stress or mental rumination on situations causing stress does not allow muscles to relax, thus tension steadily escalates.

However, this does not end the debate. Since such large parts of muscle mass remains contracted, huge numbers of messages are transmitted toward the respective muscle control areas in the brain. These signals act upon the brain as stressors, confirming that a reason exists for the organism to remain in fight or flight state. Thereby, the brain sends back orders for even greater contraction. This way the vicious circle is completed and the individual is trapped in ever increasing stress, pushing the organism to its endurance limits, and eventually pathological conditions break out and the person collapses.

Since you rarely allow time for self-observation, your muscular condition usually escapes your attention, until it causes considerable malfunction or disease. You give focus to the stressogenic factor and by ruminating, stretching and over-es-

timating it and its implications, you set the conditions for establishing permanent muscular contraction and the vicious circle of general tension. Because increased tension does not fall under the consciousness scope, inhibitory mechanisms cannot come into play. Thus, muscles stay tensed, as in the fight state, and remain in this state until the conditions fueling this tension are removed or until you consciously acknowledge the existing tension and proceed to the appropriate corrections. However, if this does not occur, if a solution is not provided to the problem, then tensions become chronic. Consequentially, apart from the somatic problems mentioned above, intense anxiety emerges because muscular tensions bear upon the psychomental level a similar phenomena.

Another phenomenon causing significant amounts of unconscious muscular tension is dysponesis.

If we observe a young student while doing his homework, we usually notice that his body is tense and bends, he lifts his shoulders, and keeps the hand not used in writing clenched or stiff. Travellers carrying suitcases in stations usually hold the opposite shoulder lifted, adopt a bent posture and body stiffness, and facial expression muslces contract in an expression of weariness and distress. In speakers participating in an open discussion and trying to win over their audience, we usually observe spinal lordosis, i.e. uplifted stif shoulders, uptight expression and neck rigidity.

In these examples, along with many more, you can spot in everyday life what man conveys when he is making an effort. Apart from using the muscles necessary in the implementation of a certain movement, he strains purposelessly several other muscle groups which are not involved in the specific action.

The phenomenon of unnecessary and unnatural contraction of muscles not involved in a movement, is called dysponesis. The body cannot last for long under dysponesis.


DYSPONESIS
In this phenomenon muscles not involved
in a certain movement needlessly contract and wear out
Right Posture
All muscles relaxed
except from the ones
involved in the movement
Wrong Posture
Contracts and lifts the shoulder
which need not work
to carry the suitcase.
Contracts facial muscles
Right Posture
All muscles relaxed
except from those
working to carry
the cart
Wrong Posture
Contracts and lifts shoulders
which need not work
to carry the cart.
Contracts facial muscles.

Dysponesis results to an accumulation of muscular tensions in the body with all the aforementioned consequences.

As a teenager, in the ‘60’s, I admired long-shoremen loading cargos at Alexandroupoli harbour. I used to watch them carrying wheat sacks from the boats to large trucks for long hours without a break. I regarded them as men of supernatural strength. I thought they were made of a different kind of material. Although I was fit, training in water polo, rowing and sailing with great endurance for my age, I lifted and carried relatively easy the sacks, but after working for twenty minutes I was a wreck. I was puzzled with the strength and endurance reserve hidden in these people, who although often middle-aged, worked all day long with just a short break for a frugal lunch. I did not know then what they had on their side. While I was contracting all over, putting in extra effort, they were easily going and calm, as if the load was part of their body. Later on, I realized that this job too, as many others, needs gain not strain, in other words it requires: “the proper way”. They simply avoided dysponesis, whereas I was breaking down my muscular system from dysponesis. However, as a university student, I had a positive experience of this rule. When for the sake of training and keeping engaged in some activity during vacations, I was loading and unloading sacks of raisins at the estate of my Cretan friend, who offered me her hospitality. Her father noticed my ease in weight-lifting and told my friend’s brother who was working with me, “Andrew, lazybone watch Spyros. What is he doing so that he doesn’t get tired? You get short of breath with only ten sacks?”. I was putting into practice what biofeedback has disclosed to me in the meantime. Professional long-shoremen, who produce great amounts of muscular work daily, thus must preserve their muscular system at the best possible functional condition. They have invented their own apt technique in carrying loads. They allocate weight simultaneously in several muscle groups and in parallel keep the muscles not involved in the work relaxed. Once they unload, they relax and rearrange their muscles. While carrying the load, their body has elasticity and agility, and finally, they keep a personal steady work pace which enables them to perform work without unnaturally wearing-out their muscular system.

And of course all this instinctively; under the need to survive.

Electromyograph is the proper device for measuring, recording and informing you about the load of tension in your muscle groups. It provides you with feedback and objectively informs you every time you succeed or fail to relax or desensitize you muscular system. You know from an objective source what you must incorporate and what needs to be re-examined and corrected. Without the electromyograph your attempt to know and relieve your muscular system resembles trying to fly an airplane without wings.

Chapter 8

Electrothermographic biofeedback

In electrothermographic biofeedback applications, the electrothermograph, or simply thermograph, or as is widely known THERMAL, a special electronic thermometer is used.

The biofeedback thermograph or THERMAL, is a special electronic thermometer operating with 3 volt batteries, differing mainly in two points from common electronic thermometers: firstly the former gives readings both when tempeature rises or drops. Meaning it does not measure only the maximum observed temperature during an observation period but constantly monitors temperature fluctuations. Secondly, there is a sensitivity difference. The biofeedback thermographer usually has three scales. The first scale measures absolute temperature and temperature changes in degrees. The second scale and third scale convey temperature changes ranging from 1/10 or 1/100 of a degree respectively. At this point, it is worth mentioning that an individual untrained in biofeedback can hardly sense moderate temperature changes of few degrees and is surely unaware of temperature fluctuations in terms of tenths or hundeds of degree.

To detect temperature, this instrument usually relies on a thermistor, a special sensor consisting in a thermo-sensitive resistance which easily varies its value according to temperature changes. The electric resistance is in succession interpreted in terms of electric current which is amplified and displayed on a computer screen as a graphic depiction.

The sensor is placed on your fingers or toes, face or other body areas, depending on your needs. Nowadays, in biofeedback workshops the thermographs are used connected to computers. Through the computer, the trainer selects the most suitable way to portray temperature fluctuations, so as to provide you with feedback for maximum results in minimum time.

Temperature fluctuations in the body's periphery are contingent upon the level of sympathetic arousal as well as on somatic thermoregulatory functions. This means that they depend on whether or not stressors have acted on the organism and stimulated the sympathetic branch of the autonomic nervous system.

Body temperature measurement constitutes indirect measurement of blood flow to the monitored body parts, granted that temperature ranges correspond to respective changes in the blood flow to tissues. More direct and specific measurement of blood flow changes is obtained by means of photosensitive methods, such as the respective photosensitive instrument used in biofeedback.

Several factors exert influence upon blood flow volume. At the arterial level the blood flow is conditioned by arterial walls. The contraction of smooth muscle fibers coating artery walls, ignited by the arousal of the sympathetic branch of the autonomic nervous system, in other words stress brings about vasoconstriction. As a consequence, blood flow is reduced, thus causing a considerable lowering in skin temperature.

Vasodilatation is observed when there is a decreased sympathetic activity upon the smooth muscle fibers of the arterial walls, namely in a relaxation state, which results to relevant increase of blood flow in skin temperature.

Thermoregulatory functions are very significant for the maintenance of homeostasis in man.

When central temperature drops, the organism in order to preserve homeostasis, causes vasoconstriction at the periphery, extremities and skin vessels, so as to avoid or limit further heat losses.

If you intervene artificially and induce changes in this procedure you put your homeostasis, even your own survival, at great risk.

Alcohol consumption, when central body temperature is low, would bring about periphery vasodilatation, antagonizing your endogenous homeostatic balance, this, along with conditions of prolonged exposure to cold, could cause hypothermia and death.

In other words, it is a perilous great mistake to drink alcoholic beverages to warm up while still exposed to cold temperatures. Alcohol will be useful after having found a shelter.

Homeostatic balance mechanisms affect the entire organism. The optimal temperature of an organism depends upon both internal and external factors. An increase of sympathetic nervous system activity is, usually, connected with the fight or flight response, when we encounter stressful situations. When fight or flight response is brought into play, vascular reactions take place leading the blood away from the periphery and the gastrointestinal tack, towards the muscles and head (Cannon, 1963). Practically speaking, the results of this mobilization are perceived as cold hands or feet. This response can be triggered by either external stimuli, for instance an anticipated accident when driving, or internal instigation, such as the feeling of fear or anger you have for your boss.

On the other hand, anything that can bring about relaxation, presents the exact opposite outcome, vasodilatation and temperature raise and implies increased activity of the parasympathetic branch of the autonomic nervous system.

The above described response toward stressors constitutes the primary and primordial response of the organism toward any type of stimuli. There is nothing unnatural in this response. However, once the stressor disappears, the system must return to the normal arousal and operation levels. If this fails to happen, then a pathological state emerges. Chronic response to stress, which is equal to anxiety, is accountable for 80% of diseases regarded from a physiology aspect as psychophysiological, that is, as psychosomatic.

Chronic stress response, initially displayed in the form of muscular tension, vasoconstriction or extreme vasodilatation (blushing) leads also to psychosomatic health problems and vice versa, it can also be ignited by such problems.

Your vascular system supports the entire life cycle of your cells, by supplying them with blood which provides oxygen and nutritive substances and in parallel carries away the useless byproducts of cellular metabolism. It is obvious that any alteration of the function of the vascular system can influence any part of the body, since changes in one system bring about changes to all the rest.

This reaction is in agreement with Charles Stroebel's assertion that many diseases have a vasoconstriction origin.

According to Elmer & Alice Green of the Menninger Foundation, the vasoconstriction of some brain vessels raises the feeling that you "are sick" while the subsequent excessive vasodilatation with the ensuing blood congestion, is what you experience as a migraine.

The pain felt during a migraine is accountable to local vasodilatation occurring through biochemical processes. This painful vasodilatation emerges to counter-balance the preceding extreme vasoconstriction caused by the sympathetic nervous system arousal.

When you are in a state of stress, your sympathetic nervous system is stimulated and this brings about vasoconstriction. When vessel walls constrict their diameter decreases which results to decreases in blood supplies for some organs at the periphery. In succession, the organism trying to restore blood circulation starts vasodilatation by bringing into play the parasympathetic nervous system. The "seesaw" balancing activity of the two branches of the autonomic system, sympathetic and parasympathetic, is in full action. When the "seesaw" does not redress balance

immediately but leans toward the parasympathetic side-activity then hyperemia is induced which is translated as a migraine.

Raynaud's phenomenon and disease are also correlated to reduced blood flow at the extremities.

Inexplicable heart strokes observed in young individuals, without any indication of arteriosclerosis or cardiac disease is frequently the result of localized vasomotor spasm, on account of stress, which deprives the oxygen from the heart.

This means that when blood vessels constrict intensely and rapidly, it can cause cardiac arrest, which can occur also when a person falls suddenly into cold water with a full stomach. Likewise, angina pectoris, as a cardiac problem attributable to vessel blockage, is often imputable to vasoconstriction. Dysmenorrheal pains can also be accounted to the drop of blood flow, while allergies can often cause vasodilatation or bronchial spasm.

The training for temperature regulation at the body's periphery basically relies upon a technique increasing peripheral blood flow.

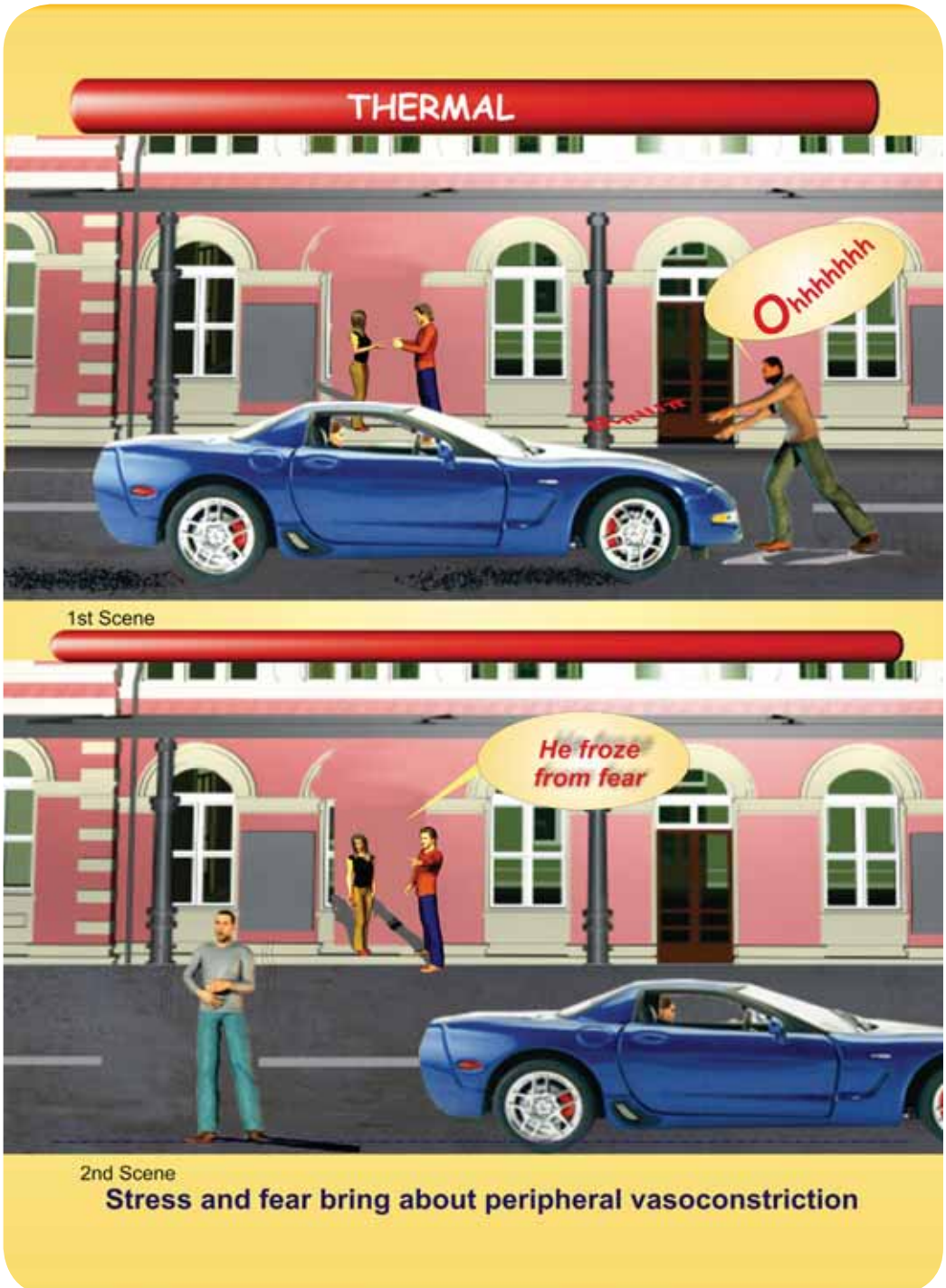
Temperature, and by extension blood circulation, like the rest of physiological variables, is subject to the law of "initial values and biological limits". As this law states: Autonomic Nervous System response toward a stimulus depends directly upon its prior level, meaning its initial value. The higher the functional level preceding the action of the stimulus, or else the higher the initial value of a function, the smaller the response toward the stimulus which tends to increase this function. To make it simple, the more stretched an elastic rubber band the less it can be further stretched, since it is

closer to its limits.The more constricted the vessels, the less they can further constrict when exposed to a new stimulus. When vessels retain extreme tension levels and are exposed to the next stimulus, there is strong tendency for minimal or zero response to the new stimulus or even for paradox, abnormal responses or reactions.

Training in body temperature control was initiated by Elmer Green and his collaborators at the Menninger Foundation. Subsequent to their original findings, the experimental and clinical applications of biofeedback studying temperature control advanced with amazing rapidness.

The striking interaction between knowledge and experience is illustrated in the study of Peper & Grossman who provided very encouraging results from the application of autogenic temperature self-regulation in children suffering from migraines. Their work proves that cooperative children learn much faster than not-activated adults. What spreads enthusiasm is that in this study with children, the disease pattern appears completely altered. Studying other therapeutic approaches involves a considerable difficulty degree in distinguishing between alleviation or relief and real cure, since treatment is usually symptomatic, oriented to fight down the symptom. According to the research conclusions, after the completion of a four year survey, the children had very few headaches and when occuring could control them. Mastering autogenic training via biofeedback enabled the children to modify the functions leading to the disease and to learn alternative ways in reducing their stress-related responses. The electrothermograph was employed in their training.

Up to date temperature control techniques relying on electrothermographic biofeedback have been applied in several fields. French, Leed, Fohrion, Lau & Jecht trained male university students to raise scrotum temperature as contraception means. These individuals demonstrated considerable decrease in sperm amount of remarkable duration, meaning as long as they practiced the technique. Sedlasec and Hecrey trained women to raise vaginal temperature to eliminate dysmenorrheal ailments, while Bradley taught women to raise vaginal temperature as a basis for painless childbirth.


THERMAL
Ohhhhhhh
1st Scene
He froze from fear
2nd Scene
Stress and fear bring about peripheral vasoconstriction

Thermographic training usually starts with the hands, placing the sensors on fingertips or palm.

It is advisable to place the sensor at a different area in each session, because the ability of the body to learn is so enormous that the trainee can easily learn to control the temperature of one finger, while the next remains cold. At the beginning one notices that when training one hand with the thermograph is usually has an affect upon the other hand too.

As your dexterity increases in achieving temperature regulation you finally reach a stage where you can control hand temperature at adjacent points, closer than two centimeters, then you realize that you accomplish this in both directions, toward hot or cold. In order to reach general relaxation the sensor must be placed on various areas, even at the feet, or elsewhere according to the trainee's needs.

We often repeat in our training workshops a process that was followed in the past by one of the psychophysiologist therapists in Menninger Foundation Biofeedback Psychology Center. We exhibit the body-mental link between mother and child, both trainees in thermal groups. In one case the mother complained about poor school performance of her child.

We brought the thermosensor in contact with a finger of the right hand in both trainees, the trainer told the child: "now, add 237+132, come on, answer me, speed up". He used an intentionally demanding and pressing tone to stress the child. The child confused from the pressure, replied stuttering "ah… 365". He gave the wrong answer and his temperature dropped one degree. The temperature dropped because the child, under the pressure of the stressor, responded with sympathetic arousal which caused vasoconstriction in his hands. The mother was surprised and her temperature also dropped three degrees. As was displayed, the mother was stressed, indeed intensely, with her child's

mistake. Then she remarked: “It just dawned on me that the impact of my child’s difficulties in learning affects me, it upset and stress me. I must do something about it”.

This demonstration was not attempted solely to convey the direct affect a psychosomatic problem has on us, but additionally to show both to the child and the mother the strong link between psychological and physiological functions.

If the blood flow to the hands changes under the influence of mental factors, what is happening with the blood flow to the kidneys, liver or the stomach?

Significant reduction of blood flow in brain areas under psychogenic stimuli explains scientifically the phenomenon of temporary amnesia, or a loss of connection to reality and lack of orientation. As the expression goes “he’s lost it” or “he went bananas”.

Another example showing how self-regulation training can become part of our education is that of L.L.Engelhard in Spearfish USA, where biofeedback was included in the local junior-school program: kindergarten up to 12 years of age. As a preparatory step, the value of such a program was explained to both teachers and students. Similar references were also made to the members of the community. The program was named “Information on biofeedback through school education” and the pursued objective was set as the minimization of anxiety and uneasiness in students. The techniques of progressive release of chronic accumulated muscular tension, autogenic training and thermographic biofeedback training were selected to teach anxiety elimination and an increase of self-knowledge in respect to internal functions, via deep muscular relaxation.

All the trainees, 32 children, successfully followed the entire program. 28 managed to achieve the predefined goals, to reduce muscular tension at extremely low levels, and develop the ability to raise voluntarily their temperature each

time stress made their fingers freeze. From a psychological aspect, their overall uneasiness was considerably limited and their self-acceptance was impressively boosted. The enthusiasm of the team was so overwhelming that many teachers started working with various students employing relaxation methods. This survey evidently manifests that most of the objectives pursued in preventive medicine were accomplished on this human specimen.

Electrothermograph is the device that gives you information on the condition of your vessels at the periphery when you are under stress. Through this device you receive information, feedback, and whether or not you succeed to bring under your control these functions and desensitize from the stressors responsible for your vasoconstriction and its concomittants.

Without the thermograph, biofeedback would look like a Ferrari without an engine.

Chapter 9

Electrodermographic biofeedback

A variable psychophysiological function that can be approached by the biofeedback method is electric skin activity.

The feedback signal is based upon changes monitored in the electric activity of the skin.

Electrodermograph or simply dermograph or G.S.R from the initials of Galvanic Skin Resistance, is the device recording skin electric activity and has been used in an assortment of clinical and laboratory applications.

A laboratory dermograph is a small portable instrument with a 3 volt battery supply which is connected through optical fibers to the computer. Its electrodes are always placed on fingers or palms. Changes in skin electric activity are recorded either as resistance (OHMS) or conductance changes (MHOS) and transformed into visual or acoustic signals fed back, in succession, to the trainee.

The electric activity skin presents is chiefly accountable to changes occurring in its electric resistance.

The electric activity of the skin depends on the activity of the perspiration glands: the greater the activity of the latter the more perspiration is excreted and the lower the skin's electric resistance. Sweat is a good conduit for the electric current, therefore the more we sweat the more current passing increases, and consequently resistance decreases. Perspiration glands stretch all over the body and are divided in holocrine and apocrine. However at the palms and the soles the apocrine type prevails. In axillae and genital organs area the holocrine glands are located.

So at the fingers or palms, the areas used in biofeedback, the apocrine glands are found.

Diminutive changes in the activity of perspiration glands, meaning quantitative changes in secretions, bring about respective changes in electric skin resistance. However, the perspiration glands' operation is controlled by the autonomic nervous system in such a way that greater sympathetic arousal, namely stress, leads to greater gland activity, therefore greater amounts of sweat, and consequentially lower skin resistance.

Another factor affecting electric skin activity is the circulation of free ion systems under the epidermis. The circulation of these ions depends on the blood flow inside the arterioles and venules of the skin, the diameter of which and the resultant blood supply is controlled by the autonomic nervous system. The correlation is of the type that increased sympathetic activity, occurring when you are stressed, induces vasoconstriction, ions supply reduction and thus reduction of the monitored skin resistance. The electrodermograph detects and measures autonomic nervous arousal through two channels. Firstly, through skin perspiration secretion, which causes fluctuations in skin electric resistance, and secondly through free ions circulation which varies according to the peripheral vessel constriction or dilation.

This makes it obvious that electrodermal activity reflects the general arousal or "discharge" of the autonomic nervous system with respect to to the functioning of your psychoemotional organ.

The dermograph provides you with information upon the level of the psychoemotional stress you experience.

There are various ways of measuring electrodermal activity. The most common is by measuring skin electric resistance or, as is usually refered, galvaning skin resistance. The galvanic skin resistance decreases when the activity of per-

spiration glands increases and when ions circulation under epidermis decreases.

Another method, less common, used to estimate electrodermal activity is by measuring skin voltage emerging from the circulation of the above mentioned free ions.

If we observe the ranging of electrodermal activity, we will notice two phenomena: the tonus level or else baseline and the interim respones or phase responses. The baseline of electrodermal activity resembles the muscular tonus: it is a constant activity, in this case of electrodermal nature, which shows only very slow changes. The baseline usually is refered to as the skin conductance baseline or as the skin voltage baseline.

A phase response indicates a change in electric skin activity as response to some internal or external stimulus. Phase response variations are considerably more rapid and larger than those observed at baseline. The time required for the completion of the reaction, the inertia or inaction period, the level it will reach, the response peak, the time it stays at this level, the preservation time and the time needed in order to return to the pre-stimulus electrodermal activity are parameters supplying the trainee in electrodermal biofeedback with very important information.

The dermograph is the instrument that supplys you with information on your psychoemotional condition. It records the psychoemotional responses occurring inside the organism under the influence of certain stimuli.

You realize and classify the influences and stimuli you receive, however you are ignorant of the psychoemotional impact they breed upon your organism. Besides any superficial, perceived impact, these factors deeply and essentially influence effect your psychomental homeostasis and body functions.This dermograph detects and reveals this profound impact. Studies have been carried out on high blood pressure patients, on patients with phobias, panic attacks, on wom-

en during labor, on athletes dealing with pre-game or game stress etc.

The electrodermograph measures certain functions of the autonomic nervous system and shows you the degree of arousal or relaxation in your body. Learning with the help of this device how your organism works, will make you realize how much you can affect your health and physical condition.

This way you learn about the link connecting your psycho-mental or somatic dysfunctions and the feelings you daily experience. Finally, you get the chance to desensitize from the influences disordering your inner-functions and homeostasis. Without the electrodermograph biofeedback resembles a top school deprived of its professors.

Chapter 10

Electroencephalographic biofeedback

Electroencephalography measures brain electric activity with the use of electodes placed on head surface.

In electroencephalographic biofeedback, a small portable device is employed, called an electroencephalograph or encephalograph or as it is known worldwide E.E.G.

The history of encephalography dates long into the past. In 1791, Galvani first noticed that nerves present some strange kind of electricity. Very small electric currents have since been named after him and are called galvanic. In 1875, the physician Richard Kayton published his treatise upon the electrical activity exhibited by the brain. He showed that brain electric currents indeed existed, some of them were produced pursuant to stimulation of the eye retina coat and acted upon the opposite brain side, this remark subsequently led to the discovery of the electroencephalograph as we currently know it.

In 1900, Adolf Beck first observed the periodically altering potential difference between two electrodes in contact with the occipital brain cortex and further noticed that these currents ceased when eyes became stimulated with light or ears with sound.

During the same period many more researches engaged in studies on the electrical activity of the brain. Among them was the Russian Danilefski, who in 1876 noted that brain electrical activity presented changes, ostensibly, independent from external stimuli. In this perspective, the brain seemed to hold its own, independent electrical activity.

Polish researcher Kibulski, teacher of A. Beck, and his associates proposed an explanatory model, a mechanism regarding the plausible origin of these biological electric currents. According to Kibulski, these currents were accountable to quantitative, concentration and differences of chemical substances alongside a cellular membrane. The ions flowing in the nerves and muscles passed through this semi-permeable membrane, which allowed only positive ions to cross it, while blocked the negative ones. In 1914, he presented photograph-

ic data documenting brain instinctive oscillations, as he characterized them, captured from observations made on animals. However, Neminsky had published the first photographs of brainwaves a year earlier.

The first brain activity record, the very first electroencephalograph performed with electrodes on the external scalp, is attributed to Hans Berger in 1925. His primary concern was to study the basis and expression of psychic phenomena at a physiological or somatic level. In 1929, he announced his classical paper on encephalography. This was a breakthrough which maximally contributed to the development of diagnostic techniques for epilepsy and brain traumatic situations in general.

The electrical activity of the brain is divided into four transmission sections depending on the frequencies of the recorded brainwaves. These range sections are symbolized worldwide with four letters from the Greek alphabet: β, α, θ, δ.

The key features of the brain activity and the brainwave transmission of each brain section are the following:

β (beta) waves: When the brain electrical activity ranges between 14-26 Hz, the encephalogram displays beta rhythm, and it is commonly said that the individual is in beta state. The frequencies above 26 Hz are usually referred to as high beta.

β-waves or rhythm usually correspond to brain activity connected with alertness, active thinking, active attention, focusing on the external environment or solving certain problems and also to stress-related or panic-inducing situations.

α (alpha) waves: When brain electrical activity ranges between 8-13 Hz, then the rhythm prevailing in the encephalogram is alpha and we say that the person is in alpha state.

A person's emotions while increasing his alpha rhythm have been described as general relaxation feelings, mild and pleas-

ant, although the individual remains alert.

α-waves generally indicate the state of relaxed vigilance and also the state of non-active or passive attention, which is better described by the term spherical attention. When your brain transmits alpha-waves your mind reaches a state of greater conceivability, enhancing learning processes and knowledge assimilation.

Most people produce some alpha waves when keeping their eyes closed. Thus researchers were initially driven to the misconception, as was later proved, that alpha waves constitute nothing but waiting or scanning signals emitted from the visual centers situated in the brain. Alpha brain activity is diminished or disappears when the eyes open, when hearing odd sounds, with anxiety or during intense, imperative, active mental effort.

θ (theta) waves: Theta waves range between 4-7 Hz. They appear when consciousness slips into sleep and characterize the hypnagogic phase (falling asleep).

θ-waves have been correlated with access to the subconscious mind and unconscious material. They have also been connected to the creative esoteric inspiration and deep meditation.

δ (delta) waves: Delta waves range between 0.5-3 Hz.

δ-waves appear when the individual is in a deep sleep without dreams; the usual expression is that the person is in delta state.

J. Kamiya Langley of Porter Neuropsychiatric Institute, California Medical Center conducted pioneering research ex-

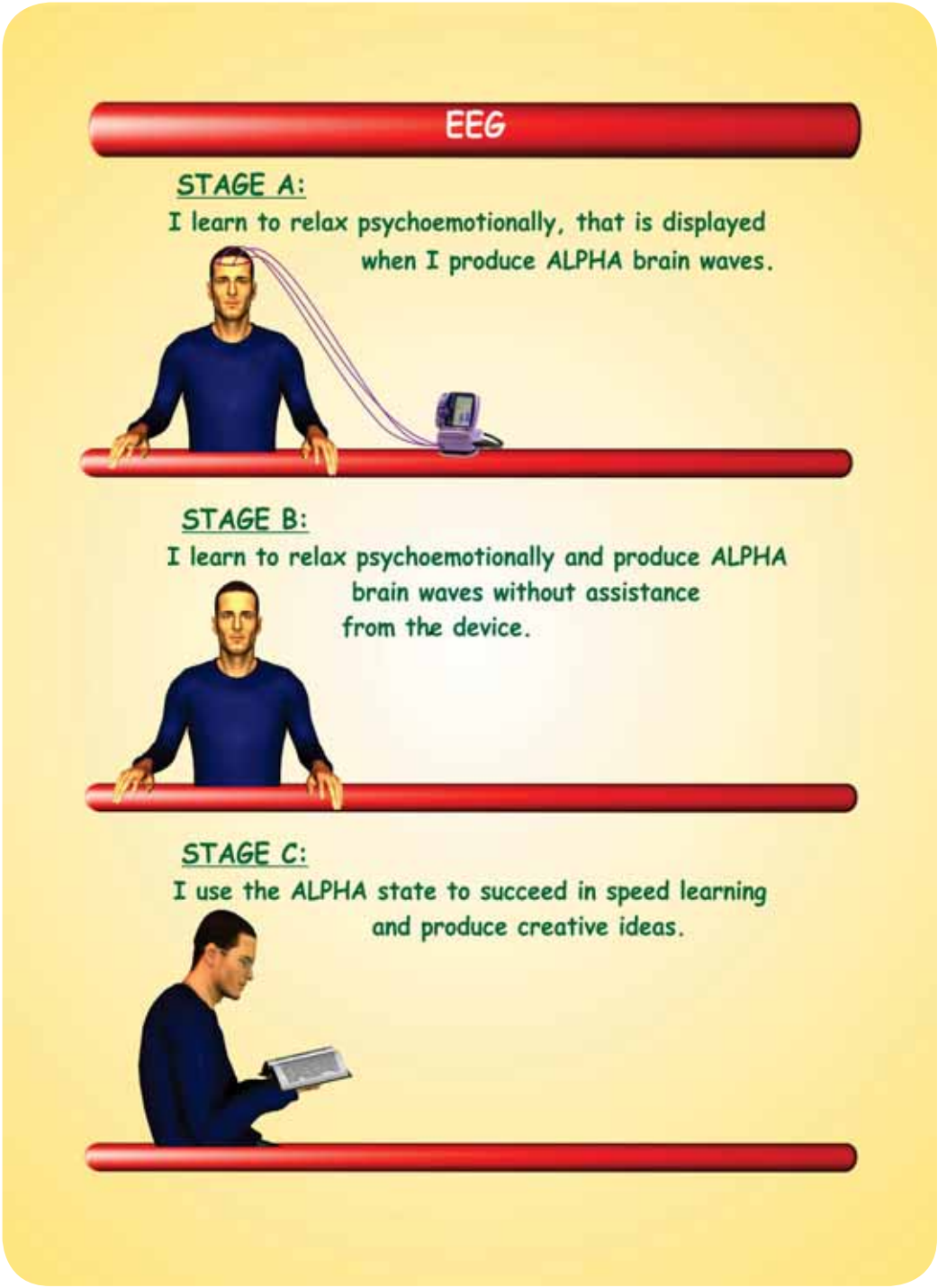
amining control methods regarding alpha-brain waves in correlation to changes of mental activity. The issue in question was whether individuals could learn to detect the production of alpha waves from their brain. He actually ascertained that after a few sessions most of the individuals had improved their ability to distinguish much more than 50% of their alpha waves, a percentage indicating that the result was not accidental.

The first from a line of works on the alpha-rhythm of the encephalogram and its relation to conscious states was carried out in 1958 at Chicago University. William Dement had by that time completed his techniques for encephalogram recording and detection of dreams at the sleep laboratory run by N.Kleitman and opened a big discussion on dreams, consciousness and the first stage of sleep.

More widely known is the encephalograph used in hospitals, which records information on paper, each line corresponding to signals received from one pair of electrodes. In these readings we can identify various waveforms, for instance, low frequency waves which are often associated with brain tumors or the typical waveforms in epileptic seizures. On the other hand, the nature of the information required in biofeedback is completely different and is associated to the way the brain functions.The electroencephalograph used in modern biofeedback laboratories is connected to computers and provides us with the possibility to select, in cooperation with the trainee, the way the brain waves will be displayed.

Encephalographic biofeedback is already successfully applied in a wide range of pathological conditions, among which constist: deficit disorder attention, hyperactivity, alcoholism, toxic-substance abuse, compulsory neurosis, epilepsy, post-traumatic stress, game and pre-game athletic stress, job stress etc.

Recently, enormous technological advances provide a great thrust into the encephalographic biofeedback progress, opening perspectives which, according to the latest results, seem to


EEG
STAGE A:
I learn to relax psychoemotionally, that is displayed when I produce ALPHA brain waves.
STAGE B:
I learn to relax psychoemotionally and produce ALPHA brain waves without assistance from the device.
STAGE C:
I use the ALPHA state to succeed in speed learning and produce creative ideas.

surpass all expectations.

Biofeedback encephalography is regularly used to produce θ (theta) brainwaves for the purposes of deep relaxation and expansion of intellectual and conceptual faculties. Through encephalographic biofeedback you learn to produce the brainwaves corresponding to the specific psychophysiological or mental state you wish to reach. For example, in order to achieve goal focus or concentration you need to learn to enhance β waves production from a certain part of the brain, whereas for reaching relaxation or equinamity enhancement of θ waves production is required.

With the assistance of a program of encephalographic biofeedback, often resembling an electronic game, you learn to control brain activity, which is objectively demonstrated on your the computer screen. Many scientists call this process «brain-aerobics».

In hyperactive children with deficit attention syndrome are employed encephalographic biofeedback programs similar to electronic games, in order to limit β waves while concurrently enhance θ waves, so as to increase their ability for attention and learning. J.Lubar, who has identified since 1970, encephalographic biofeedback in the treatment of attention deficit disorder hyperactivity syndrome in children, mentions: “biofeedback is capable of bringing about, in a manner different from that of medication, some of the brainwave changes which are necessary for the treatment of this syndrome. Biofeedback does not prove ancillary to children only for the purpose of producing the required brainwaves, but further enables them to normalize blood supply to brain areas which are substantially involved in addressing the problem”. An extensive program applying biofeedback techniques for the treatment of this syndrome in the USA conveyed improvement reaching up to 80%.

Encephalographic biofeedback is an indispensable tool for brain training helping you to learn how to be cured and released from your problems.

The international medical community has, since 1999, accepted that at least one third of epileptic patients can considerably limit epileptic seizures with the assistance of encephalographic biofeedback. S.Othmer, one of the senior biofeedback researchers and trainer of scientists who wish to become biofeedback trainers, states: “In epileptic patients a part of the brain becomes unstable and occasionally drags along the rest part into a seizure. Encephalographic biofeedback helps in stabilizing this brain area and significanly decrease seizures”.

For many people encephalographic biofeedback, in conjunction with age delaying techniques, has become a usual ancillary practice “replenishing the energy batteries” of the organism and renewing one’s somatic and psychoemotional organ.

For numerous professionals in advertisement or the arts, biofeedback provides the means for enhancing inspiration and creative work.

The basis of encephalographic biofeedback training consists in experiencing this peculiarly tranquil, detached state which is associated with αlpha-brain waves. Thus, the objective is to develop your ability to reproduce the state associated with αlpha-wave production. This state that will enabe you to enter a speed reading or speed learning process.

Without the encephalograph biofeedback this process resemble a computer without software.

Chapter 11

Stress and immune system

- Anatomy and functions of the immune system
- Stress and the immune-repression
- Stress and infections
- Stress in intrapersonal relationships and the immune system
- Personality and the immune system

Anatomy and functions of the immune system

The immune-system is appointed with the defense and protection of the organism. It can be parallelized to a defense ministry which cooperates with all defense and attack systems in order to keep the organism always invulnerable the various pathogenic factors.

Certainly, the immune system of the organism is characterized by a high structural and organizational level of perfection, armed with many self-regulatory mechanisms. Any human-made system compared to it seems primitive.

The immune-system possesses enormous adaptation faculties with respect to encountering unfamiliar adverse conditions and confronting unkown pathogenic factors. It has the power for self-control and self-repair ensuring efficiency and renewal.

The immune system is capable of recognizing as "its own" everything that belongs to the organism it guards, whereas attacks to exterminate anything it identifies as invader, therefore "stranger".

The immune system consists of:

1) the lymph organs and

2) the bone marrow.

Lymph organs include the lymph glands, spleen, tonsils, appendix and Payer's plaques, which are lymph islets situated in the small intestine.

The bone marrow produces the leucocytes or white cells which are three types:

a) Granulocytes, encompassing in their cytoplasm many granules and large horse-shoe shaped nuclei. They represent the patrol cars and police vans in our defense system. They patrol in the organism and whenever meet antigens, arrest, engulf and destroy them, or else devour them.

b) Agranulocytes, which do not contain granules in their cytoplasm, and are either microphage or macrophage cells. These spot and exterminate other attackers, playing the role of special forces. When macrophage cells have to destroy a host of enemies and need back ups, secrete cytokine which mobilizes the T lymphocytes, described below, which hurry to offer assistance.

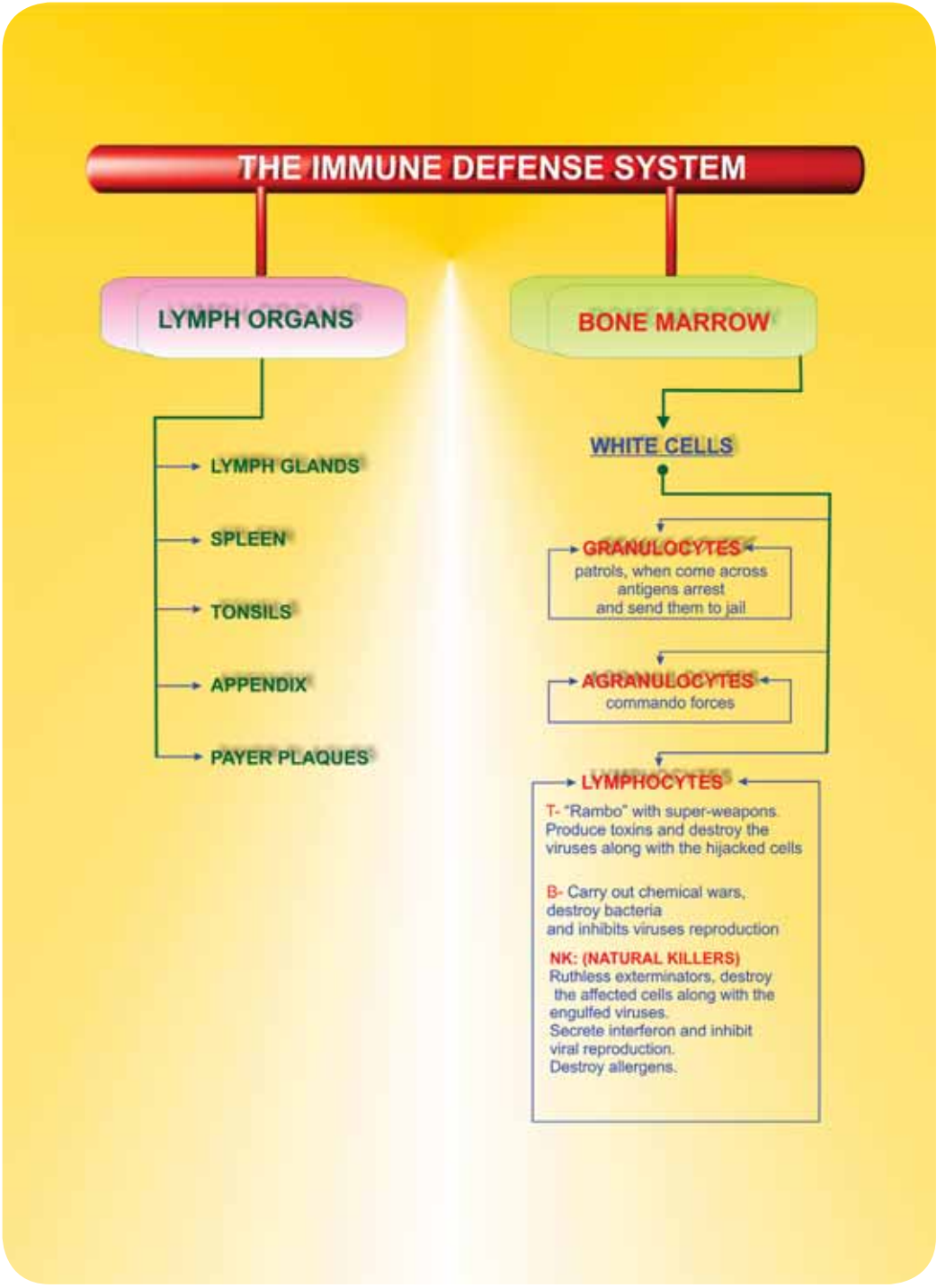
c) Lymphocytes, distinguished in T, B and NK (Natural Killers) lymphocytes.

NK lymphocytes in the event of viral infections charge against those cells of the organism “hijacked” by the invading viruses, and destroy them along with the contained viruses. Additionally, to protect the unaffected cells secrete interferon which inhibits the reproduction of the invaders.

B lymphocytes have a double task: on the one hand they protect from bacteria and on the other they inhibit viral reproduction.

T lymphocytes have three types and act like “Rambo” employing super-weapons. Some produce toxins which destroy the affected cells, along with the enclosed viruses. Others act as supportive forces, reinforcing the action of macrophages by producing suitable substances for the task. However, there are also the incorruptible forces, the “internal affairs”, which step in to cease fire when the immune system and its various “Rambo” are not suceeding and there is great risk to cause damages to the organism.

Stress increases catecholamine levels in blood circulation, these are substances produced by the organism and assosiated to nerve conductance.


THE IMMUNE DEFENSE SYSTEM
LYMPH ORGANS
BONE MARROW
LYMPH GLANDS
SPLEEN
TONSILS
APPENDIX
PAYER PLAQUES
WHITE CELLS
GRANULOCYTES
patrols, when come across antigens arrest and send them to jail
AGRANULOCYTES
commando forces
LYMPHOCYTES
T- "Rambo" with super-weapons. Produce toxins and destroy the viruses along with the hijacked cells
B- Carry out chemical wars, destroy bacteria and inhibits viruses reproduction
NK: (NATURAL KILLERS)
Ruthless exterminators, destroy the affected cells along with the engulfed viruses.
Secrete interferon and inhibit viral reproduction.
Destroy allergens.

The three main catecholamines are dopamine, epinephrine and norepinephrine. These substances have a combined affect upon the heart and vessels, geared to providing for the organism the optimal, most appropriate conditions for its functions and survival.

Dopamine raises heart rhythm and blood pressure, so as to fuel the periphery, chiefly the muscles, with blood supplies allowing this way the fight or flight response to unfold.

Epinephrine raises the heart rhythm and dilates blood vessels, thereby lowers blood pressure, while concurrently increases the blood volume at the periphery.

Norepinephrine constricts blood vessels, thus raises blood pressure.

Epinephrine and norepinephrine are more often on the focus of scientific research treating the issues concerning stress.

The feedback phenomenon primarily governs the secretion of substances of antagonistic nature, nevertheless each one of these has its value and affects various stages of a functional phenomenon triggered from stress and progressing in the organism.

Messages are sent from the periphery toward the centre, assessing the status of the mechanisms of the organism and its current needs to be counterbalanced so as to maintain equilibrium. In succession, the centre relying on this feedback modulates the type and quantity of the secreted substances. Consequently, feedback represents the fundamental functional phenomenon influencing the progress of all involved mechanisms.

The over-surplus of catecholamines may repress certain other factors in the immune system, which mainly affects the production and functions of NK lymphocytes (Nabiloff et al 1991).

Fluctuations in epinephrine blood levels leads to the migration of lymphocytes from the bone marrow toward the periphery and thymus gland (Kiecolt - Glasser et al 1992).

Such a complex super-system, about which we gave a few examples, is capable of protecting your organism against any danger, provided that you allow it to carry out its task without weakening it by means of constant sympatheticotonia (sympathetic over-arousal) caused either from mental "ghosts" or from the erroneous cognitive structures comprising your cognitive edifice, as we will illustrate further below.

Stress and the immune-repression

Thirty men, aged between 18 and 34, were examined regarding the impact of stress upon the immune system. Various parameters involved in the immune system responses were measured, which are detected in saliva, among which a special immunoglobulin called IgA.

The research conveyed that stress had a catalytic impact upon the immune-system, bearing results corresponding to an almost paralyzed immune-system (Stoppler 2001).

A research investigating, in twenty five individuals up to 30 years old, the psychological effect of stress upon the immune system, revealed considerable reduction in lymphocyte populations, particularly in T-lymphocytes and catecholamines, under the influence of chronic stress, a fact establishing the immune-repressive action of chronic stress (Manuck, Kohen, Rabin, Muldoon, Bachen 1991).

Another research studied two groups of women formed on the basis of age, one with younger women between 21-41 years of age and another with older women between 65-85 years of age. In succession the parameters of the immune system were measured, such as NK cells, various lymphocytes, T-lymphocytes, b-bone marrow cells, as well as cardiovascular factors and catecholamines. The results confirmed the immune-repressive action of chronic stress (Naliboff, Benton, Solomon, Morley, Fahey, Bloom, Makinodan, Gilmore 1991).

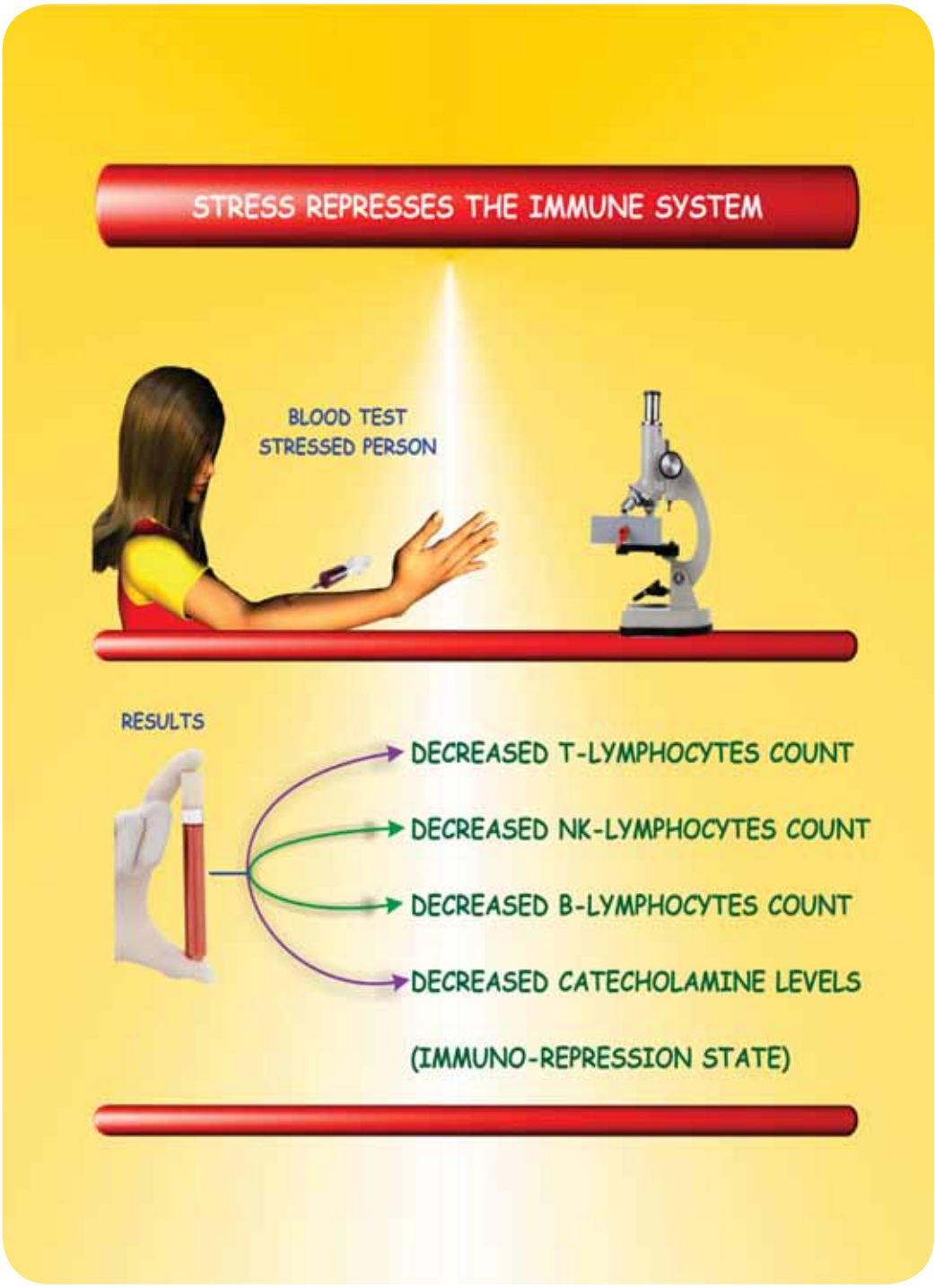
Similar results issued from the work of Brosschot, Benchop, Bodaert, Olff, Smet, Heiznen, Ballieux, in 1994, who studied eighty six men aged between 24 and 55 years.

Similar conclusions were reached in the survey made by Kiecolt-Glasser, Cacioppo, Malarkey, Glasser, in 1992, which summarized the findings of nine relevant researches.

Sguteas-Emch, Cacciopo, Uchino, Malarkey, Perl, Kiecolt-Glasser, Glasser, in 1994, examined the influence stress bears upon the cardiovascular, endocrine system and cellular-immune level studying twenty two men between 18 and 31 years old. The participants were asked to prepare a three-minute speech defending themselves from the accusation of shoplifting. In succession, they were called to solve mathematical equations and while being engaged in this, a loud sound burst out suddenly at random and inconsistent time intervals. The measurements were performed in blood samples consecutively taken. Increased heart rate, high norepinephrine and cortisole concentrations in the blood were found, as well as increased counts of NK cells. Remember NK cells are lymphocytes named after the initials of Natural Killers, which act as blind “Rambo” in our immune system, killing and exterminating every antigen in the organism even before identifying it. The curve of blood cortisole conveyed that the axis between pituitary gland and supra-renal glands can be stimulated by sudden stress factors. The final combined measurements pointed out that the interaction existing between autonomic nervous system, endocrine system and the immune system offers fertile ground for further psychophysiological analysis to elucidate the underlying mechanisms.

Benchop, Neuwenhuis, E.E.S, Tromp, E.A.M, Godaert, G.L.R, Ballieux, R.E, Vandornen, L.G.P, in 1994, demonstrated in their scientific research the intense affect mental stress bears upon the immune and cardiovascular system.

Broschot, Benchop, Godaert, De Smet, Olff, Heignen, Ballieux, in 1992, explored the implications of acute psychological stress regarding the migration of blood cells toward the periphery and their functions. Preceding research had shown the significant relationship connecting stress and the migration of blood cells to the periphery vessels, via a reinforcing mechanism preparing muscles to perform within the scope of the anticipated fight or flight response. The participants were 86 male teachers, aged 24 to 55 years. The findings verified the previous researches.


STRESS REPRESSES THE IMMUNE SYSTEM
BLOOD TEST
STRESSED PERSON
RESULTS
DECREASED T-LYMPHOCYTES COUNT
DECREASED NK-LYMPHOCYTES COUNT
DECREASED B-LYMPHOCYTES COUNT
DECREASED CATECHOLAMINE LEVELS
(IMMUNO-REPRESSION STATE)

Similar research on the impact of stress upon the immune system and other physiological parameters have been reiterated in people in a mourning period or widowhood, in serious post-traumatic cases, in people unexpectedly fired from work, in earthquake or flood victims, in political refugees, or refugees on account of war. The findings presented repeated results and the conclusion remained the same. Acute and chronic stress exerts a most severe immune-repressive action, resulting in increasing the risk for infections and immune-dependant diseases.

Stress and infections

Individuals who were exposed to intense stress demonstrated a dramatic increase of infection susceptibility, ranging from 74% up to 90% and with respect to common viral colds presented an increase of 27% to 47%. The same scientific research conveyed that the infectious mononucleosis incidence was significantly raised in medical students during the exam period (McEwen & Stellar 1993).

Another research investigated the same parameters and also pointed out the repressive affect stress bears upon the immune system (Brosschot et al 1994).

The "weekend infections", usually viral or common colds, appear at the end of a tough, demanding week, full of stressors.

Similar results came also from 293 independent clinical researches and surveys, carried out between 1960 until 2001 in which 18,941 individuals participated.

Definitely, given that stress is distinguished as acute and chronic, the period of time its influence encompasses, or else stress duration, plays a crucial role in its harmful implications. Therefore, stressors that are either very intense, bringing things upside down in life and drive one to a dramatic situation with no light at the end of the tunnel, or are of prolonged duration, lead to the somatic and psychomental derangement of the individual.

A scientific research was conducted on 48 medical students who received a hepatitis B vaccination in three doses, during an examination period with difficult lessons. The exam related stress repressed the immune system in most of the participants and considerably delayed their immunization. This simply means that when you get stressed the vaccination shot doesn't "work", because the organism lacks the required immune power (Glasser 1996).

With the same perspective, a relevant research on flu vaccination, studied individuals who were obliged to take care and offer services to members of their families suffering from chronic failure or loss of brain functions. The antibodies and special T cells produced as a response to the vaccination were measured. The examined individuals presented a very weak response regarding the production of antibodies and T lymphocytes, as compared to other subjects who were not encumbered with such a laborious and stressful task. This research confirmed the great impact that psychological stress has on the immune system and furthermore the extent of the repression it can cause, leaving the organism exposed to various hazzards.

Much research, initially conducted on animals and subsequently on people, points out that there is a direct relation between stress and the reduction of immune system efficiency. Inhibition of lymphocytes was observed in animals exposed to loud noises or persistent electrical stimuli (Borysenko & Borysenko, 1982 και Monjan & Collector, 1977).

The same outcome was also observed in animals sepa-

rated too early from their mothers (Laudenslagen, Reite & Harbeck, 1982).

The occurence of contagious diseases rose in children living in families suffering severe stress and anxiety (Mayer & Haggerty 1962).

Adults experiencing intense stress got sick with contagious illnesses such as colds, flu, herpes and diverse viral infections. Individuals under severe stress presented recurrent and serious herpetic infections (Vanderplate, Arac & Magder, 1998).

Remarkably lowered defense capacity of the immune system appears also in people suffering from chronic anxiety in anticipation of future stressors, which eventually grows into a habit in which they coexist, in the context of a special feature of their idiosyncrasy (Kemeny 1989).

The important role chronic stress and stressors in general play upon the repression of the immune system, becomes obvious also from the measurements conducted on populations who have been afflicted by earthquake, floods or other natural disaster. Wherever the rescue operation was satisfactory, the negative impact on the immune system of the disaster area victims was significantly restricted (Mckinnon, Weise, Reynolds & Bowels, 1989 and Manuck, Kohen, Rabin & Muldoon, 1991).

Women who were obliged to attend to the care of senile patients presented a delay of nine days in healing small lesions pursuant to biopsy, or else the healing time required for minor ordinary wounds was 24% longer as compared to the control group. Cytokine, a substance holding an important role in healing processes of traumas and reflecting the healing capacity of the immune system, appeared very significantly reduced in the women of the research group (Stoppler, 1996).

When we study all this research we realize that people obliged to offer their services and take care of patients suffering from chronic diseases coupled with communication problems, is the favorite group of research, since, as findings indicate, such people provide the best testament to the

repressive action of stress upon the immune system.

However, apart from the scientific conclusions, we also eventually draw the conclusion that the above group, encompassing many hundreds of thousands of people, is in need of special support through social care. Moreover, it must be stressed that although scientific analysis may be a form of scientific feedback, since it provides valuable information, nevertheless a corrective, remedying approach must be designed on humanitarian grounds to support and protect those members of our society, who motivated from altruism offer the most valuable services.

The scientific team of the psychiatric section, medical school of North Carolina university, conducted, in 1998, a research on 82 homosexual men, AIDS carriers (HIV positive without symptoms of the disease). A follow-up period of six months lasted for longer than seven and a half years. The assessment of the condition of the participants CD-4 (plus) lymphocytes in the blood were counted, since counts lower than 200/ml are associated with AIDS. Various parameters were evaluated, such as the number of stressing incidents in their life, the existence or absence of satisfaction from the support provided by the social services and from the behavior of the participants.

The findings of this research conveyed that AIDS progresses much faster in individuals who experience intense stressors in their daily routine, maintain low satisfaction levels from the support provided by the social services, demonstrate denial regarding finding means to break away from their problem and have high cortisole blood levels. Granted that AIDS is a disease pre-eminently representing the maladies of the immune system, this research acquires greater dimensions and value, because it proves directly and unreservedly the great repressive power stress has upon the immune system.

Stress in intrapersonal relationships and the immune system

Stress and anxiety in intrapersonal relationships was extensively researched since it concerns large percentages of the human population. The findings of such research efforts manifest that stress issuing from personal relationships, along with the relevant anxiety, bring upon the function of the immune system a much stronger negative influence than other stressors lacking social or intrapersonal character (Herbert, Kohen 1993).

Disordered intrapersonal relationships bear an extremely negative impact upon the immune system of people who are under conditions of the intense stress.

However, apart from the factors with negative impact on the efficiency of the immune system, there are also factors exerting a positive influence and enhancing the action of the immune system.

To know such factors is as important as to know the problem itself, given that to experience such factors clearly results from the cognitive function, which is reconstructed and renewed via biofeedback application.

Twenty-six individuals who were mourning were studied along with other twenty-six people who were not mourning which formed the control group. The research proved that the mourning group presented significant reductions of their immune system efficiency, indeed in various parameters (Bartrop, Lockhurst, Lazarus, Kiloh & Penny, 1977).

Also studied were men and women in widowhood, who were experiencing intense stressors and it was proven that

their immune system had a marked reduction of its potential (Schleifer, Keller, Camerino, Thorton, Stein, 1983 και Irvin, Daniels, Smith, Bloom, Weiner, 1987).

Other research carried out with persons who had separated or recently parted, also showed very significant weakening of their immune system efficiency (Stein, 1985 και KiecoltGlasser, 1988).

However, the scientific research advanced even further, since the issue of stress implications on the immune system has substantial gravity and concerns extensively the relationships of people. Especially, in contemporary societies, daily stormed with stressors which affect incessantly their members, the exploration of the above factors plays a decisive role in the selection of stress management strategies, which have become as indispensable as food or oxygen.

Related research made on families which had poor or hostile relationships, also revealed great decrease of immune system activity (Kiecolt, Glasser, 1988).

In cases of couples facing problems in their relationship, those who sought for means to solve their problems and actively tried diverse ways to improve the communication with their companion, following a therapeutic intervention, presented considerable improvement in immune system parameters, as compared to the others who did not look for ways out (Kiecolt, Glasser, 1993).

Another important research was conducted on people who attend chronically-ill patients, chiefly suffering from AIDS or Alzheimer. Such individuals, besides diminished immune system capacity, also developed sleep disorders and even depression (Kiecolt, Glasser, 1987).

Despite the widely accepted fact and the common experience that chronic and uncontrolled stress causes illnesses and can indeed even lead to death, the biological mechanisms implicated have not been completely explained up to date. The evidence proving the stress - malady relation are chiefly founded on epidemiological scientific researches.

The impact of stress upon human health varies from person to person, a fact attributable to the idiosyncratic diversity of individuals, as well as to the special adaptation mechanisms each individual develops. People engaged in the exploration of the potentialities of their organism, pursuing self-knowledge and exploitation of their behavior, as means to harness positive results, have developed greater defenses against stress and considerably limit the odds in getting sick under its influence.

The biochemical changes emerging in the human body due to stress opened a new chapter which is examined by science and will elucidate the develompent of defenses against the extremely stressful evnironment of contemporary societies.

Medical doctors at Ohio University, in 1993, completed a long running research and proved that chronic stress is followed by protein increase in the blood, which is associated with the appearance of certain chronic diseases. The research referred to 119 men and women, who were obliged to take care and attend to the needs of their companions suffering from progressive degenerative failure of their mental faculties. Provision of care toward beloved persons, indeed on a long-term basis, constitutes sources of chronic and wearing stress, imputable as much to the loss of communication with the beloved person, as to the negative emotions emanating from daily facing their companion in such decay.

The most important finding of the epidemiological research was that in individuals living under conditions of chronic stress increased blood levels of a substance called interleukin-6 (IL-6) were traced. Interleukin-6 is a protein molecule which increases in the blood of patients suffering from cardiac diseases, arthritis, osteoporosis, type II diabetes and certain cancer types. What is of interest is that interleukin-6 is produced by the immune system and par-

ticularly in occasions of intense immune activity, such as after transplants or extensive infections.

Additionally, it was proved that interleukin-6 levels remained high even three years after the end of the psychologically painful duty which formed the stressogenic situation.

Consequently, the organism responds to chronic stress situations in the same manner as when it is in severe and serious disease, as the ones aforementioned.

Contemporary societies are deemed as advanced from a social care aspect, nevertheless, social welfare, psychoemotional support and desensitization to these people, who through rich humanitarian offers enormously raise their odds for serious health impairment, has never been ascertained. Such individuals should be placed at the centre of social support and provision and be protected from collapsing, since they are in danger of risking their health, due to chronic stress, which has been so tangibly proven.

People living under conditions of chronic stress are prone to adopt pathogenic habits, such as smoking, caffeine abuse, over-eating and also present high interleukin-6 levels.

On the contrary, quantitative and qualitative sleep, physical exercise and a sensible diet adapted to our needs, is associated with normal interleukin-6 levels in the blood. The biological correlation that exists between stress and serious diseases has been proven not only through science but also from observation on thousands of cases exposed to the common experience issuing from everyday life.

The results of the scientific research and social experience should not be confined only to statements, we must emphasize that the need to develop conscious mechanisms to address and manage stress is nowadays more than obvious.

Personality and the immune system

From the age of ancient philosophers and physicians it has been proven that individuals with melancholic idiosyncrasy are more susceptible to the maladies now identified as infections. Additionally, AIDS epidemiology proves that introvert and melancholic AIDS carriers get sick and perish much sooner than the more extroverted and optimistic types.

In 2000, a research team in UCLA medical school studied the impact of stress on fifty-four men, AIDS carriers, all in early stages, in general good health, with good T-lymphocyte count and viral load (the virus populus in the blood). The participants were subjected to a blood test for the evaluation of the response of their autonomic nervous system. Initially, their response to an unexpected sound was investigated. Their heart rate was measured, perspiration, and vessels dilatation to facilitate blood circulation to the extremities in anticipation of fight or flight response. Timid and introverted individuals did not adjust to the accoustic stressor as fast as the rest. Their nervous system, being already in a state of tension, conveyed that this new stress was “overflowing from the glass”. Somatic stress was exerted by means of physical exercises and also mental stress via counting in inverse order.

Both initial parameters, the counts of T-lympocytes which are the cells destroyed from the AIDS virus, and the viral load were measured for eighteen months. During the research anti-virus medication was administered to some of the participants.

The final conclusion reached was that shy, introverted, melancholic, and closed to themselves characters, presented great difference regarding the distress of their immune system due to stress and also great delay regarding the positive response to medication, as compared to others.

Kreitler, Aronson, Berliner, Kreitler, Weissler & Arber, in 1995, examined the physiological and emotional impact incidents in life and personal problems bear upon different personalities. A cardinal conclusion was that the accidental events in life and personal problems have entirely different characters and meanings for people. As the research conveyed, personal problems are connected to or identified as stressors, whereas accidental events in life are not. A host of personal problems is associated with the appearance of neurosis and susceptibility toward stressors.

This research pointed out something very important for biofeedback: that man accepts accidental events in life as part of the natural evolution of life and responds normally with transient, creative stress while trying to overcome them. On the contrary, the attitudes based on the cognitive structures and psychomental rigidity , which fuel problems, are responsible for the negative impact of stress and cause problems in the organism.

One could claim that deep in the human hypostasis, an archetypical intelligence exists and distinguishes the natural from the acquired element and provides the commensurate response.

Much research has proven that the feeling of non-satisfaction as a personality feature and not as an objective parameter, turns into a powerful repressive factor of the immune system.

However, promising knowledge also derives from scientific research, assuring us that this particular attitude of the person towards reality, as well as the overall attitude, as components of one's learned and cognitive edifive, are subject to alterations, modifications and embellishment.

The expression of your personality and your attitude towards

reality are contingent upon what you have learned. They depend on the positive and negative elements you added in your cognitive building, not necessarily as your personal choices, but rather as the choices of the educational centres you attended in your lifetime.

Such centers constitute your family, the schools you attended, your friends, the books and other material you read, the TV-shows you watched etc. In other words, the sources of knowledge from which you derived the materials for the construction of your cognitive edifice. A large portion of this knowledge is beneficial for your homeostasis, whereas another brings imbalance upon your somatic and psychomental functions, which in turn brings disorder in the autonomic nervous system and initiates a range of malfunctions and diseases.

Futterman, Kemeny, Sapiro & Fahey, in 1994, studied the implications on the immune system pursuant to exposure to stress and examined the positive or negative disposition of fourteen actors, in an attempt to better explain the way the immune system is affected from stress. Actors were preferred because of their aptitude in expressing feelings before other people easier than untrained people. They were asked to play various roles as persuasive as possible, expressing through them assorted emotions. Significant changes were observed and measured in parameters of the immune system, particularly in NK cells, which subsequently returned to the previous -calmness- levels after about twenty minutes. It was discovered that the emotions inducing changes in immune parameters were not those the actors expressed or “acted” but those they had really felt.

The creation and use of social contacts each individual forms, in the notion of a social network, potently reinforces the feeling of social safety in the individual which affects positively and fortifies the defenses of the immune system (Glasser, 1985, Jemmott & Magloire, 1988, Kiecolt-Glasser, 1984, Levy, 1989).

Perhaps this explains the good health and looks displayed and pursued by the various socialites who use their social activities to create, enrich and exploit a personal social net.

Individuals who are habitually optimistic or have learned techniques enabling them to face everyday problems with optimism present greater stamina of the immune system and better overall health by avoiding their wearing out on account of pessimistic and miserable attitude toward problems (Kohen, 1989 και Kemeny, 1991).

We often come across books that urge us to become more optimistic, change our thinking patterns, face life as winners and not losers, and one could argue that we should seemingly treat this issue in a superficial and frivolous manner.

However, scientific research has proven that such techniques and practices have a most significant value for our health and prosperity. Additionally, it has been documented that individuals who pay special attention to their emotional regulation and balance, by heading actively towards this direction without letting themselves be passively adrift by the currents of everyday negativity, present typically higher measurements regarding the performance and efficiency of their immune system.

In individuals who yearn for catharsis in their intrapersonal relationships and avoid leaving problems stagnate and poison their affairs, seems that the immune system is positively affected and also their capacity to better tackle pathogeninc factors (Pennebaker, 1988).

The above referrances have a logical explanation, since all the aforementioned factors counterbalance the stressogenic factors and neutralize them via your personal intervention. This is feasible when through your biofeedback training, you manage to realize the action mechanism of the beneficial factors and incorporate them in your learning and cognitive database.

In other words, instead of complaining about your fate it is preferable to take the reins in your hands, especially when biofeedback provides you the possibility to "unlearn" negative behaviors and habits and replace them with newly learned ones which activate and boost the factors affecting positively your psychoemotional and somatic hypostasis, in particular and specifically your immune system.

The term "positive energy" is associated today with individuals who are open-hearted, communicative, cooperative, optimistic, with clear relationships and a positive image about themselves. When we say about someone that he transmits positive energy, we imply a person assembling all these features. This type of person is certainly desirable for company or cooperation, consequently has social success and expands his social or professional circle and all of this due to his "positive vibes".

Some of these people were endowed from the cradle with these characteristics and lucky enough to be raised in a family that preserved and enhanced them. However, the majority of the individuals possessing "positive energy" features are people who developed them through personal work on the elements comprising themselves and their personality, exercising in techniques for self-knowledge and exploitation of their personal and psychoemotional potential.

Therefore, you too can join those who transmit "positive vibes" and form your personal circle of positive actions and influences that can bring you closer to better health, along with more success in the social and professional field. These actions will drive you closer to the materialization of your goals, which will be based on the positive convictions you create about yourself.

As it has been noticed several times so far, the image you hold of yourself, when on account of your introversion, cowardice or psychic misery, is negative or underestimated, plays an important role in the weakening and distress of your immune system.

Scientific research conveys that the development of a sense of adequacy for your capacity, which gains objective hypostasis and support through feedback, results to significant reinforcement of your immune system and stronger resistance against stressors (Zautra, Okun, Roth, Emmanual, 1989).

Another research probed into the same subject and showed that the previously mentioned positive result is attributable to the consolidated feeling that you have an adequacy of capabilities, this firm sense alone reduces stress impact upon your organism, limits the chances for depression due to stress and strengthens the immune system, most likely modulated via central nervous system intervention (Bandura, 1989).

The positive situations which exert beneficial action and strengthen the immune system do not end here. The sense that one controls a situation, which indicates that he has the certainty that he can handle the regulatory mechanisms involved in relationships or communications, is a basic parameter in the reinforcement of the immune system (Sieber, 1992 and Kohen, 1989, also Zautra, Okun, Roth & Emmanual, 1989).

That is the secret of the dynamic and super-active people who succeed to survive remaining powerful in the jungle of stressogenic factors we all undergo daily. Usually, such people present enormous persistence and patience in the effort to achieve their objectives, since as scientific research has conveyed, individuals with perseverance in goal pursuing coupled with creativity and patience toward others, present a positive and potent condition of their immune system (Solomon, 1988).

Viewing the entire phenomenon as a learning process, one becomes optimistic that, since “whatever is learned can be unlearned”, one can reframe, renew and update knowledge by modifying its cognitive edifice which consequently ceases the dysfunctions and cure the illness that had ensued through the same mechanism.

Since the whole process is nothing other than the process

Biofeedback coupled with stress management techniques tones down the activity of the sympathetic system and in parallel supports the counterbalancing parasympathetic activity, thus brings about as an end result the beneficial desensitization from stressors and significant immune enhancement and ultimately, a sense of wellbeing and prosperity in your organism (Kiecolt-Glasser, 1985 & 1986 and Fawzy 1990 & 1993).

followed in biofeedback interventions, you should be optimistic on the positive outcome of your problems with a similar nature. The techniques for positive thinking and creative positive energy are not in the least negligible, given the immune-repressive action conveyed by negative thinking or the adoption of negative energy. Positive attitude techniques represent the preparatory phase of any organized, responsible and scientific application of biofeedback.

Besides, nowadays the techniques involved in positive thinking and positive energy form a large part of psychoimmunology's gnostic field. All these parameters, directly or indirectly influenced from the activity of the autonomic nervous system, can be controlled via biofeedback application. Biofeedback, by modulating and balancing the autonomic nervous system, in combination with desensitization from stressors, provides for the organism an improved balance and safety conditions.

With the adjunct of biofeedback techniques you can enrich your cognitive edifice with new learned cognitive elements, which enable you to reproduce and preserves a feeling of safety, bearing a strong and proven beneficial impact upon your immune system efficiency, with all its positive consequences.

Therefore, insomuch as the repressive effect of stress upon the immune system is intense, equally intense should be your efforts for self-regulation and desensitization from the stressors.

Chapter 12

Stress and work

- *Convictions about work*
- *Workplace stress as a social phenomenon*
- *The first symptoms of chronic job stress*
- *Are we sinking? Are we aware of it?*

Convictions about work

Job counseling and profession orientation constitute basic subjects in primary education and junior-high students learn early on to seek for their future professional occupation among the most lucrative, enjoyable and less laborious jobs.

Man spends the most important and productive part of his life working. However, quite often, the employee or self-employed views this job as a chore or drudgery, a necessity associated with feelings of repression or displeasure.

Modern societies have invested occupations with degrading notions which characterize the "ignorant", since the conviction that "only slaves and clocks work" gains steady ground and is consolidated especially among young people.

This particular viewpoint bears no special significance and could perhaps be regarded as a joke, if it did not sneak in subconsciously and deviously as cognitive material and firm conviction in some individuals, leading them to embrace from youth, a strongly negative psychoemotional attitude against an occupation, considering themselves as ignorant or slaves when working.

Such convictions are tremendously harmful and can prove devastating for the human organism, given that a negative attitude towards one's job stretches to the point of abhorrence or aversion, transforms the workplace into a multi-stressful environment in which the immune system, as well as the rest of the functions of the employee's organism remain invariably under suppression.

The trend to find a "snug post in public service" prevails in contemporary societies, partly depicting the hidden power within the aforementioned viewpoints on occupation. It

easily follows that such negative attitudes toward work is greatly imputed to the opportunistic and circumstantial way the individual associates to the job, disregarding his natural, intellectual and psychic capabilities. The social system of supply and demand in the workfield is responsible for shaping the job market and also the way in which every employee is connected with it. The relation of the individual with work should virtually form a source of creativity, joy and satisfaction.

Various public opinion poles conducted in developed societies reveal that 60-80% of the employees resent their job for diverse reasons and their workplace is experienced as a strongly stressogenic environment. The impact on modern societies populations is dramatic, imposing on public health a direct threat for collapse.

Unless current educational systems promptly attend to reframe the cognitive edifice, particularly that of young people, with respect to work, enabling employees to change their mentality toward their job, the forthcoming social cost society will have to meet will be unbearable.

This may sound like a science-fiction scenario, but imagine how our world will seem if job stress stretches its tentacles even further, paralyzing the working potential of the planet on account of this “auto(self)immune” rejection of work from the working force.

In the event that malicious extraterrestrials really existed, they would not need to start wars with special super-weapons to wipe us off the planet. It would suffice to consolidate in the cognitive database of younger generations even stronger negative convictions towards work, given that deprived of working, no social system, at least of a contemporary form, can survive. Employees would seem to self-imprison themselves in the most torturing and self-destructive prison called “work”, thus destroying their organism and consequently the entire social system because of their anti-work mentality and extreme convictions, subliminally introjected to them by some extraterrestrial devious enemy.

Your negative convictions with respect to work act as cognitive stressors from which you cannot escape. They have a continuous impact on your health.

Opposingly, it is natural to experience happiness through your profession and the full spectrum of positive emotions, emanating from seeing your work thrive and from the positive expression of your creativity.

Workplace stress as a social phenomenon

Today, in industrially developed countries, job stress takes the lead in the list of medical problems.

Although experts have rung the alarm bell since 1980, the problem keeps inflating, indicating that as of yet, no substantial measures have been taken to address this issue. Nevertheless, progressive private initiative leads big corporations to resort to the services of biofeedback training programs for their employees and administrative personnel, aiming at controlling workplace stress and limiting its negative implications.

Northwestern National Life Insurance Company conducted a statistical survey which conveyed that 40% of USA workforce employees view their work as "very or tremendously stressful".

One quarter of employees deem their work as the most stressing factor in their life.

The American Institute made a relevant research concerning the family and job and reported that 26% of working people feel that often, or very often, they experience intense stress at the worksite.

A Yale University research team, in a similar research, corroborates these findings and reports that 29% of people feel very stressed at work. St.Paul Fire and Marine Insurance Co. also carried out a similar survey which pointed out that job stress is implicated in the majority of the health problems employees face.

Government sources in Great Britain estimate that forty million working days are lost annually due to health problems solely accountable to job stress.

The federal ministry of employment in Australia assessed the damages caused from work stress to an approximate thirty million dollars per year based on a statistical survey conducted in 1994.

In the USA, more than half of the 550 millions working days are lost due to illnesses of the working potential imputed to job stress.

Giving a descriptive definition, we could characterize "job stress" as the corruptive or malign somatic and psychoemotional response the working individual presents when its relation with its work becomes a stressor or when the individual's expectations from its job do not match its abilities, resourcefulness and needs, which are dictated, always, by the subjective judgment of the person.

This means that job stress is related to incompatibility and lack of homeostasy between the working man and his work. The broader term "work" also encompassess the relationship between the employee and the employer.

It is obvious that workplace stress is a disease of the developed, especially industrial, societies, where the needs and demands of the working people keep pace with the modern life style which patronizes less, and at the same time demands more productive work.

Under-developed societies can not afford the luxury to dis-

sociate work from survival; other needs predominate and the working person has neither the time nor the psychoemotional luxury to experience job stress, since the prevalent stress is survival stress. Therefore, “job stress” is clearly a phenomenon and malady observed in prosperous and advanced societies which have solved the everyday, bread-winning problems and create different needs imposed by different circumstances.

Of course, the example mentioned above apply to dependant employment and not to private or independent employment, in which stress is further augmented supplemented by competition stress, a factor strictly referring to the employer and not to the employees.

We should distinguish the notion of job stress from that of challenge.

Challenge, mobilizes you bodily and psychologically to gain new skills, to learn new things and to make progress in your work, definitely undergoing some necessary, however transitional and creative form of stress. Once you respond to a challenge, you experience feelings of tranquility and fulfillment. That’s why challenge is considered as a most important parameter promoting healthy, pleasant and productive work.

What may ensue from job stress is almost self-evident, all the more when one knows the repercussions that chronic and daily stress bear upon man’s somatic and psychoemotional organ.

The primary and greater risk involves injuries, particularly in industrial units, where workers handle large and complex pieces of machinery.

Stress at the workplace triggers a line of reactions in the organism which «fires the alarm» and responds by regulating its various psychosomatic parameters in preparation for fight or flight. The nervous system is brought into a state of over-arousal. Adrenaline and other hormones are secreted to render senses more acute, the pulse speeds up, respiration accelerates and muscles contract gradually accumulating tension.

This response, as has been repeatedly mentioned, has usefulness and significance when occuring toward real threats and for short time intervals and subsequently, as soon as the real danger passes when relaxation in the organism is restored. It constitutes a typical response, bearing the same features and having almost identical parameters for all people. When it takes place circumstantially, even if instigated from imaginary threats originating in erroneous mental associations, no particular problems emerge, provided it doesn't last for long. However, when the working individual remains steadily in a full time job in constant sympathetikotony [sympathetic overarousal] evidently considerable attritions are induced in its organism and biological functions, consequently leading him to face, sooner or later, serious health problems.

The first symptoms of chronic job stress

"Why am I so tired all the time?"

"Why does my memory fail me?"

"Why is my sexual performance not like it used to be?"

"Why have I lost my interests?"

"What has come over me and why am I so miserable and introverted?"

These are some commonly asked questions in stressed, modern working people of industrial societies. The statistics are relentless. An impressive 80% of all visits made to doctors in primary health care services are accountable to symptoms or diseases originating in stress.

If attention and solutions are not provided to these problems, then stress implications expand and entrench into deeper levels, causing more serious problems such as: cardiovascular disorders with paroxysmal high blood pressure, ischemic cardiac disease, heart stroke, brain stroke, diseases of the muscle-skeletal system, and melancholy which may lead to depression, suicide and cancer, chronic non-healing ulcers and a spectrum of health problems issuing from chronic stress

related and immune system repression.

The most ordinary and primary ailments indicating the existence of job stress are the following:

- ***Difficulty in thinking***
- ***Slow association of ideas***
- ***Memory lapses for recent events***
- ***Inability for relaxation and equanimity***
- ***Increased and uncontrolled irritability***
- ***Oversensitivity to noises and strong light***
- ***Atypical migrating chest pains***
- ***High blood pressure***
- ***Bulimia or anorexic disposition***
- ***Diffuse feeling of malaise in stomach and abdomen***
- ***Insomnia***
- ***Paroxysmal tachycardia or arrhythmia***
- ***Superficial, irregular and unstable respiration***
- ***Tension headaches, muscular tension mainly in shoulders, neck and lower back area***
- ***Frequent, recurrent colds and various infections***
- ***Elongation of healing time required for abrasion or small wounds***

When a person enters a state of stress, his body releases endorphins which difuse his thoughts and emotions.

The employees who feel insecurity and stress at their worksite environment and live in a continuous defensive state experience a mental dullness which is portrayed on their expressionless faces, in a total lack of enthusiasm and also in the frigid and fruitless relationship between employees and employers.

This situation drives the employees to further isolation, which is a sign foreboding the advent of repercussions on

the business as well: More defective products at the final screening unfit for the market, more displeased clients from the offered services, more expenses to cover work accidents, more lost work hours, and heavier insurance and health care costs.

At an executive level, where skills are demanded for decision making and innovative initiatives, the aforementioned disorganizing factors lead to thinking inactivity, errors increase, non-exploitation of opportunities and accidents occur with adverse consequences either for the stressed individual or others.

However, poor creativity or a limited flow of fresh ideas is incompatible for executives with a position in the business and incommensurate to both their paychecks and the demands of their employers, consequently, another vicious cycle is initiated. Innovations and pioneering ideas certainly constitute the most empowering characteristics any succesful business should incorporate to win the competition game.

Under the pressure of stress, our thinking ability is significantly restricted, a fact obstructing higher executives to adopt divergent thought patterns which form the basis of creativity. We call divergent thought the individual's ability to combine distant ideas or situations. Divergent thought requires a clear mind as well as psychoemotional balance, important elements of what we call "thinking in an unordinary way". When you experience stress your perception is confined only to the obvious and conspicuous combinations of different ideas. In this event, chronic stress entraps two of your most remarkable characteristics, namely your creativity and innovative ability.

Many organizations and corporations assign to institutions specializing in carrying out interest surveys, the drawing-up of assessment reports regarding the annual business costs accountable to job stress.

A study conducted in 1990 by Princeton reported that the health costs spent per year by middle size companies equal 45% of their post taxation profits. Given that latest research points out job stress as the primary cause liable for 60% up to 90% of personnel health problems, the stakes are too high for

companies or organizations and leave no room to disregard the implications this phenomenon bears on their budgets.

A research of the American Journal of Health Promotion marked that employees experiencing stress at the worksite are two times more likely to be absent from work for more than five times per year.

Controversies exploding between employers and employees and frequent job quitting, in conjunction with bad intrapersonnel relationships are important factors negatively affecting the company.

Occupational accidents due to workplace stress belong in another vast chapter which primarily affects the worker who risks his physical integrity or even his life and secondarily the company as well.

Stress decreases attention and increases tiredness or distress, slows judgment and the eventual psychic boredom or indifference towards safety regulations which may prove fatal. Workers who report high worksite stress, according to valid studies, are 30% more likely to cause accidents than workers who present low stress levels. However, since the insurance companies are also aware of these figures, insurance plans designed for workers whose basic problem is job stress have doubled the costs, according to a research published in Harvard Business Review.

Another survey in Harvard Business Review, referring to one-hundred large corporations, indicated 5% reduction in customer figures, customers who were displeased due to poor services provided by stressed or bad-tempered employees, which is directly translated into gross profit losses ranging from 7% to 10%.

Nevertheless, the loss of intellectual capital appears to have even greater gravity and leads a company to serious financial blows if it avoids in taking the appropriate measures and avoids training its employees in methods dealing with job stress reduction and stress control in general.

Mental or intellectual capital is considered the “know how”, coupled with the cognizance of the particularities, budding or incubated innovations in our occupation.

The experts in business administration firmly believe that in the 21st century the most competitive and profitable businesses will be the ones having the best and largest share of mental capital. Unfortunately, however, job stress destroys mental capital.

When the human brain functions under the influence of intense stress it thinks in narrow minded, superficial and simplistic terms, omitting to take into account the full scope of parameters involved in the issue under consideration. Intuition, clairvoyance and creative thought are rendered inactive. The mental assets shrink and the lack of fresh ideas, novelties and competitive products drive the business in stagnation and decline.

However, the sad news does not end at this point. The latest research in the workplace document that violence among workers, particularly in large industrial blocks of heavy and unhealthy employment, is on the rise, along with drug, alcohol and nicotine abuse.

Are we sinking? Are we aware of it?

The American Institute of Stress announces :

In the USA, 500 billion dollars are annually lost on account of work stress related situations, such as absence from work, accidents, personnel replacement and insurance costs, American Statistical Association 2003.

Stress is largely associated with the major, most widespread of death causes, including heart strokes, cancer, lung disorders, liver cirrhosis, accidents and suicides.

- An average of one million workers in USA are absent on any given day largely due to job stress related disorders.

- 60% of all absences from work are accredited to problems related to job stress.

- The percentage of workers who reply in questionnaires that are feeling “very stressed at work”, doubled in 1985-1990.

- Approximately half the workers in the USA suffer symptoms of general fatigue caused by job stress.

- The costs entailed in job stress are estimated up to 500 billion dollars per year in the USA.

- Insurance costs for workers regarding health problems with stress related origins have sky-rocketed the last years. In California alone, employers paid one billion dollars in one year for relevant claims.

40% of staff replacements in companies are accountable to job stress. The purchase of services, programs and products to address workplace stress soared from 9.4 billion dollars in 1995 to 11.31 billion in 1999. Holding an outstanding place among these are biofeedback services.

- The Xerox Corporation assesses that the cost for substituting one high-rank executive ranges between 1 and 1.5 million dollars.

- In the USA, homicides during the work day is the second major cause of violent death on the worksite for men and the first cause for women.

- In the following chart the professions presenting stress are cited with scores higher than 6 in an evaluation scale of 1-10, compiled and announced by the Institute of Sciences and Technology of Illinois.

Professions presenting high scores of work stress:

Profession	*Score*
Miners	*8.3*
Policemen	*7.7*
Prisons wardens	*7.5*
Construction workers	*7.5*
Pilots	*7.5*
Journalists	*7.5*
Directors of advertisement dprt.	*7.3*
Business executives	*7.3*
Dentists	*7.3*
Actors	*7.2*
Personnel managers	*7.1*
Department managers	*7.0*
Doctors	*6.8*
Radio-TV channels personnel	*6.8*
Nurses	*6.5*
Movie studio personell	*6.5*
Ambulance personell	*6.3*
Musicians	*6.3*
Firemen	*6.3*
Teachers	*6.2*
Social workers	*6.1*

This dismal data imposing a direct threat on the hypostasis of mostly big companies engaging numerous employees, has been studied by expert psychologists, sociologists, environmentalists, communication specialists and economists in quest of applicable solutions.

Today several techniques are put into practice, aiming at diminishing job stress according to the suggestions of the above connoisseurs.

In many countries a morning exercise programs for their working potential is applied, a movement that started in Ja-

pan, and was widely applied in Germany, France and the USA. Many corporations have embraced a long mid-day break, with snacks and table games, even including billiard or table-soccer, bright ling etc.

Yet other corporations select reward programs offering financial or other forms of bonus to motivate their employees to eliminate absence from the job, with indeed remarkably lower costs than those due to job stress. Benefits for the family, such as free camping or with reduced fees for the employees children, free school bags, free tutoring in foreign languages etc, are largely implemented to counterbalance job stress, making work more attractive and desirable.

During the past five years, a contemporary trend spreading to large industries is to paint interior walls with bright, appealing colours, install better lighting and place music speakers at the worksite to play the music or commentary of a popular local radio station.

In certain cases, programs offering presents, pecuniary or other, to those who discover or correct a flaw or oversight in the production line of a product.

Another frequently observed phenomenon is that of parties or festivities organized by companies, inviting personnel families and giving gifts, so as to break the monotonous job atmosphere and allow employees to get to know each other better and bond.

Similarly is the recompense system offering group trips, usually to exotic destinations, as a reward to the employees who were not absent from work or who proved more productive. Business discount cards form the latest measures giving the employee the opportunity to shop with special rebates which increase in value according to the employee's consistency and effectiveness at work.

Statistics convey that such measures truly bring positive results, chiefly by eliminating the unsatisfied feeling experienced by workers. The magical power of a gift, no matter how small or insignificant it may seem, plays an enormous part in mobilizing the employees, bearing virtually minimal

cost for the enterprise.

Nevertheless, despite the positive results emerging from the application of similar measures, the final outcome far abstains from the desirable or expected.

This happens because the psychoemotional anchors keeping a person attached toward the concept of "work" have not been cut. The beliefs the employees have has not really been changed, however their negative effect is counterbalanced to some extent, but definitely not to the goal expected. The anchors are still fastened, but the rope has slackened a little allowing the psychoemotional organ of the employee to change a visual field making things slightly better.

The substantial need to bring changes of an internal nature in the relationship of the working individual with its job remains stagnant and has to be faced.

Biofeedback is regarded as one of the chief ways to address job stress given that via the biofeedback process the working individual:

- ***recognizes the hazards created by job stress and avoids it***
- ***adopts a more homeostatic attitude in relation to his workplace***
- ***realizes and identifies his abilities***
- ***comprehends the possibility to perform efficiently in the specific job and the ensuing personal benefits***
- ***changes his attitude towards work***

consequently:

personally benefits from avoiding job stress
improves the relationship with his employers
gains respect in his workplace and his ideas are recognized gains prestige and enhances his social image

Ultimately, via biofeedback, desensitizes him from work stress and safely handles it.

The proper occupational guidance in young people will also play an important role, basing future profession selection on the individual abilities, aptitudes and intrinsic talents of each person. This is the direction in which scientists of various scientific fields are working towards.

This steers a course driving primarily to the well-being and homeostasis of the individual in the worksite, and secondarily, appealing financially to the employers. Does it sound like science fiction again to hope that trade unionists of various work fields will venture to seek solutions for the problem called job stress, originating in the best interest of workers, which will nonetheless economize financial resources for the business as well, thus entitling them to a rightful claim a significant share of these savings?

Would there be employers who would decline such a service offered from their employees, even if he were morally compelled to fairly reward them with half of the profits ensuing from such initiatives?

Trade unionists experiment, primarily to the avail of the union members.

Equally essential is the intervention each country ought to undertake in order to shape more rationally the work market for the purpose of becoming more homeostatic for its citizens, protecting society members from falling ill on account of their relationship to work and preventing the blow to the financial system. By such means, the society work potential would enjoy better health, and benefit from social offers in connection to a prevention and reward program, drawn from the funds saved and recycled to them.

Large contemporary corporations adopt biofeedback in order to address job stress and in succession reward their employees with a portion of the ensuing profits. This way everybody is content and gains. The workers are especially multi-benefited, from upgrading their living standards, from fortifying their health through biofeedback, and from the additional income which actively contributes into further reduction of job stress.

The cognitive approach of job stress can act either as a trap or health protecting shield.
Biofeedback assisted by relaxation and desensitization protects the working person.

Chapter 13

Biofeedback applications in education

- Theories on speed reading
- Theories on speed learning
- The biofeedback model
- Attention Deficit Hyperactivity Disorder

Theories on speed reading

Speed reading is a desired asset for the majority of contemporary people who deal daily with large amounts of information that needs to be processed. The frenzied information production rhythm in all sectors drives modern man toward everyday stress, which stems from the feeling that he can't keep up with progress because he falls back in information supply, meaning he is short of the time required to get the updated information he needs.

The dilemma whether the human brain is capable or not of meeting such demands has been long resolved. The mind's computer remains unexploited because our "scanner", namely our eyes and the "graphics card", that is our vocal cords, are too slow. Therefore, although our inherent "processor", that is our brain, operates rapidly, nevertheless it is slowed down waiting for the other two parts which are very slow. In succession, we will see how biofeedback upgrades our electronic system by turning both the "scanner" and "graphics card" faster, thus providing solutions to the issue of speed reading and learning.

The story of speed reading starts back around 1940 with the invention of the tachyscope, a device that projects images or texts on screen for minuscule time fractions, for example for one-fifth of a second. At that time, scientists discovered that the faster the pictures or texts succeeded each other the more the participants in the experiment could recall. It seemed as if eyes played the role of photographic instruments. In this way, speed reading came onto the horizon. In 1950, the first portable apparatus was made that could be used as a tool for the development of speed reading.

In 1958 Evelyn Wood, actively engaged in previous years with this issue, came up with a novel method. Her discovery was completely accidental, when she found out that she read faster when following her finger strolling on the text.

E.Wood studied all the current methods for speed reading and initiated her own method naming it Reading Dynamics.

Numerous methods on speed reading have been introduced since that time taught through seminars and books. Several such methods are on the market such as Photoreading (1994), Mega-speedreading (1997), Alpha-netics (1999). Books and seminars on speed reading describe a variety of techniques enhancing the reading speed and helping the person to maintain its conceivability within acceptable limits. Assorted techniques are employed and usually the trainees are given instructions similar with the following:

-read words in a faster pace

-read pages vertically downwards

-keep diaphragmatic breathing while reading

-avoid food rich in carbohydrates

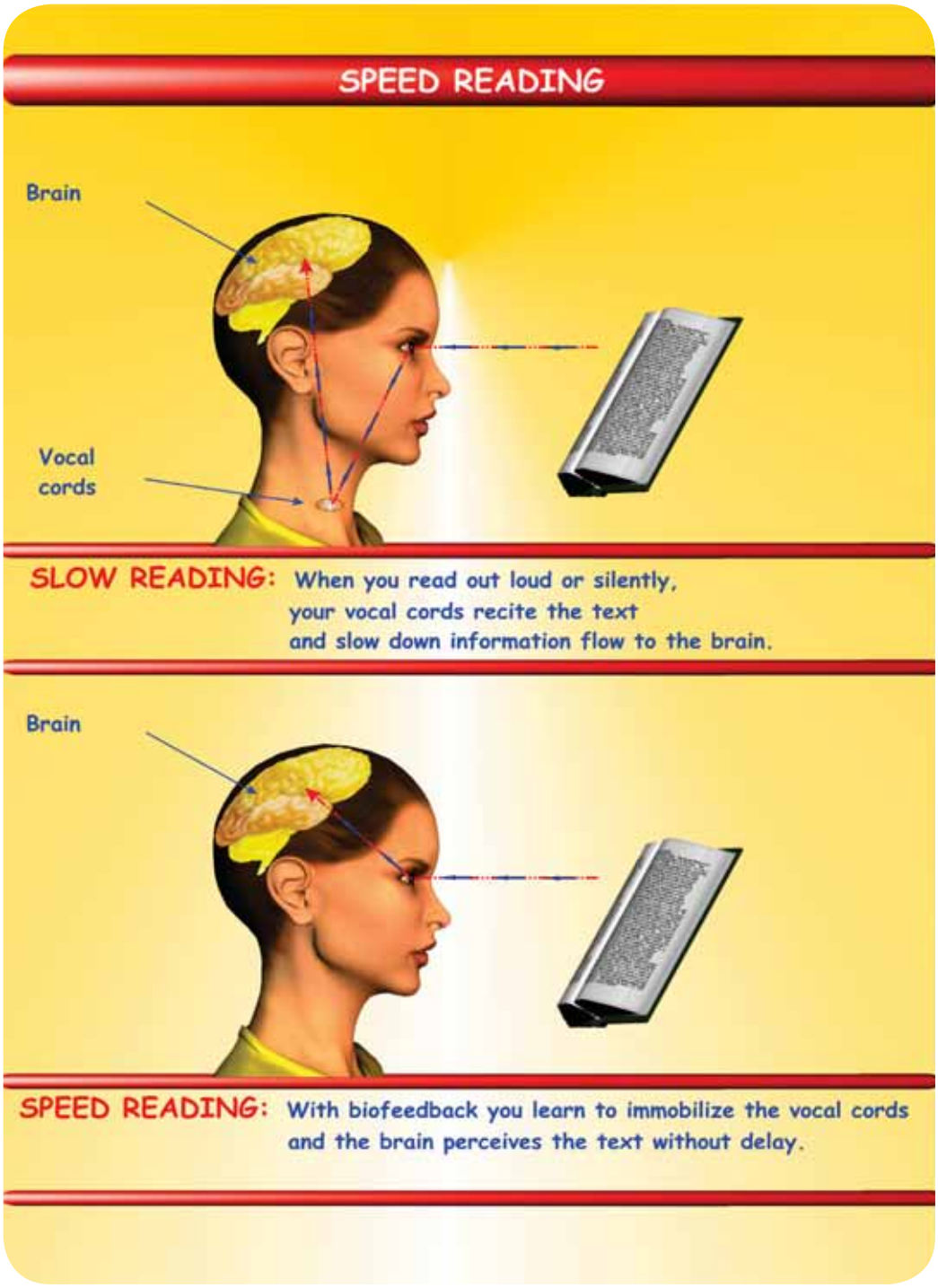
-hear familiar pleasant sounds when reading

-read each line synchronizing the pace with that of a metronome

-use an S shaped guide on the pages and read the text alongside (Buzan 2000).

Other methods focus more on different parameters. In Scheele's method (1998) the results are obtained by reaching alpha and theta brain waves, training in relaxation and Zen techniques. Some seminars and books on speed reading encompass a selection of study techniques.

Other researchers reached the conclusion that speed reading represents a selective reading method consisting in the assimilation of many words or phrases with few glimpses or by means of fast text scanning. When practicing the method, the reading pace accelerates while the reader tries simultaneously to comprehend as much as possible from the text. This method proves more efficient when the text contains concepts already familiar to the reader. But does not yield much benefit when the text encountered for the first time requires in depth comprehension or includes unknown notions. Quite naturally, of course, since it resembles hearing an analysis of advanced mathematics from which


SPEED READING
Brain
Vocal cords
SLOW READING: When you read out loud or silently, your vocal cords recite the text and slow down information flow to the brain.
Brain
SPEED READING: With biofeedback you learn to immobilize the vocal cords and the brain perceives the text without delay.

you understand zero, it sounds like a foreign language with unknown sound symbols and thus unkown notions.

The programs and books on the market for speed reading help, mainly, to develop the skill of moving fast through texts, rather than enabling the person to comprehend in depth or incorporate texts in his memory. Consequently, while by such methods the reading speed is raised, comprehensibility and assimilation capacity significantly decrease, indeed drop lower than 50% as compared to ordinary reading where conceivability ranges around 65-75%.

Theories on speed learning

The human brain possesses enormous capabilities which currently remain unexploited to a great extent. Each person follows a learning pattern he deems natural for himself, derived from his contact with society and his experience. However, prominent experts have altered our views concerning man's intrinsic learning abilities. They have reached the conclusion that we use just 10% of our brain faculties, whereas the rest 90% remains unused.

F.Tilny, a leading specialist in brain studies in France, believes that we will in the future be able to develop voluntarily brain centers that will enable us to use powers unimaginable today.

G.Bruner of Harvard University, notes: "We are just starting to suspect the extent of human trainability, man's ability for perfection. Never in the past have we engaged in this subject".

J.Schwartz, a psychophysics expert refers: “The potential of man is so vast that it becomes practically inconceivable”.

Scientific references to the scope and magnitude of our faculties are lengthy. However, a large percentage of people, guided by acquired mental structures which require from the individual to present himself as weak and helpless in order to draw from others attention and support, project strong skepticism regarding the learning abilities of man.

They argue that “Super-learning must be a form of self-deception. It must be silliness”. “History teaches us that man’s abilities have never changed”. Logic erects yet another barrier, formulated as follows: “It may be applicable for others but it could never work for me. I have never managed in my life to learn the quick and easy way, why will I succeed now?” or “I am already learning fast enough, so how much more can I improve?”

Several thousands of people have successfully displayed remarkable memory reserves.

The best way to decide whether you can personally benefit from speed reading and speed learning is by trying it.

Many skeptics, such as members of inspection committees in Bulgaria investigated if projects for speed learning are utopical, and personally ascertained that this particular type of training is indeed efficient.

All the above mentioned methods have more or less positive results, however it is evident that they are individualized depending on the idiosyncrasy, character and learning models of each person. Therefore, it was not feasible to be massively applied so as to breed widely positive results. However, it must be stressed that thousands of people managed to overcome or solve their learning difficulties and caught up with progress relying on these methods.

The biofeedback model

Biofeedback is by far the most effective method through which man can accomplish speed learning. Speed learning is not identical with speed reading, since the former implies and encompasses the latter. Furthermore, speed learning aims at assimilating a very high percentage of the information reaching the brain. This indicates that simply speed reading does not suffice, it is essential that the person incorporates what he has read and is capable of revoking it easily from memory at any given moment.

Biofeedback science, in its few decades of application, brought a revolution in the educational sector and has overturned many theories predominating about the way man learns and processes information, human brain perceptibility in various consciousness states and the potential competences of the human mind.

This capability of biofeedback is chiefly based on the fact that as a scientific method it utilizes real and objective data which are fed back by the biofeedback devices, and its results are completely objective, measurable and repeatable, given that it unfolds your inherent capacities, those you possess but do not take advantage of, and does not endeavor to raise new ones.

This means that you can reiterate the process as many times needed to consolidate it and turn it into an automatic procedure.

Therefore, training in biofeedback affords you the possibility to achieve speed reading, firm embedment and facile revocation of the knowledge you acquire.

Biofeedback protocols include three training stages, exploit-

ing the full array of current science and technology achievements.

1st: Progressive Release of Chronic Accumulated Muscular Tension

We have already referred to relaxation as one of the fundamental biofeedback tools. This is so because through relaxation you can have genuine contact with yourself. Relaxation brings about stress control. We are all familiar with the fact that stress and anxiety compose the two main factors distracting your attention when you want to study.

When you are mentally working, either in college, university or school, calmness and desensitization from stressful factors or stressors is greatly needed in order to study efficiently. Every stressing event or source of anxiety can disarray your attention when studying.

Besides, a significant parameter bearing negative affect upon your studying efficiency forms also the time required to return to the previous balance, the pre-stress state, where your performance was more satisfactory.

Relaxation diminishes or even completely eliminates the impact of stress and anxiety upon you when studying. This connotates that you study in a state of calmness based on passive attention or spherical attention.

Physiologists, for many years, have asserted that man remembers easier what he learns in a state of muscular relaxation. If we could exercise on slowing down our heartbeat while thinking, mental work would be facilitated, claims Barbara Brown and continues in her book “New Mind, New Body”: “In slower heart rate the mind advances with big steps and high efficiency. Voluntary slowing down the heart rate actually relaxes the heart. Usually our heartbeat ranges between 70-80 times per minute. Experts believe that if we could go down to 60 heartbeats per minute than we would attain better health and improved mental performance. Although numerous biological data in connection to better learning are known, they are however not put into practice”.

It would be plausible to think now that you’ve spotted a contradiction. When heart rate slows down, the blood supplies to the brain also cut down, and the latter gets tired easier. However, speaking in biofeedback terms will clear the issue. When we talk about voluntary control of the heart rate we mean lower-

ing the heart rate to optimal level for the performance of the organism to a level indicating that the organism is in a relaxation state and not in a stressful state, at which the cardiac rhythm accelerates. Anyway, I should emphasize that no matter what happens to the organism, even in the event of the most serious bleeding, the brain is the last organ to be deprived of its blood and oxygen supplies.

It follows that there is no danger within reasonable and normal rates that control cardiac pulse so that the organism may function within relaxation instead of stress levels.

Lozanof discovered yet another aspect of the body-mind relationship, which emerged from long studies on individuals with supernatural or extraordinary capacities, such as yogis, people with super-memory and human "computers". The measurements resulting from diverse monitoring devices affirmed that when these subjects were accomplishing their amazing mental feats their body was in relaxation and the brain produced alpha-waves, a frequency indicating relaxation (7-13 circles per second). They did not exert any voluntary pressure on their minds to function. Whatever was going on occurred without any effort. They were in a state of passive or spherical attention.

That is a paradox, thought Lozanof. Relaxation is connected to very intense mental labor. It is generally accepted that when a person performs a cumbersome mental task his pulse and blood pressure raise and his brain waves accelerate to b waves (over 14 circles per minute). This takes place because too often reading and learning constitute cognitive stressors, since both processes have been associated from an early age with feelings of suppression or compulsion.

In this perspective, a relaxation state could be reached in the body in parallel with maintaining throbbing activity in the mind, for instance solving math exercises or learning foreign languages. If someone could keep his body engine running slowly instead of accelerating speed while his brain works, he would let the brain function at unimaginable levels. Remember the respective "paradox" REM function displayed

during sleep. While the mind is super-active, engaged in experiencing dreams full of action and eyeballs keep incessantly moving, the body remains in total relaxation. If this is possible during sleep why can it not happen at alert states as well? Anyway, what is for sure is that while the mind steps on the gas, the body may slow down, in relaxation.

Here, biofeedback gives the solution, the training with the electroencephalograph.

Of course, Lozanof was not the first physician to deal with relaxation techniques. Nor was he the first scientist with profound knowledge on hypnosis who set his mind to find a way that would permit the individual to enjoy the benefits of hypnosis without having to give up the control of his mind.

The German doctor Giohan Schultz, who was occupied with the same issue in the 1930s, formulated the theory of Autogenic Training, an excellent self-control system for both the body and the mind, extensively applied in medicine and recently used in sports training in Europe, America and Australia. Schultz ascertained that genuine relaxation constitutes an extended consciousness state very different from that of guided hypnosis. Additionally, in relaxation you yourself have the absolute control over the entire process.

The reason why it takes you quite some time to read a text is that whether you read it out loud or silently, your vocal cords are vibrating and recite the text, even without making a sound.

2nd: Biofeedback speed reading

In order to assimilate a text, the human mind must originally come in contact with it. It has to read it. Reading is produced in two ways. Either you read out loud, recite and at the same time hear the text while reading it, or you read “silently” with your mouth closed and without speaking.

In either case it takes considerable time to read one page of text.

It is clear that the speed in which the text travels to the brain

is directly dependant upon the speed the vocal cords respond to the stimulus. However, vocal cords present a high degree of sluggishness in comparison to the brain's capacity for information intake. For example, the brain is capable of capturing the information cited on a page of text in an almost photographic manner, in just three seconds, whereas vocal cords need 70 seconds to read the same page.

This plainly and logically means that if you could immobilize your vocal cords while reading, then the speed your brain is capable of receiving information could be utilized.

Indeed, this is actually the case.

The ability to read a text without reciting it with your vocal cords is obtained through biofeedback training.

Following a specific training course with the electromyograph you can learn to halt vocal cord movement during reading, thus your brain unimpeded gets the information printed on the page, in an almost photographic manner, like a snapshot with your eyes.

3rd: Biofeedback increased perceptibility

As was earlier mentioned a state of bodily and psychoemotional relaxation is attainable.

A particular state of tranquility, calmness and global attention can be reached. This state is characterized by lack of attachment to anything in specific, a state defined as global or spherical in terms of perception and conception.

Many studies convey that in this state the brain presents its highest capacity to perceive and perform.

Let's assume that a university student maintains α relaxation state while studying, this implies that stressors little or not at all affect him, and therefore his attention is not distracted. Suppose also that he is able to photographically read the pages. Now take another step and accept that this person, following the above processes, is also in alpha brain state, where his brain becomes highly industrious and prolific.

It is evident that by employing just these three techniques, namely relaxation, vocal cords standstill and alpha brain state, this person has multiplied his studying efficiency.

Various tests conducted with people studying serious science texts in the above manner proved that the speed of studying is multiplied almost six times, while in parallel text, incorporation exceeds 93%. Whereas, a very assiduous student, studying in the ordinary way, needs six times more to complete his work and embedment does not surpass 65%. If the latter wishes raising to 93% the consolidation of information received through studying, he must repeat his reading three more times. The time is further compressed when reading literature.

In our age, the imperative to learn and incorporate large amounts of information, the necessity to keep up pace with the advances and dawn of new information led to the invention of learning systems, which apart from the aforementioned processes, additionally encompass specialized speed reading methods, such as writing texts in a specific manner, audio-visual adjuncts which embody music composed in a special manner and with special rhythm enhancing the brain functions of perception and conception. All these methods are used in biofeedback, either separately or jointly, in consort with the needs and potentialities of each trainee.

Special biofeedback training assisted with the encephalograph helps you learn how to reproduce this particular state of serenity, calmness and global attention especially in studying, when it is even more necessary.

Attention Deficit Hyperactivity Disorder (ADHD)

Biofeedback has demonstrated impressive results in this frequent learning disability. Estimates are that 5-15% of the population presents this form of learning disorder. Encephalographic biofeedback has been applied in children with ADHD syndrome since the '70s.

Lubar & Shouse, in 1976 employed encephalographic biofeedback to treat children with ADHD. Their highly successful work opened a breakthrough and a host of research which carried out documenting the effectiveness of the method in the treatment of ADHD (Lubar, 1991. Lubar, 1993. Lubar & Lubar, 1984. Tansey, 1993).

Rossiter & LaVaque, in 1995, noticed that 20 sessions of encephalographic biofeedback sufficed to provide very effective assistance to children with ADHD. They also concluded that biofeedback can prove long-term auxiliary in the future academic education of children, facilitate behavior normalization and smooth social adaptation.

Sterman, Goodman, & Kovalesky (1978) and Othmer, Othmer, & Marks (1991) demonstrated with their research, that the results pursuant to encephalographic biofeedback training obtained in children suffering from attention deficit and hyperactivity were invariably maintained even after the completion of the training course.

Jasper, Knott & Satterfield, pioneers in this research field, used encephalographic biofeedback to control ADHD symptoms in order to test their original hypothesis that hyperactive children might possibly present a problem in activating the reticular formation in the brain stem. Their hypothesis proved correct. Children with ADHD have difficulty retaining long beta-wave brain activity along with presenting hyperactivity in theta-wave range.

The individuals who overcome this problem with the aid of biofeedback are capable in entering that particular mental state correlated to the production of brain wave patterns with frequency ranging between 12-15Hz from the sensorimotor region. Scientists named this wave pattern SMR from the initials "Sensori Motor Rhythm" (Sterman et al. 1969).

Extensive research involved in addressing ADHD was carried out for two consecutive years within the framework of a project implemented by a public school for special children presenting such disorders; New Vision School, Minneapolis USA. The school applied biofeedback training for the treatment of children with attention deficit and restlessness. The students followed two, half-hour programs every week for two school years. The results were stunning!

All students regularly participating in the program increased their IQ level and also significantly improved their TOVA-test scores (Test of Variable Attention) assessing attention and impulsivity.

In 2000, Monastra et al. announced at the American Psychological Association Congress the findings of their research in which one hundred students and adults participated who attended a 12 month program on encephalographic biofeedback with respect to attention deficit and hyperactivity. They results were very positive.

The last couple of years, researchers working at East Virginia Medical School in cooperation with NASA, explored the possibilities in combining EEG biofeedback training with videogames designed for this purpose. Researches found out that the combined method shares the same results with traditional biofeedback. This promising method has the advantage to facilitate the maintenance of the child's concentration and overall interest in the training. Thus, today many similar biofeedback protocols include videogames.

Naturally, biofeedback applications in educations do not end here. Lately, a large private Swiss school, applied biofeedback to elevate and enhance diverse psychomental features of the students, such as mental alertness, attention, focus, creativity, self-cognition and self-discipline. The school's teachers were trained in biofeedback by the AAPB (Applied Psychophysiology and Biofeedback) science team. An analogous program is implemented now at Yonkers in USA.

Recently, at London Imperial College, a survey was conducted studying the impact various biofeedback training forms bear upon dancers performance (Joshua Raymond, Imran Sajid, Lesley A. Parkinson, John H. Gruzelier). Twenty-

four ballet dancers were randomly divided into 3 groups. The 1st followed alpha-theta EEG biofeedback training, the 2nd biofeedback training on cardiac rhythm variability and the 3rd group did not attend the biofeedback course. The results conveyed that the dancers' performance in both groups of biofeedback training improved versus no improvement in the group that had no biofeedback training.

Biofeedback applications in education are highly sought after today from many large companies, especially in the USA, which train their executives in speed reading and learning to enable them keep up with progress and endure the competition. Furthermore, special biofeedback programs are implemented in order to shape leading business executives and create supermodern sales systems.

Chapter 14

Biofeedback & sports

- *Man or Superman?*
- *Body alone, or body and soul?*
- *Do not forget muscle sense*

Man or Superman?

The speculation in sports, whether the body can be fortified by the powers of the mind so as to perform better is diachronic. Man has always had the need to perform wtih the aid of two mechanisms instead of one.

The magnificent structure called the human body would be highly prized with an additional motor, an extra mechanism reinforcing its activities, supplementing endurances, enhancing performance, and expanding its boundaries. Two motors are always better than one, in any system employing movement and propulsion. Notwithstanding, the body has confined limits which are generally accepted. We often witness their transgression, indeed in superlative degree, raising in our mind many questions.

Are my body limits really the ones I know, those which I have learned? The reply has been given since antiquity, when Hippocrates formulated the assertion that both the mind and soul reside within the body, however, influence, steer, and govern it. Scientific research fully verifies Hippocrates claim and advances it with larger leaps.

It has been proven that the autonomic nervous system, which affects the entirety of your internal functions, is ultimately influenced from, depends upon, and is ruled by your will; your psychomental processes. It may sound over-repetitious, but especially regarding athletics, it is deemed imperative to reiterate it once again. Each time your psychomental organ projects negative scenes or beliefs in relation to your limits, potentialities, competences or your reaction pattern towards a stimuli, it provokes cognitive arousal of your autonomic nervous system because the entire psychomental process is equivalent to stress. Its negative consequences and ramifications have already been expounded.

If you are an athlete set on the starting block of the track waiting for the starter's pistol to go off, focused on exploding to the race fractions of a second after the signal, to go after the gold medal, imagine what disaster may befall on you if a cognitive type of stress overpowers you at that crucial moment.

Being an athlete leaves no room for "playing" with this kind of psychomental games. You cannot afford the luxury to expose yourself to the hazards of cognitive stress that can paralyze your muscular system. Being an athlete, especially one of peak performance, your needs are located in the completely opposite direction. What you need is a way to control pregame stress and anxiety.

Being human, surely, sometimes uncertainty and worry trouble your mind, questioning your capability to reach your high-set goals; thoughts cast doubts on your abilities. This is natural, because you are in fact a human being, because you judge and compare. The functions of psycho-mental speculation and concern, even that of doubt, are positive processes in the notion that generate inside you as creative stress. This is a form of stress positive and subservient to man's functions and activities; it constitutes your power motive. Creative type of stress mobilizes you to test yourself: To find out your true limits and select the appropriate methods that will assist you to exploit the full range of your natural physiological boundaries. Such creative stress will drive you to seek for solutions, methods and experts.

Once you are cognizant of your actual limits and well comprehend the mechanisms which can be employed to reach them, you are already half-way to standing on the winner's podium. Given that cognitive stimuli can increase the autonomic sympathetic system arousal, why not harness their action to the benefit of your organism and the demands of your game? And why couldn't cognitive stimuli act in the inverse order as well, meaning reduce the sympathetic arousal whenever required with all avails and advantages this entails?


BIOFEEDBACK AND SPORTS
I apply running economy, I will have more reserves for the finish line.
I control dysponesis. So, I better utilize my muscles.
I control dysponesis. So, my shooting is steadier.
I shoot in between two heart beats. So, I have the benefit of complete stability.

There are occasions when your organism needs to demand the arousal of your sympathetic nervous system, so as to bring into play the normal fight response, when confronted with obstacles, time or distance. Nevertheless, this reaction must be regulated by you. If rampant and excessive (perhaps more than you need), then you will suffer a devastating blow, a break down. Conversely, in the case that it is much less than you actually need, it will be unable to mobilize, empower you to utilize your potential. You never need a cognitive stimulus affecting your sympathetic nervous system, the instant you expect to hear the starting signal for the race.

Since it has been scientifically proven that the mind, in cooperation with psychic processes, is capable of either disorganizing or "boosting" your body, you have no other option but to find the way to do the latter.

Psychomental incentive for the purpose of goal achieving resembles a formidable turbine that can reinforce your body, give wings to your feet and stretch your endurance to reach your genuine limits. You do not transform into a superman, however you grow into a substantially integrated personality, not sparing unexplored even the smallest ounce of potential in your itinerary geared to winning the gold prize. The entire mechanism, previously described, is the one in which biofeedback focuses, reveals its modus operandi and puts it in the service of champions.

Body alone, or body and soul?

Pat Riley, the legendary renown coach of the Los Angeles Lakers basketball team, who inspired his team to win the American championship four times within a period of nine years, writes in his book "The Winner Within": "If there is one thing on which I am an authority, it is matching the talents and advantages of individuals in a team, to create a force bigger than the force of each member put together…".

This book is about the force which determines the course of us all; the desire to make our life matter. It will encourage you to pursue the ultimate goal. It will offer you the proper tools to succeed it. It will help you create the appropriate environment for your talent to flourish".

Diamond, an American psychologist, mentions "Your mind and body are interlinked. Your mind gives commands to your body to perform movements and your body informs your mind how it feels. The mind is the most powerful electronic computer in the world and can help your body achieve astonishing things. It can offer you enormous possibilities and accomplishments in the sports domain".

In consort with this statement, whereas, today 35 years after biofeedback laboratory and clinical athletic applications, the opinions of most physicians and psychologists are engaged in this issue.

Nowadays, it is accepted as an unequivocal truth that the way an athlete thinks, the ability to relax, the capacity to modulate the arousal level of his nervous system, the capability to concentrate and self-confidence form the determinant factors of his/her performance.

Formulating a well-targeted remark, Vic.Braden, president of the homonymous Tennis College in the USA, designated biofeedback as the "forerunner of science prevalence in the field of sports training".

William Morgan and his colleagues were among the first researchers to examine, in 1976, the body-mind interaction during physical exercise. In an original experiment conducted with college students; they were told to pedal on stationary bicycles while under hypnosis keeping steady pace giving constant workload 100 Watt for 20 minutes of cycling. However, from the 10th to the 15th minute of exercise, the researchers supplied the hypnotic suggestion that were pedalling up a steep hill. During these 5min the students were climbing this imaginary "hill," their breathing (total intake of

air into the lungs per minute) rose by about 20%. Breathing then dropped to the previous levels when they were told that they were once again riding on level terrain. A clearly mental, virtual experience resulted in prompt summoning of the body and its somatic functions, required to carry out the task.

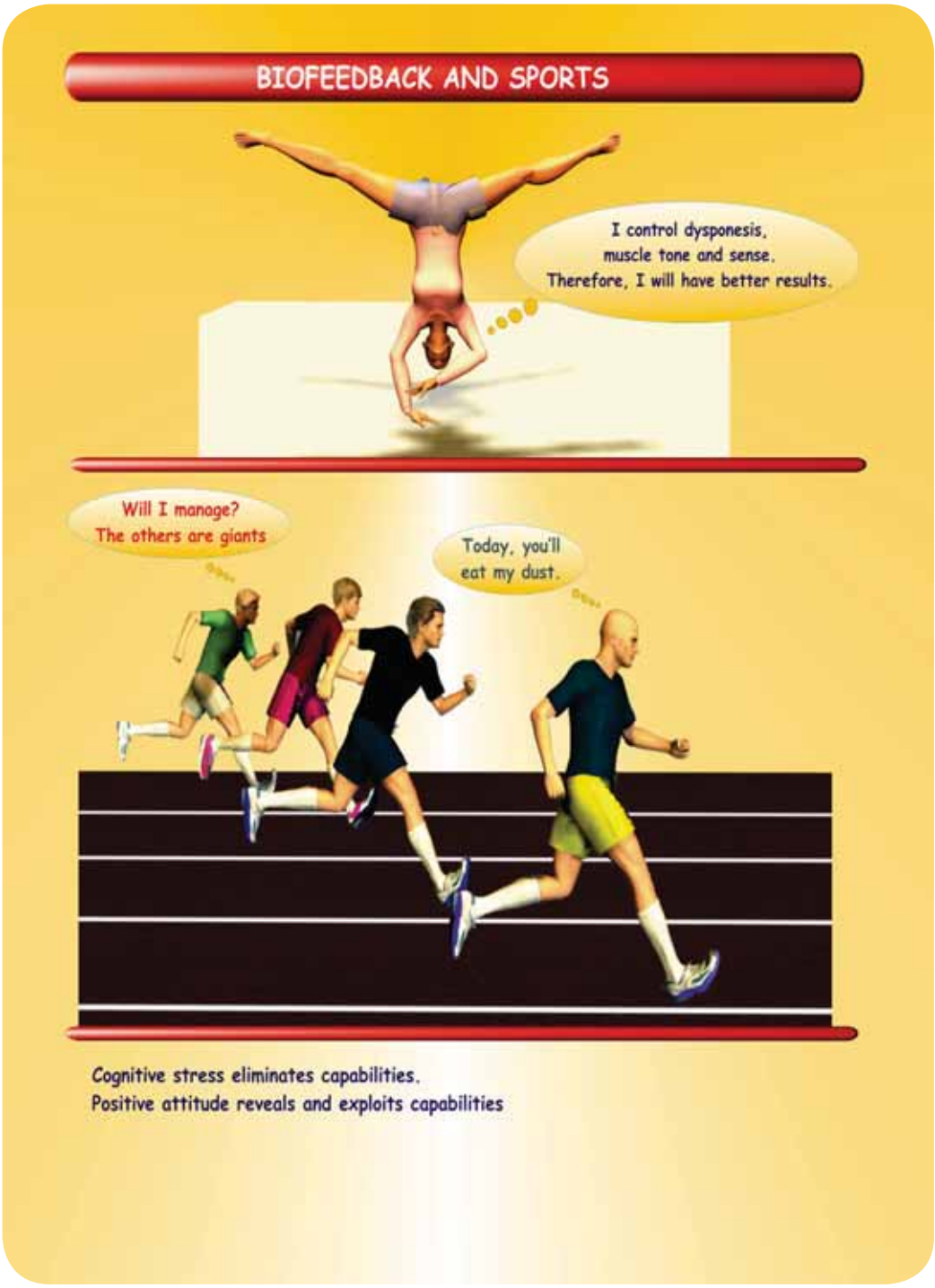
Around the same time, Herbert Benson, studying the effects of muscular relaxation and biofeedback on patients with hypertension started interviewing distinguished long-distance runners, investigating the link between mental attitude and a successful race. To his surprise, without exception, every athlete had applied a self "mental strategy", indispensable to their success. This provided serious preliminary indications that a person's thoughts and mental attitude can indeed alter the body's response in physical exercise.

Then, researchers probed more systematically into the possible assistance of biofeedback to athletes in terms of performance enhancement, mainly due to energy economy augmenting their effectiveness within a certain time. We call "running economy" the efficiency with which the body coverts oxygen consumption to forward a motion. This is an extremely important parameter in sports wherein an athlete's endurance is a determinant factor in the success, such as long-distances races, bicycling, basketball, football, rowing etc.

The question that arised was whether or not athletes could have voluntary regulation of respiration or cardiac operation during physical effort. Since this could prove useful in energy economy, less fatigue and notably boost performances.

Eli, Dreshman, Blumenstein & Weinstein, in 2002, applied biofeedback training to a group of young swimmers and demonstrated a very significant difference in their performance relative to those not using biofeedback training.

Research proved that via biofeedback training athletes succeeded to lower breathing rates and limit shortness of breath to a significant extent. At the same time they regulated cardiac rate within a certain range, adjusting it to more beneficial levels for the type of sport they were engaged in.


BIOFEEDBACK AND SPORTS
I control dysponesis,
muscle tone and sense.
Therefore, I will have better results.
Will I manage?
The others are giants
Today, you'll
eat my dust.
Cognitive stress eliminates capabilities.
Positive attitude reveals and exploits capabilities

A limitation of earlier surveys on relevant issues was that they all studied low to mediocre intensity exercise in which heart rate ranges between 95-120 beats per minute. The matter to be resolved was if biofeedback could also be useful in sports involving harder physical exercise, thus causing more fatigue. For this purpose, Hartfield et al., worked with biofeedback in twelve cross-country runners whose exercise heart rate reached up to 160-170. The amazing result was that by providing them feedback on their breathing the runners managed to significantly lower oxygen consumption per minute.

Hartfield's research propelled the idea of biofeedback's usefulness in sports running. A few years later a very interesting research was carried out by the National Health Institute of USA. Ten college athletes were asked to bicycle with intensity reaching 60-70% of their maximum heart rate. Half of them received continuous feedback, in the form of a numerical signal, about their heart rate and were also given instructions and biofeedback training so as to slow heart rate during exercise. The other half did not get any feedback information on their heart rate, nor was asked to reduce it.

After following four training sessions in slowing down the heart rate, the athletes were, in the next session, asked to carry out a certain bicycling exercise which, prior to their biofeedback training, were completing with heart rates in the average of 65% their maximum heart rate. However, observation of their heart rate and biofeedback training during this session actually helped athletes to impressively reduce their heart rate.

In this research, the athletes who received information on their heart rate via biofeedback had 22% less heart beats per minute relative to the control subjects, the athletes who did not receive biofeedback training. Additionally, those in the biofeedback team used oxygen at a 6% lower rate and reduced lungs ventilation by 14%, although the actual intensity of the exercise was the same in both teams. To a sports expert, such changes in numbers are spectacular.

To illustrate this enhancement with the energy economy of value in runners, for example; 1% may result in 20-30 seconds gain in a distance of 10 kilometers. A 3% energy economy would further improve time by one minute, - extremely important numbers in sports!

This research of the National Health Institute of USA documented that the regulation of the nervous system by means of biofeedback during exercise, facilitates the organism's "economy", decreasing the arousal of the sympathetic branch of the Autonomic Nervous System which is responsible for the "fight or flight" response, therefore also for an increase in heart and breathing rate, oxygen consumption and muscular tension.

Tretilova & Rodimiki's research, in 1979, with artilary demonstrated that median heart rate at rest was 68.7 pulses per minute. Comparing the alterations in heart rate values in both directions, up and down, during shots and resting intervals, they noticed five distinct patterns of psychophysiological reactions. The best artilary performances were achieved when heart rate increased by almost 80 to 90 pulses per minute above its resting value.

Such findings support those published by Landers, Wang & Courtet in 1984, conveying that a heart rate increase above the baseline and within the balance level contributes to better efficiency. This indicates that different relaxation levels are suggested as optimal for every movement, depending on the type of sport.

Coulture, Singh, Chahal, Wankel, Oseem & Wheeler, in 1999, exercised with biofeedback training in forty-four gunmen and evidenced that the athletes improved relaxation competence, target focus, muscular sense and physiological control, in comparison to the control subjects, who did not attend biofeedback training, thus the former displayed marked improvement in their performance.

In 1999, Sara Caird, leading a scientific team in Otago university of New Zealand, combined biofeedback with a technique of progressive muscular relaxation, and provided a more specific account of the benefits such training gives to athletes.

Eight long-distance runners took part in the research. The runners, both male and female, used a difficult workout regimen regarding lactate threshold (the exercise intensity at which lactate acid starts to accumulate in the blood). The scientists, prior to the research, ran the relevant tests to assess athletes' maximum oxygen consumption; "running economy", lactose threshold and maximum running velocity. For the next six weeks runners were trained in Jacobson's 1st progressive muscular relaxation, three times per week. Right after this training practice in muscular relaxation, the athletes were subjected to a test of maximum velocity race which reached the lactose threshold and lasted for 10 minutes. During the first 5 minutes of the race the runners did not get feedback, but during the second half of the race biofeedback information was displayed on a screen before them regarding their breathing, heart rate and oxygen consumption. During the second half the runners used the method of muscular relaxation they had learned in order to keep their breathing, heart rate and oxygen consumption at the lowest possible levels.

After a few weeks of exercise, the results were stunning! The athletes gained the capacity to reduce the amount of energy consumption by 9%, lowered oxygen consumption by 7.3% and cardiac rate almost by 3%. The ensuing 7% improvement of energy economy could be interpreted in terms of four minutes improvement in one hour running duration of their personal times. This amounts to tremendous improvement in the eyes of those occupied within the sports domain, especially if one takes into account, that it did not result from hard physical workout, but from the participation of one's mind in the training.

The research conducted by Otago of New Zealand had yet another significant finding. It conveyed that after the end of the training period, the athletes maintained the abilities they had developed during training.

Biofeedback applications in sports have increased nowadays in geometrical progression. Estimates are that since 1970, when biofeedback was first introduced in sports, more than 30,000 Olympic game athletes have been trained in this method.

In 2003, the scientific team of San Francisco University comprised by Erik Peper, Andrea B. Schmid and Shapiro Ed.D, undertook the biofeedback training of United States National Rhythmic Gymnastic Team. The scientists employed electrodermal biofeedback, initially to illustrate to the athletes how their thoughts affect their body and performance. The next targets were: to monitor their ability for muscular relaxation, to spot which components of their routine caused them anxiety and also to learn to preserve self-concentration in training irrespective of distractions or adversities stemming from the environment. Learning the biofeedback technique focused on:

-modulating the level of psychomental arousal closer to the optimal for best personal performance

-reducing misdirected muscular efforts, bad usage of muscles, due to dysponesis during exercise

-facilitating the skill for refreshing sleep when under stress

-building the foundation necessary for the image sensory recall of their program to be more efficient.

As it becomes evident, the first-stage of the training chiefly aimed at reducing pre-game and game stress, while the second stage focused on increasing their ability to concentrate on their gymnastic routine despite adverse conditions, something that maximally contributes to the success and enables athletes to face real game-like conditions. As a result, team performance admirably improved.

Milan football team uses and has used biofeedback now for several years.

Bruno DeMichelis, head of Sports Science of AC Milan football team declared that the capacity of biofeedback devices to monitor muscular activity coupled with the psychological preparation these provide, "helped us reduce injuries by 90% and taught our athletes how to enter a somatic and psychomental state that promotes peak performances".

Famous sports psychologist Vietta Sue Wilson at York University has trained over seven hundred Canadian Olympic Games coaches in biofeedback.

The supportive instrumentation used in biofeedback vary from electrodermographs, electrothermographs, units monitoring breathing and heart rate, electroencephalographs, electromyographs etc. depending on the sport.

Dan Landers has been teaching, for a number of years, the Olympic Artilary the technique to shoot rifles between heart beats, with the use of a heart rate monitoring unit.

Kall placed sensitive pressure sensors in ski boots and adjusted them to transform weight shifting into sound pitched signals, in order to train skiers via audio feedback.

The ostensible goals set for each athlete differ since they are determined by the type of the game, i.e. swimmers usually follow biofeedback training with the electroencephalograph and the goal is to produce lower alpha brain waves (7-9 Hertz), long distance runners aim at maintaining low-energy consumption levels etc.

Biofeedback instruction with progressive muscular relaxation trains muscles to stay more rested and more relaxed to meet the demands of intense effort and prolonged exercise intervals in training. It proved that reduction of psychomental tension can relax extremely tight muscles and allow steady hand and feet movement in exercise, thus achieves energy economy. Steady and more flexible movements are attributable to increased muscular sense developed via biofeedback training. An athlete with very “tight” muscles resembles a car trying to accelerate with the handbrake pulled. Just as the handbrake restrains the car from speeding with maximum velocity, similarly a tight muscle consumes energy and lowers muscular efficiency. Whereas progressive muscular relaxation decreases resistance to movement, it supplements and enhances performance.

The basic idea is that if you lower the tension level of your nervous system, heart and respiratory stimulation will be consequently lowered. This brings about the slowing down

of heart rate at specific desirable figures, cuts down both on oxygen consumption and the calories expenditures necessary to run the exercise and eventually facilitates the energy economy of the organism.

Progressive muscular relaxation and biofeedback training, besides increasing the flexibility of muscles, also improves movement plasticity and speeds up the release of tension after maximum effort.

In every move you make, the antagonist muscles must enter a state of maximum relaxation, whereas the co-agonist muscles (involved in or supporting the movement) must prepare for maximum tension and output. This has to be implemented in the distinguished speed and rhythm required by each sport and indeed in the most "economic" manner for the athlete.

Do not forget muscle sense

The muscular sense you gain via biofeedback training helps you utilize your muscles in a correct, more sensible and balanced manner. It gives movement agility, plasticity and harmony. This is a key factor for any type of sport. Concurrently, the phenomenon of dysponesis is avoided, which raises needless tension in muscle groups not involved in the movement, thus, energy is economized. These advantages significantly lower the odds for injuries, a valuable asset especially in the case that you are a professional athlete.

Both pre-game anxiety and anxiety in the real game plays a tremendous role in your performance. Biofeedback training greatly helps you maintain stress at normal levels, those required and necessary so that your effort yields the best re-

sults. Additionally, it has been proven that when bodily functions are influenced from the over-arousal of the nervous system, they get easier fatigued, energy reserves fall and exhaustion comes easier.

Athletes experience intense anxiety, particularly the “elite” athletes who are focused in international headlines and feel the expectations of sports fans demanding a new record. “Elite” athletes are identified from their commitment both in the pre-game preparation as well as in the game. That is the reason they cope with intense stress prior to, as much as, in real-time effort, i.e.: apprehensive of game failure, anxiety whether or not he will be able to meet the expectations of their coach or country, the pressure imposed from the obligation for better achievement, dealing with tough competition from other athletes etc. Definitely a method helping athletes to relax and limit pre-game stress acts as a rescue board and is a basic part of training.

From the very first hours in your biofeedback sessions you realize by first hand the enormous opportunities offered to you, the ability to master mind interaction with body functions, in the manner you deem as most fruitful and productive for your athletic activity. This enhances your self-control, a cardinal quality and also greatly boosts your self-confidence, both important coordinates of your success.

Intensified concentration and the ability to focus, elimination of negative thoughts, enhancement of positive expectations, and increased self-confidence has been proven by scientific research that significantly elevate your performance. Biofeedback helps you in yet another way: increases readiness and promptness of reaction time, which are determining parameters for performance in some sports such as artilary, fencing, tae quo do, wrestling etc.

Pinel & Schultz, in 1978, systematically applied electromyographic protocols and conveyed the most significant impact pre-game stress has upon athletic performance. This research assesses that pre-game stress reduces the performance of athlete even up to 30%.

Another, somewhat neglected, sector to which biofeedback is extremely useful deals with particular problems athletes

face occasionally. Such problems are melancholy, usually after a failure or injury, chronic fatigue, increased or decreased appetite, sleeplessness due to anxiety and others. Biofeedback is the indicated method of treatment for all the above. Biofeedback opened new horizons in athletics, challenging not only the sports professionals, but each one of us who wishes to improve performance, surpass personal limits and use the inexhaustible power of the mind to gain the satisfaction and benefits athletic activity can offer us.

Peter Kledzos, of Greek origin and the oldest living Olympic champion refers to the pole-vault saying: "Whether one uses a bamboo pole or a modern Kevlar pole, mental resilience remains as important as it was always".

Khasky & Smith, in 1999, and Rasid & Parish, in 1998, used biofeedback to reduce anxiety and attain the ideal psychomental attitude for sport performance, while Broucek, Bartholomew, Landers & Linder, in 1993, used Biofeedback to address the issue of pain endurance.

The order in which muscles contract and relax during biofeedback can alter to be aptly adjusted to each type of sport, i.e. for a weight-lifter it is imperative to relax specific muscle groups not involved in lifting, thus save energy to be used by the muscles encumbered to perform the task. Under no circumstances could a weight lifter achieve record performances without mastering the phenomenon of dysponesis. On the contrary, an archer may need to focus on relaxing the facial muscles and upper extremities so as to facilitate his concentration when shooting the arrow.

Luke Behncke, of Melbourne University, in an extensive study published in the Athletic Insight Journal, refers to the necessity of mental training which enables an athlete to stabilize and augment his/her performance.

The capacity of an athlete to control mind and emotions, besides promoting performance, builds the foundations for increased self-confidence and well-being (Boys & Zenong 1999).

Cohn, in 1990, presented information regarding mental training methods employed for the purpose of increasing performance, which were successfully adopted in many sports, such as golf, tennis, volley, basket and football, bowling, rhythmic gymnastics, ski, diving etc.

Diamantidis and Cangol, in 1980, applied biofeedback coupled with mental training to basketball players. The team, after four game seasons, climbed from the 103rd and ranked 2nd at the general collegiate teams ranking. Lobmeyer & Wasserman, in 1986, examined the effect of mental training on the free-shots of basketball players and noted the supremacy, 7% higher efficiency, in subjects who had made prior mental exercise. Even better results in the same sport was demonstrated in research conducted by Wrisberg & Anshel, in 1989, and Kavussanu, Crews, & Gill in 1998. Diamantidis et al, of the Greek Biofeedback Centre, provided biofeedback training to a large group of athletes, comprising in 1988 the Greek National Track Team, and the exceptional results of their survey were announced at a press conference held in the Zappion mansion in 1993, with the participation of eight track champions on the panel. Several of the athletes that trained in biofeedback, now coach other champions.

Each time you want to unleash the maximum of your potential and abilities for top performance, without tiring or causing irreparable damage to your organism, biofeedback is the natural and scientific tool for you.

Even the strongest of drug enhancements are incapable of being effective, if you do not control the mechanism of your psychomental participation in the effort.

You have in your possession a body with immense abilities of which you may not be cognizant. Exploit your abilities and put two turbo machines in your effort, the somatic and the psycho-mental.

Chapter 15

Biofeedback in natural medicine and rehabilitation

- *The mechanism of neuromuscular function*
- *Nature heals. Do you know that?*

The mechanism of neuromuscular function

The first methodic biofeedback applications concerning body lesion rehabilitation were delivered in the 1950s, chiefly in war victims with physical handicaps or impairments. Rehabilitative medicine developed as a medical specialty after World War II aiming at improving the functionality and life quality of individuals with mobility disabilities. The domains of physiotherapy, speech therapy and rehabilitation psychology developed techniques optimizing life quality. Subsequently the number of rehabilitation centers rose considerably.

Physical disabilities derive from diverse causes, impairing either the central or peripheral nervous system, such as: spinal cord or head injuries, hypoxia at labor, congenital problems involving cerebral palsy, spina difida etc. Also in Guillain-Barre syndrome, multiple sclerosis, amyotrophic lateral sclerosis, encephalitis, poliomyelitis, facial nerve paralysis, and vascular brain diseases causing brain strokes.

Physical therapy and rehabilitative medicine deal with cases of neuromuscular impairment. In such cases there are damages at the motor unit, or neuron or both.

The conduction velocity of the electric charges transported through our nerves, which resemble wires, is higher at the upper extremities than at the lower, broadly ranging between 45-75 m/s (meter per second) and 38-55 m/s respectively. As neural conductance velocity is the speed electric charges travel in the electric conduit, namely the nerve. Nerve conductance is ruled by the general principles regulating the conductance of an electric cord; the larger the cordcross-section the higher its conductance velocity. Temperature influences neural conductance in a manner that one degree temperature decrease brings about velocity reduction 2-2.5 m/s. Age is another parameter affecting

neural conductance so that velocity in infants is half of that observed in adults, on account of nervous system immaturity in infancy. In elderly people, over 60 years, neural conductance is 10% slower than in adults, obviously due to neural tissue-network anility.

These peculiarities dictate conductance measurements, concerning the affected nerves in cases needing physical rehabilitation treatment, to be always made comparatively, in the sense that nerves are examined and assessed bilaterally. Better accessible to biofeedback control are mainly the facial, median, radial and ulnar nerve which innervate the upper extremities, and also the femoral, common peroneal and tibial at lower extremities.

In the biofeedback laboratory, we can examine the neuromuscular synapses, the nerve-muscle link, or else the neuron-motor unit connection to determine whether it operates normally. When a neuromuscular synapsis is disrupted the nervous stimulus transmitted in the form of electric charge through the nerve can no longer reach its end destination, the muscle, nor thereby pass to the muscle the command to contract.

Neuromuscular synapsis, besides its strictly mechanistic aspect, meaning the nerve-muscle linkage, further encompasses a chemical aspect defined and ruled by the secretion of a series of chemical molecules, in diminutive quantities, subservient to the neuromuscular synapses. Some of these substances are called neurotransmitters. Pharmaceutical substances antagonizing neurotransmitters or other chemical agents block the neuromuscular synapses, bringing about paralysis. Once, on account of impairment, neuromuscular synapsis is blocked the muscles no longer receive electric stimuli and paralyze, emaciate or become atrophic and incapacitated.

Neuron conductance is usually impaired in chronic diseases, such as metabolic, degenerative, inflammatory and post-traumatic. Factors keeping muscles active, in normal volume and good functional state, constitute both the nervous stimulation and muscle arousal.

The skeletal muscles of the human body would be un-

able to perform and output work if there were not operating in pairs, one muscle executing the opposite movement from the other. In each muscle pair of this type, one muscle is called agonist and the other antagonist. If the muscular arrangement did not follow the pattern of functional couples, no set of movements would be feasible; neither bones could act as levers and thus enable movement implementation. The muscles end in tendons which adhere to the bones in a particular mode that forces bones, by pulling or drawing, to produce movement each time muscles contract. When an agonist muscle contracts and performs its tug task, its companion in the muscle pair must simultaneously relax allowing so the movement to take place. Likewise, when agonist muscle relaxes, its antagonist concurrently contracts, making possible the opposite movement.

Therefore, every body movement is executed and completed by means of synchronous, gradual and coordinated contraction and relaxation: the agonist and antagonist muscles respectively perform.

When a part of your body is in relaxation, for instance your hand, then both agonist and antagonist muscles are relaxed. A typical pair of muscles, accessible to everyone wishing to witness and test this function directly, even by mere touch, comprise front arm muscles or biceps and triceps, at the back side of the arm. When biceps contracts the forearm is pulled and bends the arm to the elbow forming a right angle proper for weight lifting. In this case, the biceps play the role of agonist whereas the muscles at the rear arm are the antagonists. When the biceps contract its antagonist relaxes and vice versa. Imagine holding a long pole topped with a comb and stretching up our hands to reach the olive tree top so as to “comb” down the olives, the moment we pull down and lower our hands the rear arm muscles act as agonists and biceps as antagonists. Likewise, all body muscles form and perform in similar functional duets.

When, subsequent to degeneration processes, neuron cells thin-out the replenishing mechanisms in the left neurons are put into motion, sprouting is initiated alongside the remaining nerves which start innervating the adjacent, enervated muscle fibres and increase in this manner the ratio

of innervations. Nature leaves nothing to chance. It has anticipated and so provided that in the occasion of enervated muscle fibres, due to neural diseases or lesions from degeneration, in other words, when the nerves reaching muscle fibres and trigging their functioning have been destroyed, sprouting starts from the adjacent, healthy and intact nerves and sprigs grow to innervate the enervated muscles. This way is redressed, at least anatomically, their impaired hypostasis.

Diamond et al. (1976) observed that when a motor neuron is impaired, eventually its activity ceases. Due to this impairment, various chemical factors diffuse to adjacent tissues. This represents a chemical SOS for help. Adjacent neurites receive the message and start helping by sprouting sprigs to reach the impaired area. Amazing altruism and mutuality exist at nerve level. This mechanism is called parallel neural sprouting.

It seems that through this mechanism the functionality of the damaged tissue is substituted. After the necessary time lapse the axon grows again (Tsukahara, 1981). As it grows it heads toward its pre-injury locations, following the chemical signals transmitted by the impaired and decomposing tissues.

Ultimately, functional synapses are formed and the neural pathway is restored.

In clinical practice we sometimes meet a phenomenon called synaptic suppression. Notwithstanding the fact that synaptic surfaces exist and are intact, the brain however does not use them and seems to ignore or strike them out (Mark, 1980). The brain is characterized from absolute hierarchy in its structures and functions. When a function is performed at vari-

ous functional brain levels and the higher centre is damaged, the directly lower level resumes control to restore the function. This, so termed, replacement mechanism is mainly responsible for the restitution of a large number of neuromuscular impairments (Davis, 1979).

These young sprigs of nervous tissue which reinstate muscular innervations, namely the neuromuscular synapses at the impaired muscles, are relatively less mature than the rest of the nerves therefore neural signals transmission is slower through them. As a result, the command for muscular contraction reaches some fibers with delay, thereby not all fibers contract simultaneously and this lack in synchrony is demonstrated as inadequate movement control.

Nature heals. Do you know that?

In light of those elementary lessons mentioned above, regarding the physiological functions nerves and muscles possess, surely you must feel admiration for the complexity and completeness your organism presents, and as well for the prudence nature shows by attending to the anatomical or functional restoration of the organism each time the latter sustains some form of impairment. Usually, when a muscle is impaired, as aforementioned, its paralysis follows, consequently its antagonist muscle, its match in the bipolar muscle pair, looses its task orientation. Like a fish out of water it fails to function normally and eventually develops spasticity (constant muscle contraction), since it neither meets any resistance, nor receives any functional response from its “mate” that would initiate its relaxation. This explains why in body parts with neuromuscular lesions certain muscles are often paralyzed whereas others remain in spastic contraction. The phenomenon leads to extremely dysfunctional states, including mobility problems and serious painful syndromes.

Subsequent to neuromuscular impairment and within the context of healing processes, re-innervation of the muscular fibers is initiated, however, the patient is not aware of this pro-

cess, nor has any sense of it. Up to the last decades, science was equally ignorant of the fact. Thus, these most valuable healing efforts of the organism remained unexploited. Besides, due to the functional immaturity of the ventured activity, the patient perceives this whole effort as an additional problem to the one already existing.

The basic idea in biofeedback regarding rehabilitation was on the one hand to try to restore functionality the newly re-innervated with sprigs muscles and on the other to train the person how to use and re-activate the rehabilitated from nature muscles.

The individual is unaware that such a beneficial faculty has been deposited by nature in the impaired tissues waiting to be withdrawn and exploited personally by the patient to the avail of lesion restoration. Biofeedback science in cooperation with clinical neurology, by exploring the neuromuscular function, discovered this precious and useful secret.

Thereby, biofeedback therapeutic efforts set as goals on the one hand the re-functioning of muscle fibers which have healed from innervations aspect and on the other hand the subject's retraining in using these muscle fibers.

The multiple achievements biofeedback exhibits in our days in physical rehabilitation prove that both goals have been accomplished.

Several researchers have expressed their views on this issue contributing to its ample interpretation and elucidation. Joseph Brudny and his team, in 1979, asserted with respect to post-stroke brain lesions, that the significant success biofeedback exhibited in restoring damages was accountable to:

The information feedback provided by the electromyograph, when the patient is executing a movement, substitutes

the disrupted internal nervous loop and the deficient processing of the signal issuing from the examined brain lesion. In succession, the nervous pathway followed is described to bypass the lesion and “recover” the impaired function.

As the progress goes on the synapses which previously remained unused or sub-functionied start acquiring functional faculties, because the feedback process compels them to become active. Their axons stretch and seek for new synaptic connections in the neuromuscular tissue system.

It is estimated that in the States 35,000,000 people suffer from some form of physical disability which usually causes lesser or greater paralysis, not allowing the patient to walk or in many cases not even to serve rudimentary needs, such as eating or getting dressed. This raises the need for attendants to look after disabled people on a permanent basis at home or rehabilitation centers. The advances of medicine and technology nowadays rendered feasible a long life for many people, who under different circumstances would be unable to survive, and as numbers escalate so does the necessity to develop new techniques and solutions.

Biofeedback was successfully applied in 1960 in hemiplegics from brain stroke. Ever since biofeedback applications have multiplied and expanded to address a host of problems.

By providing to the suffering person, feedback instantly displaying the electrical activity of the muscles we want to regain control, the patient can be trained to inhibit undesirable muscle spasticity, augment muscular power, expand movement amplitude and gain control over paralyzed muscles.

Technology progresses enable us today to measure with great precision the electrical activity of muscles by an electromyograph and supply this information to the patient in au-

dio or/and visual form. Even paralyzed muscles retain some elementary electrical activity which amplified by the electromyograph can provide feedback to the trainee. Feedback displays both to patient and therapist the most diminutive changes in muscle activity which under different circumstances would be imperceptible. This offers substantial help to the patient, who guided by the feedback cue gradually regains control of the muscle. Diagnostic electromyography and research dealing with the fine control of motor units fueled the evolution of clinical electromyographic biofeedback.

In cerebral palsy and skeletal muscle disorders specialized feedback instruments can be used such as the electrogoniometer, or devices sensitive to pressure or body posture. The type of the device depends primarily on the type of the problem and secondarily on the therapist's resourcefulness. The biofeedback trainer should allow to be expressed all his/her creativity, scientific learning and experience when creating the therapeutic protocol that will be applied.

Certain basic principals or guidelines must be followed in protocol designing, nevertheless, each patient constitutes a unique idiosyncrasy or constitution so the protocol has to match the patient potential, patience and desire for improvement. Therapists treating patients with neuro-kinetic disorders are confronted with a basic problem, how to keep their attention focused and active, facilitating the proper utilization of the feedback given to them, displayed on the monitoring device. Researchers try to invest the feedback signal with features that can attract attention. Cutting edge multimedia technology has equipped scientists with current useful tools that can facilitate and accelerate rehabilitation, through a process that is both pleasant and promoting active participation.

An example of such adaptation which has been used in upper extremity rehabilitation, pursuant to brain stroke, is the following: The goal of the training session was, for instance that the patient manages to reach with his hand a tea cup. Instead of employing feedback on repetitive hand contracting and flexing values, the patient watched on a TV screen a hand extending towards the cup, demonstrating

the optimal movement pattern or the best movement the patient had achieved in previous session. Thus, the patient was trained to watch the moving picture on the TV instead of his/her hand. This way the sensorimotor process involved in movement performance is made subconsciously, facilitating so neural re-activation and functional modulation of the problematic extremity.

In Europe, the Euromed Rehabilitation Center from 1994 helps patients with cerebral palsy or other relative disorders to improve their deranged functions. Varied treatments are applied such as kinetic therapy, physiotherapy, magnet-therapy, shiatsu etc. Biofeedback has the central role among these interventions.

The main problems in which biofeedback has been successfully applied the last 45 years, are:

Paralysis due to brain or spinal cord impairment
Brain strokes
Brain palsy
Torticollis (contracted neck muscles)
Post-traumatic headaches
Guillen-Barre syndrome
Bell's paralysis
Speech disorders
Carpal tunnel syndrome
Parkinson disease

There is a multitude of scientific studies regarding biofeedback application and new ones keep being added to the list.

In the section of neuromuscular rehabilitation electromyographic biofeedback has been successfully applied in:

Brain strokes and brain injuries (Marinacci & Horande, 1960; Johnson & Garton, 1973; Amato, Hermsmeyer, & Kleinman, 1973; Swaan, van Wieringen, & Fokkema, 1974; Brudny et al.,

1974; Basmajian, et al., 1975; Brudny et al., 1976; Basmajian et al., 1982)

Spinal cord cross-sections (Brudnyet al, 1974; Seymour & Bassler, 1977; Nacht, Wolf, & Coogler,1982; Brucker, 1983)

Spastic hemiplegia (Brudny, 1974; Wolpert & Wooldridge, 1975; Skrotzky, Galenstein, & Osternig, 1978; Asato, Twiggs, & Ellison, 1981)

Torticollis (Cleeland, 1973; Brudny, Grynbaum, & Korein, 1974; Korein et al., 1976)

Neuron injuries (Booker, Rubow, & Coleman, 1969; Kukulka, Brown, & Basmajian, 1975)

Poliomyelitis (Marinacci & Horande, 1960; Swann et al., 1974)

Parkinson's disease (Netsell & Cleeland,1973; Nusselt & Legewie,1975)

Clerk's spasm (Reavley, 1975)

Tendons dislocations (Brudny et al., 1976) και

Guillain-Barre syndrome (Cohen, Crouch & Thompson, 1976; Ince, 2006).

For many of years, the attempt of science to probe into the organism's healing and restoration capacities regarding motor neuron lesions had meager perspectives, due to the prevalent views of the past supporting that nervous tissue possessed insignificant regenerative faculties. Biofeedback application conveyed that the brain can identify the new functional synapses and activate them through proper biofeedback training, restoring them thus at maximal degree functional impairments.

Chapter 16

Therapeutic applications of biofeedback

A. STRESS & ANXIETY RELATED DISORDERS

Anxiety neurosis
Obesity
Insomnia
Chronic fatigue syndrome
Phobias
Post-traumatic phobic disorders
Post-traumatic shock in children
Post-traumatic shock in Vietnam veterans
Panic attacks
Rage outbursts
Self-destructive tendency
Anxiety response in patients with chronic diseases
Fainting episodes
Nausea and dizziness
Hyperhydrosia (over-perspiring)
Stuttering
Bruxism
Vocal chord dysfunction, functional hoarseness
Tinnitus

B. PAIN MANAGEMENT

Chronic pain syndromes
Headache-migraine
Pediatric headache
Carpal tunnel syndrome
Arthritic syndromes

Torticollis (contracted neck muscles)
Raynaud's syndrome
Chronic back pain
Chronic lumbar-sacral pain
Chronic myalgia (muscular pain)

C. PSYCHOPHYSIOLOGICAL DISEASES

C1. Cardiovascular
- High Blood Pressure
- Arrhythmias

C2. Gastrointestinal-Urinary
- Peptic ulcer
- Constipation
- Spastic colitis
- Urinary and fecal incontinence
- Nocturnal enuresis in children

C3. Respiratory
- Asthma
- Asthma in children

C4. Gynecological
- Dysmenorrhea
- Vulvar vestibulitis
- Dyspareunia
- Vaginismus
- Childbirth pain

C5. Male Genital system
- Erectile dysfunction
- Chronic aseptic prostatitis

C6. Endocrine

Diabetes mellitus

C7. Neurological-Psychiatric

Learning disabilities

Hyperactive Syndrome

Attention Deficit Disorder

Dyslexia

Autism

Epilepsy

Parkinson's disease

D. SUBSTANCES ABUSE

Smoking

Alcoholism

Toxicomania (drug addiction)

Chemotherapy

E. CHRONIC DISORDERS

Neuromuscular rehabilitation post-traumatic, post-operative or post brain stroke

Permanent mobility problems

Scoliosis-Kyphosis

A. STRESS RELATED DISORDERS

Anxiety neurosis

Very significant surveys on biofeedback treatment in anxiety neurosis documenting very high percentages of positive results have been carried out by many researchers, among which:

Bryden & Ley (1983)

S.Diamantidis (1984)

S.Diamantidis and Polychronopoulou (1989)

Thomas & Sattlberger (1997)

Baehr, Rosenfeld & Baehr (1998)

Thatcher (1998)

Manchester, Allen & Tachiki (1999)

DeBeus (1999)

Hamilton & Barnes (1999)

S.Diamantidis et al (1998)

Ibric & Kaur (2000)

Lowson & Barnes (2000)

Lowson, Barnes & Davis (2001)

VanBloem (2001)

Gurnee (2002)

Moore (2003)

Tan & Kirsch (2003)

Freides (2005)

Obesity

Obesity today is not viewed merely as a disorder but as a disease. Especially in developed countries, 65% of the population is overweight or obese. In the decade 1991-2001 obese persons doubled their numbers in the United States. Statistic data convey that the number of deaths caused from

obesity in the United States every year exceeds 300,000 and relevant medical care costs surpass one hundred billion dollars.

Obese persons are more prone and more likely to develop high blood pressure, high cholesterol blood levels, cardiovascular diseases, heart stroke, brain stroke, diabetes mellitus, various cancer types and other diseases such as sleep apnoea, rheumatoid-arthritic problems and uric arthritis.

Obesity constitutes a complex and multifactor disorder. It is distinguished in obesity of organic etiology, associated with a specific diagnosed disease usually of endocrine, and obesity of functional etiology when its onset and progress is linked to causes beyond organic. In functional obesity, food over-consumption is the outcome of a number of environmental psychological and hereditary factors which have to be addressed radically, methodically and simultaneously to obtain substantial and genuine solutions.

Repetitive weight loss and gain is common in obese people who cannot manage to keep their normal weight figures stable. This is most often due to the failure to cope successfully with the underlying psychoemotional factor. In such cases we are talking about the “yoyo” syndrome, named after the popular childhood toy, merely because weight goes up and down resembling a yoyo’s movement. This “yoyo” syndrome conceals a great risk, the breaking down of the patient’s muscular system, since each attempt to waste fat and weight is accompanied by muscular tissue loss due to catabolism, unless the patient incorporates in the slimming effort a special program strengthening muscular tissue, designed according to one’s needs.

Obesity can become a very threatening menace because it has the power to deteriorate, imperil and weaken the organism in several points and at many levels. The obesity monster resembles a Hydra possessing the qualities of chameleon. Functional obesity usually develops pursuant to a psychological stimulus which sets into motion diverse factors and mechanisms in the organism. The initial stressful action brings about arousal of the sympathetic system with all stress’s consecutives which overpower the organism in

a manner depending on one's sensitivities and predispositions. In succession, more stress inducing factors of a cognitive nature add up, springing from the mental elaboration and subjective interpretation of everyday living conditions, and initiate a vicious circle.

The mechanism mediating in obesity is multifactorial, therefore multifaceted treatment is needed. Obesity is broadly accepted as one of the most difficult health problems to be tackled. Biofeedback protocols treating obesity cases encompass a variety of devices and techniques taking into account the individuality of each case and the needs of this particular organism.

The boost of self-esteem and self-consciousness which are promoted when a one is trained in biofeedback, along with the factual confirmation that the person gets from the biofeedback devices that one can indeed control somatic functions, are also very supportive to the treatment.

Both obesity originating in bulimia and its extreme opposite eating disorder, anorexia nervosa, share the same psychopathologic basis.

Very significant results regarding the biofeedback treatment of bulimic cases announced with their researches the following:

Esplen & Garfinkel in 1998, Toronto Canada

S.Diamantidis, Kyriakopoulou, Kyvelou, Polychronopoulou & Drossou, 1998, Athens Greece

S.Diamantidis & Hadzikostas, 2004, Nicosia Cyprus

Smith, Sams & Sherlin in 2003.

Very substantial results in the treatment of anorexia nervosa conveyed the researches of:

Jordanova in 2000, Skopje F.Y.R.O.M and

Smith, Sams & Sherlin το 2001.

Insomnia

In 1994, Morin, Culbert & Schwartz of Virginia University

medical school, conducted a comparative meta-analysis to review the findings of 59 scientific researches involving 2.102 patients suffering from insomnia who were not taking any medication but were treated solely with non-pharmacological treatments, among which biofeedback. They assessed the factors: induction, duration and quality of sleep. The findings indicated 81% improvement of insomnia.

In 1998, Lenvin of Moscow medical academy, applied an extraordinarily original method to address insomnia and named it “brain music”. The researcher used an electroencephalograph and recorded brain waves at various sleep stages, then transformed them into brain music, using a special algorithm he personally developed. In succession, he worked with 58 chronic insomnia patients who listened to the resulting audio tapes of brain music before going to sleep. The findings conveyed that 80% of the insomnia patients had positive response to this method. The method was further researched inducing the same positive effects.

Chesson, Anderson, Littner, Davila, Hartse, Johnson, Wise & Rafekas, in 1999, of Louisiana medical school studied the biofeedback influence in the treatment of chronic insomnia and ascertained strong positive efficacy.

Relevant significant findings resulted from their research on the biofeedback treatment of insomnia also:

Kroeker & Henkelman (1986)

Morris, Sharpe, Sharpley, Cowen, Hawton & Morris (1993)

Kaiser & Sterman (1994)

Flanigan, Morehouse & Shapiro (1995)

S.Diamantidis, Polychronopoulou, Kyvelou & (1998)

Chronic Fatigue syndrome

James & Folen, in 1996, of Psychology department Army Medical centre Honolulu USA, applied EEG-biofeedback paradigm to define a therapeutic protocol for the treatment of chronic fatigue syndrome.

Chronic fatigue syndrome (CFS) is specified as the condition of constant fatigue. Many people fall under this category who notwithstanding their adoption of a hypochondriac approach regarding their life quality, i.e. follow specific healthy diet regime, take all vitamin or other nutrition supplements, attend to their sleep and working conditions etc, nevertheless feel tired all the time. This problem preoccupies several millions of people especially in advanced and industrial societies. Its aetiology is not yet completely clarified, particularly with respect to the participation of other factors, apart from that involving sympathetic nervous system arousal. This syndrome forms an enormous wound in all current economic systems leading to billions of work-time losses, congestion in health care services and huge pharmaceutical consumptions for the alleviation of sufferers' symptoms.

In the previously mentioned research, an EEG-biofeedback training protocol was implemented based and co-assessing Wechler adult intelligence scale results. Both clinical findings and test results showed a significantly improved ability of the subjects to cope with the syndrome, significant enhancement of their functional faculties and also considerable improvement of life quality.

Remarkable results referred in their researches on chronic fatigue syndrome also:

Holmes, Kaplan, Gantz, Komariff, Schonberger, Straus, Jones, Dubois, Cunningham-Rundles, Pahwa, 'Ibsato, Zegans, Purtilo, Brown, Schooley & Brus (1988)

Manu, Matthews, Lane, Tennen, Hesselbrock, Mendola & Affleck (1989)

Hickie, Lloyd, Wakefield & Parker (1990)

Manu, Lane & Matthews (1992)

Ray, Weir, Phillips & Cullen (1992)

Scheffers, Johnson, Grafman, Dale & Strauss (1992)

Tansey (1993)

Buchwald, Pascualy, Bombardier & Kith (1994)

DeLuca, Johnson & Natelson (1994)

Johnson, DeLuca, Fielder & Natelson (1994)

Krupp, Sliwinski, Masur, Friedburg & Coyle (1994)

DeLuca, Johnson, Beldowicz & Natelson (1995)

S. Diamantidis, Polymenea, Lampropoulou, Padziaras & Kyriakopoulou (1989-1996)

Billiott, Budzynski & Andrasik (1997)

Brown (1999)

Hammond (2000)

Trudeau, Moore, Stockley & Rubin (2000)

Phobias

The term phobia refers to conditions characterized by chronic and unfounded fear, mainly sustained by mental processes and ruminations. In phobia states fear overwhelms the psychomental organ and very often drives the individual to irrational [and disproportionate] reactions and behaviors, usually unresponsive to rational approaches or explanations. The majority of phobias covert an exaggeration factor sometimes based on past traumatic experiences. An almost limitless list of phobias exists. However, the most common are:

Height-phobia or acrophobia when one is afraid of heights. Usually, phobic subjects do not restrict it to themselves but also experience fear when they watch someone else walking near edges in altitudes or approaching a balcony edge without a rail.

Animal phobia (Dog-phobia, Cat-phobia, Spider-phobia etc).

Death-phobia regarding oneself or one's family.

Agoraphobia: when one is afraid of crowds or assemblies.

Cardiac arrest phobia or heartstroke phobia.

Claustrophobia: when one is afraid of confined spaces.

Hemophobia or blood phobia.

Hydrophobia: when one is afraid of water.

Public speech or public appearance phobia: when one is afraid to be exposed in public.

Bacteriophobia and Nosophobia or disease phobia.

Counterphobia: when one is afraid that something scary or fearful situations will occur.

Ceraunophobia: when one is afraid of lightening and phobia of thunder or sudden loud noises.

Anthropophobia: when one is afraid of people.

Desensitization from phobias via biofeedback relies on the fact that no fear can appear without participation from the body, which issues from the arousal of the sympathetic branch of the autonomic nervous system. Positive results concerning the treatment and control of varied phobias by means of relaxation and biofeedback have been stated by many researchers, such as:

Telch MJ, Valentiner DP, Ilai D, Petruzzi D & Hehmsoth M, in 2000, Texas university, on claustrophobia.

S.Diamantidis, Drossou, Kyriakopoulou & Kyvelou, in 1998, Athens, on claustrophobia and height-phobia.

Whitney SL, Jacob RG, Sparto PJ, Olshansky EF, Detweiler-Shostak G, Brown EL & Furman JM, in 2005, Pittsburgh university, on height-phobia.

Wiederhold BK, Jang DP, Gevirtz RG, Kim SI, Kim IY & Wiederhold MD, in 2002, San Diego, on flying or air-plane travel phobia.

Buodo G, Sarlo M, Codispoti M & Palomba D, in 2006, Padua university in Italy, on blood-phobia.

Koch EI, Spates CR & Himle JA, in 2004, West Michigan university, on small animal phobia.

Paquette V, Levesque J, Mensour B, Leroux JM, Beaudoin G, Bourgouin P & Beauregard M, in 2003, Montreal Canada, on spider-phobia.

Elmore AM, in New York USA, on dentist-phobia.

Friis-Hasche E & Hutchings B, in 1990, in Denmark, on dental-phobia.

S.Diamantidis & Vasilara, in 1998, Athens, on dentist-phobia.

McCullough L & Osborn KA, in 2004, Harvard medical school, on public appearance phobia (acting in movie film).

Davidson JR, Foa EB, Huppert JD, Keefe FJ, Franklin ME, Compton JS, Zhao N, Connor KM, Lynch TR & Gadde KM, in 2004, USA, on social-phobia.

Post-traumatic phobic disorders

Post-traumatic stress disorder is an overwhelming phobic anxiety and in general pathologic condition evolving in certain individuals pursuant to a terrifying event which either caused or threatened potential serious body damage. Traumatic events that can set off post-traumatic stress disorder include: violent personal assault, car crash or other accidents, calamities and natural disasters such as earthquakes, floods, storms and hurricanes, wars, refuge associated conditions. People at every age can present this syndrome.

Usually, women are more than twice likely to develop post-traumatic stress disorder and 5.2 millions of American citizens between 18 and 54 years of age, suffer from this syndrome. Estimates are that 30% of Vietnam veterans presented this syndrome at some point of their post-war life.

This disorder often leads to melancholy, alcohol abuse or substance abuse and the symptoms appear every time the subject replays or relives the events that provoked one's intense fear when undergoing the traumatic situation.

Beyond the physical disabilities or injuries that such situations may leave, what bears great significance is also the person's psychoemotional participation in the traumatic facts. The triggering mechanism of the symptoms is purely psychophysiological and numerous symptoms from diverse systems are encompassed in the post-traumatic stress disorder, for instance, stomachache, spastic colitis, bulimic or anorexic tendency, headaches, chronic fatigue; furthermore the pa-

tient may eventually may be driven to neurosis or psychosis.

Biofeedback training aims at desensitizing the trainee from the stressful effect provoked by the flashbacks or scenes composing one's traumatic background. In this case the most appropriate instrument for biofeedback training is the electrodermograph-GSR which enables the trainee to examine the impact the traumatic experience bears upon one's organism and gradually desensitize it.

In 1993, Diamantidis, Hadzikostas, Paziaras & Hadjigeorgiou in Cyprus applied biofeedback training in Greek-Cypriots, previous inhabitants in Cyprus territories now occupied by Turkey, to address phobic states which where initiated from the events that took place during the period of Turkish invasion on the island, with most positive results.

- **Post-traumatic shock in children**

Very positive findings in the treatment of post-traumatic shock in children documented in their researches:

Siever (2003)

Storms, Davis, Dunn & Bodenhamer (2005).

- **Post-traumatic shock in Vietnam veterans**

For decades, Vietnam War veterans became the focus of biofeedback researches, chiefly due to the growing need to address the enormous psychological problems veterans developed on account of their traumatic war experiences. Very good results were demonstrated from:

Speigel & Fink (1983)

Stutman & Bliss (1985)

Peniston (1986)

Peniston & Kulkosky (1991)

Panic attacks

Biofeedback training exercising control over breathing, skin conductivity (perspiration) and muscular tension can be

very effective in the management of panic attacks, as substantiate researches conducted by many scientists.

In 1986, Gilbert applied a method in which the involved subjects perceived alterations in their skin conductivity with signals analogous to those associated with their panic symptoms and practiced to provoke and restrict these signals, succeeding in this manner to control panic symptoms.

In 2001, Meuret, Wilhelm & Roth of Stanford, conveyed that after biofeedback training panic symptoms diminish and when reappear, are easier to overcome by means of controlling breathing rate and depth and increasing ventilation.

Similar results yielded the researches of:

Somer (1995)

Padgitt

Goodwin & Montgomery

S.Diamantidis, Lampropoulou, Polymenea (1998)

Fisher (2005)

Rage outbursts

Uncontrollable anger reactions are met not only in psychotics or unstable individuals but also in healthy people undergoing especially adverse or serious situations or impasses and experiencing psychological pressure, indignation or despair. Every system in the organism, spurred by the autonomic nervous system, vigorously participates in the emotional explosion. In this framework symptoms manifested are described as: “my blood was up”; “it made my blood boil”; “he’s got a crazy look”; “he is shaking from top to toe”; “he is frothing” etc. Through biofeedback training one manages to control such outbursts to a significant extent. The trainee originally learns to locate the early symptoms, governs them and keeps the entire reaction under control. Similar finding conclusions underpin the researches of:

Milich, Longey & Landau (1982)

Bryant, Scott, Tori & Golden (1984)

S.Diamantidis, Drossou, Polychronopoulou & Polymenea (1988)

Lewis, Pincus, Feldman, Jackson & Bard (1986)

Hindshaw (1987)

Mednick, Brennen & Kandel (1988)

Mednick, Brennen & Kandel (1988)

Tancredi & Volkow (1988)

Klorman, Brumaghin, Salzman & Strauss (1988)

Baxter, Schwartz & Mazziotta (1988)

Lewis, Lovely, Yeager & Femina (1989)

Nordahl, Benkelfat, Semple et al. (1989)

Swedo, Schapiro & Grady (1989)

Adams, Meloy & Moritz (1990)

Machlin, Harris, Peralson et al. (1991)

Nestor (1992)

Prichep, Mas, Hollander, Liebowitz, John, Almas, DeCaria & Levine (1993)

Baxter (1992)

Bars, in Basel, Switzerland (2003)

Carmen (2003)

Fisher (2005)

Self-destructive tendency

The underestimation of human life value, crisis in the domain of values and institutions in general, moral and existentialist disorientation of man, suffocating psychological conditions form some of the causes which according to the adepts, approximate to an epidemic of suicide in our age. Unfortunately, a large percentage of suicidal persons are juvenile. In the USA alone, it is estimated that a minimum of 6000 children and teenagers commit suicide every year and if we take into account that for every child committing suicide, corresponds

with 200 children attempting it, the figures appear astronomical. Girls attempt suicide more often than boys with a ratio of 4 to 1, however boys are most “successful” when commiting, with a ratio 3 to 1. In the USA, dozens of centers are operating for the prevention of suicide and biofeedback has an outstanding place among the applied therapeutic methods. Furthermore, biofeedback is employed by the therapeutic institutions of the American Army where according to official sources, suicide rank within the top death causes among recruits during times of peace.

In Greece biofeedback training to 7 individuals with suicidal tendencies showed excellent results (S.Diamantidis et al, 1989-1998).

Anxiety response in patients with chronic diseases

Biofeedback has proved particularly effective in addressing anxiety and depression appearing in patients suffering with chronic pain, as evidenced in the research of the psychiatrist Brian Erickson carried out in 2005 in the USA.

From a follow-up study including 524 patients with chronic pathological or psychiatric disease, who had followed biofeedback and relaxation training, it emerged that 75% of the patients reported maximum, significant, or moderate improvement. Positive correlation was noted between the percentage of improved cases and the number of biofeedback sessions attended by the individuals. Decrease of symptom frequency was observed in 54% of the patients and decrease of symptoms severity in 30%. From the patients receiving pharmacological medication, 54% reported a drug dose reduction (Olson RP, 1988, Illinois School of Professional Psychology, Minneapolis, Minnesota).

A study in Greece conducted with 300 individuals suffering from stress or/and anxiety of varied chronic physiological, psychological or social etiology, ascertained that via biofeedback training, by means of discharging chronic muscular tension and desensitization, the trainee accomplished to increase his/her immune system potential and to break loose from the vicious circle that is formed between the stressful

situations and the symptoms issuing from the anxiety such situations create (S.Diamantidis et al, 1998).

Fainting episodes

McGrady et all, in 2002, at the Psychiatry department Ohio Medical College, Toledo USA, studied the application of electromyographic and elctrodermographic biofeedback in 10 patients with repetitive fainting episodes followed by headaches. Six out of ten patients presented great reduction of fainting episodes after the completion of biofeedback training.

Nausea & Dizziness

In 1983, Gordon A, Gordon E, Berelowitz M, Bremner CH, Bremner CG published in the Journal of Clinical Gastroenterology, a case study of diaphragmatic hernia cured by biofeedback training.

An area in which biofeedback met broad commercial use was that of traveler's nausea and dizziness. What actually generated this trend was the use of biofeedback techniques by NASA to address space motion sickness astronauts present at launching and during space missions. As a result, many small devices inundated the market in the United States helping susceptible people to self-train while traveling, so as to avoid nausea crisis or seasickness.

In 1979, Homick at the Houston Space Centre, studied the effect of biofeedback treatment on the nausea and vertigo syndrome appearing in people training under conditions that lack gravitation. This research treated an issue of great importance because it examined a group of symptoms which could jeopardize or even prove catastrophic for the outcome of a space mission. In this broad program of inter-disciplinary research, a large number of scientists were involved and as etiology of space motion sickness was accepted and to a large extent, the so-called sensory conflict theory. Biofeedback training was included in this research to succeed controlling the autonomic nervous system which affects and aggravates nausea. The findings were encouraging and thereby further similar researches were planned gearing at solutions

for this crucial problem.

In 2000, Cowings & Toscano at the NASA Ames Research Centre compared the effectiveness of three methods treating the problem of motion sickness in astronauts: biofeedback training, promethazine pharmacological medication and no-treatment control. These three groups were studied. Those in the first group were administered promethazine, the second biofeedback was applied and the third group received no treatment (control group). The promethazine and control group did not differ. The biofeedback group showed statistically significant difference in the treatment of astronauts' sickness in terms of the decrease of nausea symptoms, increased nausea tolerance and improved physiological parameters (heart rate variability and decreased skin conductance).

In Greece, 23 individuals followed biofeedback training and succeeded to eliminate car or seasickness and to travel comfortably without problems. Full maintenance of the results was ascertained in their follow up after 5 years (S.Diamantidis et al, 1998).

Hyperhydrosia (over-perspiring)

It is estimated that more than 200.000 people in the USA suffer from excessive sweating in palms, soles and very often in the armpits, back and chest. Normally a person sweats when he/she is irritated, experiences tension or physical exercise; however people suffering from hyperhydrosia over-perspire for no apparent reason. This phenomenon is further aggravated when we are stressed to the point of soaking writing papers and being unable to work. Accountable for this problem is the disordered balance of the sympathetic nervous system for reasons you may be unaware, which regulates our involuntary functions.

Biofeedback today is placed among the classical therapies applied in hyperhydrosia. Both electrodermogaph and thermographer are devices used in the treatment of this problem with especially satisfactory results.

In 1980, Duller & Gentry used biofeedback training to treat chronic hyperhydrosia. In the research 14 individuals partici-

pated with these problems and eleven of the subjects had very significant improvement. The improvement obtained remained unaltered as showed the measurements conducted six weeks after the termination of the biofeedback training.

In 1979, Koldys & Meyer applied biofeedback to address hyperhydrosic eczema in five patients. All five subjects demonstrated significant improvement of the skin problem.

Diseases that respond positively and improve through biofeedback therapy are also various skin diseases of mainly psychological origin, such as psoriasis, eczema, herpes and acne (S.Diamantidis et al, 1996).

Stuttering

Stuttering is a speech disorder in which natural speech flow and eloquence is interrupted from the repetition of certain syllables or prolonged sounds. These vocal disturbances may appear in words or whole phrases. The exact cause of stuttering is not conclusive, although the actual physiologically involved has not yet been fully comprehended by the specialists. It is generally viewed as the result of multiple factors, including genetic, which affect the brain systems responsible for the movements of speech organs. Stuttering presents a strong psychosomatic or psycho-physiological link: the fact that it becomes aggravated in periods of stress, anxiety or phobia, whereas it significantly improves or completely disappears in states characterized from tranquillity and psychoemotional safety.

In 1996, Craig A. et al conducted an extensive research on stuttering including 98 children, aged between 9 and 14 years, and divided them into four groups. The first group was treated by speech therapists in a special clinic. The children of the second group were treated at home solely by their parents who had been properly trained for this task. In the treatment of the children of the third group biofeedback protocols were employed based on computer programs, and designed by biofeedback trainers, adept in stuttering therapy. The children of the third group were neither assisted by speech therapists, nor by parents who had no active role in their treat-

ment. The fourth group was the control group and the children received no treatment. One year after the completion of the research therapeutic program the results were as follows: 1) 48% of the children who were treated by speech therapists had fluent speech. 2) 63% of the children who were treated by their parents had fluent speech. 3) 71% of the children who had followed biofeedback training had fluent speech. 4) The children who received no treatment had no progress.

In 1982, Craig AR & Cleary PJ implemented a clinical program comprising of boys between ten and fourteen years who were trained with the assistance of biofeedback electromyograph to reach the following goals: 1) reduction of muscular activity of facial muscles involved in speech 2) modulating the muscular tension of these muscles while speaking and 3) maintenance of low activity levels in these muscles. In the lab, a reduction in stuttering was mmediately obtained. The children became proficient with the techniques they learned to reduce stuttering at 60-80% in an extra-laboratory environment and the follow-up showed that they kept improving during the following nine months.

The significant efficacy of biofeedback training in addressing stuttering has been illustrated by dozens of researchers:

Manschreck TC, Kalotkin M & Jacobson AM (1980)

Davis SM & Drichta CE (1980)

S.Diamantidis, Drossou & Kyriakopoulou (1998)

Van Borsel J, Reunes G & Van den Bergh N (2003)

Stuart A & Kalinowski J (2004)

Kalinowski J, Guntupalli VK, Stuart A & Saltuklaroglu T (2004)

Stuart A, Kalinowski J, Rastatter M, Saltuklaroglu T & Day alu V (2004)

Additionally, in the Walter Reed Army Medical Centre, in Washington, a special therapeutic program on stuttering is being applied in soldiers by means of biofeedback training. This program lasts four weeks and with specialized biofeedback protocols has treated stuttering with great success.

Bruxism

Bruxism, the habit of grinding or clenching of teeth is a problem commonly met mainly in children or young individuals. Actually, teeth grinding, usually occurring during sleep, is the result of great muscular tension piled up in chewing muscles and facial muscles in general. This tension caused by stress or anxiety is demonstrated chiefly at night, usually accompanied by anxious dreams and exhaustive sleep which is neither resting nor refreshing for the person. When bruxism is chronic, serious dental damage and erosion is caused. The biofeedback protocol applied in treating bruxism mainly employs the electromyograph often in combination with the electrodermograph (S.Diamantidis et al, 1998).

In 2001, Gardea, Gatchel & Mishra, at Dallas University in Texas, carried out a research in 108 patients suffering from bruxism. The subjects were divided into three groups: The first group was treated with behaviorist supportive therapy, the second followed training with the electromyograph according to a specific biofeedback protocol and the third was the control group and had no treatment. The control group did not present any significant difference. The first group had improvement surpassing 45% and the second group which had followed biofeedback training demonstrated improvement over 93%.

Vocal chord dysfunction, functional hoarseness

In 2003, Earles, Keerr & Kellar, of the American College for Allergy, Asthma and Immunology conveyed that this disorder is owed to stress and responds spectacularly to biofeedback training.

Tinnitus

Tinnitus, or as is commonly known; ear buzzing, ringing swishing or other type of noises, is usually an idiopathic condition which is not associated with any specific evident pathologic factor. It is a constant nuisance which patients experience as if some annoying machine was working inside one's head. It can take diverse sound forms varying from a simple

whistling to the sound of tanks rolling on an asphalt road. The dangers involved arise from diverting attention, bringing about brain fatigue, bad mood or nervousness and rendering communication difficult. Tinnitus very often compels a person to become extremely introverted.

In 2001, Gosepath, Nafe, Ziegler & Kemman in Mainz clinic studied forty people suffering from tinnitus and applied biofeedback, using chiefly the electroencephalograph to enhance alpha waves and reduce beta waves, through brain function regulation. After fifteen training sessions all patients displayed a significant reduction of the problem.

B. PAIN MANAGEMENT

Chronic pain syndromes

According to the World Health Organization, persistent pain syndrome accounts for over 17% of the office visits of Americans to primary health care physicians. Medications prescribed for the treatment of chronic aches or pains rate second in the list of most frequently prescribed medicines, followed by those with heart and kidney problems.

In 1996, a special consultation organization of the National Health Institute of USA, after reviewing all relevant surveys and researches on the issue of pain control reached the conclusion and confirmed that relaxation and biofeedback techniques can assist in the pain control in cases of cancer patients, chronic back pains, arthritis, irritable bowel syndrome, headaches and other medical conditions.

Thus, a long-term clinical and research experience was corroborated, proving biofeedback as directly relative to the treatment of various pain syndromes. Clinical studies had substantiated that biofeedback training enabled individuals to exert considerable pain control, ranging in certain cases up to 100%, on various painful syndromes.

Emotional, cognitive and social factors play a very important role in determining the occurrence and degree of the pain syndrome a person may develop. Quite frequently it may be an expression of psychic depression or collapse, anger or general reaction against the environment.

We should however distinguish between pain and ache. Ache is considered a rather chronic ailment, dull and not acute, whereas pain is characterized by more acute, albeit shorter duration of painful stimulation.

It is of special importance that the help of relaxation can offer in the treatment of painful syndromes. As we know, pain intensity directly correlates to the subject's attitude toward the painful stimulus. The more one is afraid of pain, the more intense he/she feels the pain. A first result issuing from biofeedback is the person's ability to exert immediate control over this pain-phobia, and signifies that the individual has already walked half-way on the path to pain control.

As diverse events of everyday life have illustrated, the sensation of pain is closely interwoven with the mental strain or charge the person builds with respect to pain. Under hypnosis; a person can easily tolerate piercing in the extremities, which otherwise would be very painful. Since, while in hypnosis, he/she is unaware that he/she is being pierced and is not functioning the respective cognitive mechanism. Tooth extraction or other painful situations may be tolerated without experiencing the slightest pain. Likewise persons cope with assorted painful conditions, in vigilance when in deep relaxation -but not under hypnosis- and anxiety control. The electroencephalographic study of individuals in both these conditions conveyed that their brain is in a special tranquil state, which is depicted in the EEG by the prevalence of alpha rhythm with concurrent theta and beta waves in a specific ratio.

In 2001, randomized controlled clinical trial conducted by Meltzak & Perry supported the very significant results of biofeedback training on pain control.

Raynaud's disease is considered as a problem similar in nature with a migraine. Both these health problems are more like conditions rather than diseases, and differ in that migraine patients have cool or cold hands and excessive blood flow in the arteries to the head due to vasodilatation, whereas Raynaud patients have very cold hands: almost zero blood supply to the fingers, with normal or minimal dysfunction in the blood flow to the head. Despite their disparities, both the

above conditions improve through thermal biofeedback training setting as with the goal of the control of hand temperature, because biofeedback training affects the sympathetic nervous system which mediates in the modulation of blood circulation of all body organs.

By learning how to “warm” your hands or “cool down” your head, you restore the deranged balance and abort pain and difficulty in action (dyspragia). This is not the result of some “trick” but of profound conscious and permanent control of the operation of the autonomic nervous system and notwithstanding that the beginning requires some effort to be achieved in succession. It is made automatically and effortlessly as all the rest of the autonomic functions.

Studies reporting the applications of biofeedback on chronic pain syndromes have conducted:

S.Diamantidis, Lampropoulou & Kyvelou (1998)

Ibric (2000)

Ibric & Dragomiresku (2003).

Headache-Migraine

Tension headaches and migraines compose an overwhelming majority of all the functional headaches that appear in human beings. There are also other types of headache of organic and pathological etiology, however these form the smaller percentage of headaches. Before attempting any therapeutic intervention in the case of a headache, thorough clinical and laboratory examination should precede to set the diagnosis. For tension headaches and migraines, biofeedback constitutes a selection treatment, since both are attributable to post-stress arousal of the sympathetic nervous system. Tension headaches result from excessive tonus and tension of the muscles in the neck, head and face area due to stress emanating from everyday stressful conditions.

Biofeedback excellently addresses both types of headache via desensitization from stress-inducing factors.

Biofeedback had been acknowledged as an official therapeutic method in headache treatment by many medical orga-

nizations, such as:

- American Association for the Study of Headache since 1978

- American Psychiatric Association since 1980

- American Medical Association since 1983

- American Association of Applied Psychophysiology and Biofeedback since 1987

- Canadian Psychiatric Association since 1981 and with more recent act in 1995, and

- Central Health Board of Greece, by virtue of consultation report no. 451 of 7/4/1987.

In 2002, Grazzy, Andrasik, D'amico, Leone, Usai, Kass & Bussone, at Milan University in Italy, conducted a three-year study of patients suffering from a transformed migraine complicated with the overuse of analgesics. The objective was to determine whether or not a combined treatment employing biofeedback could provide an effective solution to this problem. Sixty-one individuals were treated with parallel biofeedback-assisted relaxation. All patients were followed prospectively for three years and showed significant improvement. A notable finding of the research was that the patients who had followed combined biofeedback treatment maintained the good results steadily within the three years of follow-up. Whereas, a greater number of patients in the control group assigned pharmacological medication alone showed greater relapse frequency, leading to resuming over-consumption of analgesics.

In 1999, McGrady, Andrasik, Davis, Striefel, Wickramasekera, Beskin, Penzien & Tietjen, in cooperation with the psychiatry departments of nine universities, investigated the application of psychophysiological therapy in headache treatment. The researchers, with the term psychophysiogical therapy, mean biofeedback coupled with progressive release of chronic accumulated muscular tension techniques. It was an extensive survey including meta-analysis of research conducted by the application of biofeedback and progressive release of chronic accumulated muscular tension in migraine cases and tension-type headaches. The results indicated that

biofeedback training in conjunction with relaxation techniques can be applied either alone or in combination with other treatments and has no adverse indications. Biofeedback effectiveness proved to be very high without any side effects. As a final conclusion, a typical therapeutic protocol emerged to exemplify the integration of biofeedback into primary health care practice with respect to the treatment of migraine and chronic benign headache.

In 2001, Lake, at Michigan Head-pain and Neurological Institute assessed the therapeutic and prophylactic efficacy of biofeedback and relaxation in migraine and headache cases. The results demonstrated that biofeedback is a valuable help in malignant headaches in which patients are usually driven to overuse analgesics, particularly in serious headaches with episodes lasting over fifteen consecutive days.

In 1986, Sargent, Solbach, Coyne, Spohn & Segerson, in cooperation with Menninger Foundation, performed a control study and examined 136 subjects suffering from migraines. Four groups were formed, in which respectively was applied: EMG biofeedback assisted with progressive release of chronic accumulated muscular tension, thermal biofeedback, autogenic phrases and no treatment. A significant difference of improvement was shown in the biofeedback groups with comparison to the control group that had not received biofeedback.

Positive findings reported the researches and applications of the following:

S.Diamantidis, Lampropoulou & Kyvelou (1988 - 1996 - 2001)

Carmen (1999)

Freides (2003)

Kaushik, Kaushik, Mahajan & Rajesh (2005) in Uttaranchal India.

Pediatric headache

In 1989, Duckro & Cantwell-Simmons employed biofeedback training in many cases of headache in children who

poorly responded to pharmacological therapy. Their consecutive research lasted more than five years. The review and summarizing of the findings proved that children, who have the advantage to learn easier than adults, achieved amazing results and high percentages of pain relief through biofeedback training.

In 1998, Sartory, Muller, Metsch & Pothmann, in Wuperttal University Germany, studied 43 children around eleven years old, suffering from migraines and applied biofeedback training and relaxation techniques. The overall improvement regarding the intensity and frequency of the migraine episodes was noted and a reduction of the required analgesic intake. The outcome of this research conveyed a significant difference of biofeedback efficacy in the treatment of pediatric migraine.

Similar positive findings in migraine in children was yielded through the research carried out by Siniatchkin, Hierundar, Kropp, Kuhnert, Gerber & Stephanie in 2000.

Carpal tunnel syndrome

In 1992, neurologist Daniel Skubick from Philadelphia, USA, and psychologist Stuart Donaldson from Canada, applied a pioneering treatment to patients suffering from carpal tunnel syndrome. They employed EMG biofeedback training on the respective sternocleidomastoid muscle and had remarkable results.

Arthritic syndromes

Extensive scientific research have been carried out to investigate the therapeutic role of biofeedback in various types of arthritis. A recent comparative analysis of the findings of twenty-five controlled research groups was conducted by Yucha & Gilbert in 2004. This research proved significant pain reduction, improved function of joints and improved psychological mood in patients through biofeedback intervention. A large percentage of patients comparatively decreased the need for hospitalization (Young, Bradley & Turner, 1995).

EMG and thermal biofeedback treatment significantly re-

duced the duration and intensity of arthritic pain in comparison to the group that did not receive biofeedback training (Flor, Gunther, Turk & Koehler 1983).

This research was repeated three years later by the same researchers with the same findings (Flor, Gunther & Turk 1986).

In 2002, Astin, Beckner, Soeken, Hohberg & Berman of Baltimore Medicine School, conducted a systematic review of scientific research that had been carried out in the preceding five years to examine the efficacy of psychological interventions in the treatment of rheumatoid arthritis. Twenty-five trials met the inclusion criteria and were assessed. Biofeedback, along with progressive release of chronic accumulated muscular tension and behavioural therapies, was one of the basic treatment methods applied. The results conveyed that these therapeutic interventions are significant and worthwhile therapeutic support in alleviating patients suffering from rheumatoid arthritis. It was suggested, among other findings, that the earlier the psychological therapy started the higher the percentage of the obtained positive results.

In 1993, DeVellis & Blalock of the Arthritis Research Centre of North Carolina University, evaluated the biofeedback intervention within the framework of psychological and educational methods used to prevent arthritis disability according to the classification scheme drawn up by the Word Health Organization. WHO classifies the progress of rheumatoid arthritis from the somatic stage, in the sense of physiological changes, to the stage of kinetic problems and physical disability. The main methods employed to impede or inhibit this escalation from pathology to disability encompass:

a) thorough and responsible information on the problem

b) teaching patients methods that develop self-management skills

c) biofeedback training

d) applying cognitive-behavioral techniques

e) using other psychotherapeutic techniques

f) enhancing social support of patients.

Medical literature leads to the acknowledgement, underpinned by research findings, that biofeedback is one of the primary methods in the treatment of patients suffering from rheumatoid arthritis.

Similar conclusions were also reached by Baird, at Indiana University, in 2001, in a relevant scientific research. Also with Diamantidis et al in 1998 in Athens and Astin, Beckner, Soeken, Chohberg & Berman in 2002 in USA Baltimore.

Spastic torticollis

Successful therapeutic treatment of spastic torticollis (contracted neck muscle) by means of electromyographic biofeedback has been reported in a number of scientific surveys. In 1991, Jahanshahi, Sartory & Marsden, in London, conducted a controlled outcome study, randomly selected twelve spastic torticollis patients, who were randomly assigned to electromyographic biofeedback training or relaxation training and noted that the patients who had followed the biofeedback sessions had significant reduction at the muscular activity of the sternocleidomastoid muscle.

In 1990, Leplow, at Kiel University, in a scientific study of ten spastic torticollis patients, applied biofeedback intervention and obtained dramatic reduction of the muscular contraction.

In 1989, Priolo, Gargano & Ceschina, in Italy, applied biofeedback in children with spastic torticollis and accomplished spectacular therapeutic results.

Also in cases of neck dystonia electromyographic biofeedback is considered on a broad scale as the method of treatment, as was proved by Smania, Corato, Tinazzi, Montagnana, Fiaschi & Aglioti, in two research projects conducted in 2003 in Verona Italy.

Raynaud's syndrome

In 1985, Yocum, Hodes, Sandstrom & Cleeland conducted a research to assess biofeedback training in Raynaud's syndrome and included twenty-three patients of whom eleven

had Raynaud's disease, twelve had Raynaud's phenomenon and nine had also recurrent digital ulcers.

Raynaud's syndrome refers to a disorder in which fingers or toes suddenly experience decreased blood circulation caused mainly by exposure to cold or emotional stress. It is characterized by repeated episodes of color changes of the skin of digits freezing and numbness. The blanching occurs because abnormal spasm of blood vessels leads to poor blood flow to the digits, thus they initially turn white, then blue due to prolonged lack of oxygen and finally when the blood vessels dilate digits turn red. Raynaud's disease (or primary Raynaud) has no predisposing factor. Raynaud's phenomenon (or secondary Raynaud) is the same as the disease, but occurs in individuals with a predisposing factor -it is secondary to another disease or disorder- i.e. arteriosclerosis, scleroderma, lupus, thus is often more complicated or severe. In this study electrothermographic (thermal) biofeedback was employed and from the first week all participants showed significant improvement in elevating temperature in the hands. Noticeably, patients with scleroderma or systemic lupus erythematosus had the greater elevation. Finally, improvement of both subjective sensations (57%) and skin lesions, such as ulcers (44%) remained unaltered one year after treatment.

In 2001, Middaugh, Haythornthwaite, Thompson, Hill, Brown, Freedman, Attanasio, Jacob, Scheier & Smith, department of anaesthesiology and preoperative surgery, Medical University South Carolina, made an extensive research in which trained in biofeedback 313 people with Raynaud's syndrome. The outcome was that 67,4% of the group trained with the electrothermograph learned volitional hand warming, and 55/4% of the electromyograph group (frontalis EMG biofeedback) had the same achievements.

Significant analogous results also reported the studies and biofeedback applications of Sabharwal, Ianni, Desai, Wenig & Mayes in 1988 Detroit, Stambrook, Hamel & Carter in 1988 Canada, Freedman in 1991 Detroit, S.Diamantidis et al in 1996 Athens, Freedman, Birger, Sha'anani & Pavlotzki in 1997 Israel, and others.

Chronic back pain

Many people complain of back pains which often become torturing and raise huge obstacles in relation to their work. Such pains compel one to often change desk chairs, to put sitting pads or cushions from special materials on the office chair or car seat, to keep searching and changing orthopaedic mattresses and pillows albeit with no substantial relief. Despite good laboratory tests, and no pathological cause, such people continue to experience intense back pain and are very often driven to psychiatric medications with little improvement.

This condition is, in most cases, accountable to accumulated large amounts of tension in the deep back muscles. That is to say, the muscles located in the deeper layers alongside the spine. These spine muscles are responsible for holding and supporting vertebrae to their proper positions. Given that this painful syndrome indiscriminately also appears in physically fit or people who work out and do not follow a sedentary lifestyle, the conclusion emerges that the tension in spine muscles cannot be easily addressed by means of physical exercise or physiotherapy. The accumulated tension in the deep spine muscles caused from chronic stress and anxiety must be released. Biofeedback protocols have been applied in order to train and desensitize individuals suffering from spine pains with very high effectiveness.

In 1992, Stenger of the San Antonio Texas Pain Clinic applied protocols including psychotherapy, physiotherapy, behavioural interventions etc to address chronic back pain and ascertained that these methods yielded better results and presented vertical increase of efficacy when combined with biofeedback training, since the latter released the built up muscular tension and desensitized trainees from the chronic anxiety factors that generated the problem.

In 1990, Asfour, Chalil, Waly, Goldberg, Rosomoff & Rosomoff of Rehabilitation Centre, Medical School of Florida, used electromyographic biofeedback to treat similar chronic back or lumbar pain syndromes and reported that when the employed methods were coupled with biofeedback training, effectiveness was significantly increased.

Electromyographic biofeedback, for the control of back muscle tensions, with parallel thermal biofeedback training enhanced circulation at the painful area brought about very significant results (S.Diamantidis et al, 1995, Greek Biofeedback Centre, Athens).

Chronic lumbar-sacral pain

In 2003, Mozeikin examined and treated 106 patients with pain in the lumbar-sacral spine with biofeedback. The findings conveyed a very high efficacy and response to the biofeedback training. In some cases, combined treatment was used, including manual therapy and acupuncture concurrently with biofeedback. The results proved that the combined approach was actually more effective and indicated that the basic improvement originated in that biofeedback offered the possibility to reduce and normalize the muscle tone. In addiction, the trained subjects had the benefit of acquiring the skill for self-regulation which enabled them to prevent possible future pain exacerbations.

In 1994, Newton-John, Spence & Schotte applied electromyographic biofeedback in 44 patients suffering from chronic lumbar-sacral pain and presented statistically significant findings with respect to pain reduction and improved functionality of the painful area.

Similar significant results also conveyed the research conducted by v Zh Nevrol, Psikhiatr Im & S S Korsakova in 2003.

Chronic myalgia

S.Diamantidis, Polychronopoulou & Padziaras studied fifty-four individuals who attended the training program of the Greek Biofeedback Centre in Athens. All persons suffered from myalgia, pain in various muscle groups (neck, trapezoids, back, arm). The pain did not recede during sleep, while 49 of the participants had been taking systematically analgesics and or/muscle-relaxants for at least four months. Electromyographic biofeedback training was applied for five weeks. The results were highly satisfactory. 76% of the trainees statistically presented a significant reduction of tension

levels, duration and frequency of pain crisis. 20% of the subjects reported a significant decrease regarding the duration and frequency of pain attacks, while nine trainees developed the skill to succeed significant pain relief by employing the method of progressive release of chronic accumulated muscular tension learned from the biofeedback sessions: 86.7% of the patients who took analgesic-antispasmodic medication reported reduction ranging from 70% up to 100% at the drug dose necessary to alleviate pain. The results, announced in 1998, at the 6th Pan-Hellenic Symposium of Natural Medicine and Physiotherapy, were preserved at the follow up six months after the completion of the biofeedback course in 83% of the trainees.

C. PSYCHOPHYSIOLOGICAL DISEASES

In 2004, Ryan & Gevirtz carried out scientific research to assess the effectiveness of biofeedback with patients diagnosed as having “functional” disorders (irritable bowel syndrome, chronic fatigue syndrome, facial muscle pains, anxiety with somatic features or non-cardiac chest pains, etc) and to determine whether or not it could limit the recourse of patients with such problems to hospital care and cost-saving through lower utilization of medical services.

It is well known that patients presenting similar problems continuously visit physicians in primary and hospital care, thus overloading the medical service system. The investigated sample of the research comprised 49 patients. The subjects in the biofeedback treatment group lowered symptom frequency and severity significantly beginning from the first two weeks. The positive results and reduced expenses were maintained at the follow-up six months after the biofeedback treatment time interval. These findings indicate that biofeedback’s contribution in the relief of psychosomatic, or according to newer terminology, psychophysiological disorders is very significant, without any side effects and with fast efficiency.

S.Diamantidis et al conducted a study on 300 subjects who were trained in biofeedback and reported that via desensitization from stress inducing factors, the person accomplishes reduction of vulnerability and increases their resilience toward

stressors which constitute the generating causes of psychosomatic disorders such as duodenum ulcer, spastic colitis and constipation, psychogenic asthma, migraine, dorsal, sleep disorders, phobias, libido disorders, muscular pains, etc. These results were announced at the 16th Congress of Army Forces in Thessalonica in 1996 and at the 36th International Congress of Alternative Medicines in Athens 1998.

C1. Cardiovascular

Acute myocardial infraction, heart stroke, is the most commonly known cardiovascular disease affected by acute or chronic natural or psychoemotional stress. Scientific research has illustrated that behaviors of a type A person, characterized from aggressiveness, competitiveness, workaholism and continual precipitation are more likely to undergo cardiac arrest, as compared to type B behaviors which do not display the previous features. Moreover, individuals adopting the type A behavior present high rates in cholesterol, triglycerides, glycocorticoids, increased insulin intolerance, coronary lesions of greater gravity and finally greater fluctuations and amplitude in blood pressure, often accompanied from catecholamine response at time based tests (Eliott & Icedolfer 1982).

Higher catecholamine rates in the plasma increase platelet agglutination concurrently with raising vertically the risk for myocardial infraction, also lead to cardiac arrhythmia, vessel constriction and suppression of insulin secretion (McEwen & Stellar 1993).

In 2004, Kranitz & Lehrer, in the psychology department of New Jersey University studied a variety of non-pharmacological interventions in the treatment of cardiovascular diseases. Various biofeedback methods showed great promise for the treatment or management of several cardiovascular diseases. Biofeedback applications in relation to high blood pressure, cardiac arrhythmia, angina pectoris, cardiac ischemia, myocardial infraction and Raynaud's phenomenon were included. Notwithstanding that the number and types of scientific researches is these areas widely vary, nevertheless the research to date conveys that biofeedback could be a very valuable alternative or adjunct in the treatment of cardiovascular diseases.

High Blood Pressure

In 2003, Nakao, Yano, Nomura & Kuboki, Tokyo School of Medicine carried out a meta-analysis reviewing 22 randomized research on essential hypertension patients, published between 1966 and 2001. This analysis-evaluation led to the conclusion that biofeedback has a very significant lowering effect in blood pressure. The efficiency of biofeedback is enhanced when combined with relaxation techniques assisting in the release of accumulated muscle tension.

In 2005, Yucha, Tsai, Calderon & Tian, of the Nevada-Las Vegas University, conducted a study on 54 hypertensive patients who received biofeedback coupled with relaxation techniques and reported a very significant reduction of blood pressure levels in 69% of the patients.

In 1981, McGrady, Yonker, Tan, Fine & Woerner, of Ohio Medical College, examined the effect of electromyographic biofeedback in blood pressure and evaluated 38 hypertensive patients. After 8 weeks of training, the biofeedback group patients demonstrated significant blood pressure reduction while the control group remained unchanged.

In 1992, Jurek, Higgens & McGrady, of Ohio Medical College, studied 30 hypertensive patients who were taking diuretic medication combined with biofeedback. The addition of biofeedback treatment to the diuretic therapy resulted in reduction of blood pressure beyond that associated with diuretic alone and patients demonstrated a very significant improvement.

Diamantidis, Polychronopouloy, Drossou, Kyriakopouloy & Kyvelou studied 20 essential hypertension patients who attended the training program of the Greek Biofeedback Centre, for over four years. During the biofeedback sessions, a particular method of progressive release of chronic accumulated muscular tension was employed, assisted by relaxation, and electronic biofeedback devices (EMG, THERMAL, GSR) were used, supported by computer, so as to ensure the objectivity required for the correct evaluation of the trainees efforts and for desensitization. A special blood pressure diagram was kept by all participants in the sessions. The results were most significant: 65%

of the trainees lowered their mean systolic pressure by 10-15 mmHg and mean diastolic pressure by 10-20 mmHg, while 85% of the trainees at the completion of training sessions demonstrated a very significant decrease of hypertension episodes frequency and were capable to control crisis by minimizing their duration. Therefore, biofeedback conclusively, through recognition and identification of the autonomic nervous responses mediating in systolic and diastolic blood pressure and by promoting desensitization from the factors affecting these responses, has a significant effect in the treatment of essential or idiopathic hypertension. Additionally, it contributes significantly in the prevention and management of hypertensive crisis. The method, results and conclusions of the research were announced in 1997 at the 23rd Pan-Hellenic Medical Congress and in 1998 at the 23rd World Congress of Alternative Medicines.

Arrhythmias

In 2003, Pozo, Gevirtz, Scher & Guarneri, in San Diego California, studied 63 individuals, 67 years old being the average, suffering from coronary disease and conveyed that biofeedback offers cardiac patients the possibility to control their heart rate and so decreases coronary disease mortality rates.

C2. Gastrointestinal-Urinary

Gastrointestinal diseases such as peptic ulcer, ulcerative and spastic colitis has been proven as stress affected. Anger, negativity and hostility increase the acidity of stomach secretions, whereas the sense of rejection considerably reduces it. Granted that these functions are regulated by the autonomic nervous system has drawn the conclusion that stress strongly affects patients with gastrointestinal problems, because it is responsible for the usual parasympatheticotony, the background upon which these disorders develop. In some cases hyperacid peptic ulcers with profound bleeding, often ending in hemorrhagic shock, appear in people who have had sudden injuries, undergone big surgeries, sustained extensive burnings or infections, and who have traumatic brain lesions or other destructive consequences (Ballieux 1984).

Peptic ulcer

In 2002, Hans, in Seoul University, conducted a clinical study on 47 peptic ulcer patients who followed a stress management program with biofeedback training assisted by muscular relaxation techniques. The outcome pointed out reduction of the symptoms and significant ulcer healing. Likewise, very positive findings emerged from the study of 26 patients with duodenal ulcer: healing was accomplished and its preservation lasted over 8 years (S.Diamantidis et al, 1998, Αθήνα).

Constipation

Bernard Brucker, director of the Biofeedback Department in Miami University announced in 1999 his research findings with respect to the application of biofeedback training in the treatment of chronic constipation. The research included 34 men and 31 women, between 50 and 77 years of age, who showed no improvement from herbal fibers or conventional medication, found the biofeedback solution raised constipation improvement to 80%.

In 1998, Chiotakakou-Faliakou, Kamm, Roy, Storrie & Turner studied the long-term effect of biofeedback for twelve months on patients with idiopathic constipation and applied biofeedback training protocols. 57% of the patients demonstrated improvement and bowel ailments were very significantly decreased, while oral laxative use was also significantly reduced. The remaining subjects presented improvement with slower rhythm.

The same issue was researched by Wank, Luo, Qi & Dong in 2003, Binjiang Hospital China, who treated 50 patients suffering from chronic constipation. The researchers reported that biofeedback had a long-term effect with no side effects for the majority of 62.5% of patients with chronic idiopathic constipation unresponsive to traditional treatment. Clinical manifestations including straining, abdominal pain, and bloating were relieved and less oral laxative was used. Spontaneous bowel frequency and psychological state were improved

significantly after biofeedback training.

Diamantidis, Drossou, Kyriakopoulou, Hadzicostas, Kyvelou, Polychronopoulou, Padziaras, Hatzigeorgiou, Polymenea & Lampropoulou studied 137 chronic constipation patients between 1985 and 1988. The subjects received electromyographic and thermal biofeedback training for three months. In the majority of patients (76%) the constipation was completely eliminated, progressively improving throughout training sessions. Only one person had no response, while the remaining subjects had medium to great improvement.

Emmanouel & Kamm, in St. Mark's Hospital U.K, investigated whether biofeedback treatment could, apart from normalizing impaired pelvic floor coordination, also affect bowel frequency and gut transit. Their research included 44 women, average age of 39 years, with idiopathic constipation. 56% presented significant improvement of symptoms and reduction or elimination of laxative/suppository use.

In 2005, Fernades-Fraga, Azpiroz, Casaus, Aparici & Malagelada of Digestive System Research Unit, in Barcelona University, conducted a retrospective analysis of 148 chronic constipation cases, due to functional outlet obstruction. Biofeedback treatment was performed using the electromyographer and a manometric technique. 66% of the patients showed great improvement and the conclusion drawn was that biofeedback is one of the most valuable treatment options in a substantial proportion of constipated patients.

In 2004, Palsson, Heymen & Whitehead of the Department of Medicine, North Carolina University, studied the biofeedback effect in the treatment of constipation and release of pelvic floor muscle tension and critically evaluated 74 relevant research. Improvement of symptoms exceeded 62.4%. The study proved that therapeutic success rate per subject was significantly higher with biofeedback than with standard medical care and concluded that biofeedback is a valuable adjunct in the treatment of this problem.

Spastic colitis

In 1990, Schwarz, Taylor, Scharff & Blanchard, in New

York, studied 27 patients with irritable bowel syndrome (IBS) otherwise called spastic colitis and proved the significant effect of biofeedback. Significant improvement after biofeedback treatment was reported on the following symptoms: abdominal pain/tenderness, diarrhea, nausea and flatulence. Similar significant findings emerged also from the study of 23 IBS patients with complete symptom elimination and long-term maintenance for over 4 years (S.Diamantidis et al, 1998, Αθήνα).

Urinary and fecal incontinence

Notwithstanding urine and fecal incontinence are tantalizing problems for a considerable portion of elderly people, male and female, the extent and seriousness of the issue was not revealed until the past decade, when these disorders ceased to form social taboos. The State Department of Health (USA) acknowledged the therapeutic effectiveness of biofeedback intervention in this disorder and ranked biofeedback on A- class. According to the Health Department's evaluation, biofeedback constitutes a choice therapeutic method in the treatment of urinary and fecal incontinence on the grounds that "biofeedback demonstrates very high efficiency, is the less aggressive form of therapy without any side effects". Pursuant to this official assessment, insurance corporations both in the States and in Europe, cover the expenses involved in biofeedback training relative to the treatment of urinary and fecal disorders.

The muscles located on the pelvic floor play a determinant role on the regulation of bowel and urethra functions. Various factors increase the tone of these muscles, such as stress, aging, menopause, hard childbirth labor, diabetes mellitus, surgical operations for prostate, chronic constipation or brain stroke which cause muscular dysfunction resulting to impaired physiological functioning of the large bowel and urethra. Controlling pelvic floor muscles, by means of biofeedback training, is a relatively easy procedure and yields very good results.

Burgio et al, in 2002, published in the Journal of the American Medical Association, a research concerning 222 women

aged between 55 and 92 years. The finding of this long-term study reported improvement of urine incontinence of older women ranging from 76% up to 86%.

Sherman et al, in 1997, Madigan Army Medical Center, carried out a research on urinary incontinence in young women soldiers who experienced urine leakage during exercises and field training. All participants in the biofeedback training program improved significantly and in many cases achieved complete resolution of the problem.

In 2005, Yang & Wang, in the Medical University Taipei Taiwan, studied 20 children with dysfunctional voiding and applied biofeedback relaxation on the pelvic floor. Complete or partial resolution of voiding symptoms was achieved in 70% of the children (urine flow rate and voided urine volume increased and residual urine decreased) and was proven that biofeedback is an effective treatment in infantile dysfunctional voiding.

In 2004, Ceo, Yoon & Kim, in the University School of Medicine in Seoul Korea, investigated the therapeutic effect of biofeedback in 120 women with urinary incontinence. In parallel, the efficacy of a new vaginal cone to release tension from the pelvic floor muscles was researched. Very significant improvement was obtained both in the vaginal cone group (88.3%) and the biofeedback group (91.6%), given that the basic underlying problem in female urinary incontinence is accumulative excessive tension in pelvic floor muscles.

In 2002, Pager, Solomon, Rex & Roberts of the Concord Hospital in Sydney, studied 102 cases of fecal incontinent patients and confirmed the long-term improvement achieved through biofeedback training based on special protocols. 75% of the patients presented very significant improvement and 83% reported remarkable improvement in the quality of life.

Also, in 2003, Hammond presented very significant results in fecal incontinent patients.

Nocturnal enuresis in children

In 2000, Yamanishi, Yasuda, Murayama, Sakakibara, Uchi-

yama & Ito, of the Medical School Saitama, Japan, studied 39 children, 11 years old being the average, presenting mainly nocturnal incontinence and/or daytime incontinence refractory to conventional treatment. Biofeedback training was used to control the over-activity of the urinary bladder. 62% of the children were cured and the rest significantly improved.

In 2005, Yang & Wang in Taipei Taiwan University, employed biofeedback training in the treatment of 20 children with enuresis with great effectiveness.

C3. Respiratory

Asthma

Bronchial asthma is chiefly accountable to the susceptibility of a person toward environmental agents which are called allergens. Due to this susceptibility, every time the person is exposed to allergens, an allergic reaction is triggered inducing a spasm on bronchi and bronchiole, edema of the mucosa wall resulting to the narrowing of the airways and obstruction of airflow to the lungs, appearing with the symptoms of labored breathing, wheezing-rattling and psychomental distress. This syndrome acts as a powerful stressor upon the organism and brings about arousal of the sympathetic autonomic nervous system and further aggravation of the condition, especially if panic appears to contribute to the overall encumbrance of the organism. Thus, added to the initial symptoms produced by the allergic reaction, are the secondary symptoms emerging from stress, anxiety and panic.

The aforementioned type of asthma is clearly of an organic aetiology. However, there is a type of asthma clearly functional which is not associated to susceptibility to allergens, nor allergic reactions. This type of asthma is caused from stress alone. The brain is connected to the bronchiole, the fine and thin-walled tubular extensions of the bronchial tree, through neural pathways. When it is under the influence of stressing factors, the brain transmits, through these pathways, messages which incite bronchospasm. We often hear the expression “he lost his breath”. This brings the chain of events leading to asthma: stress, anxiety, worrying and fear

activate a mechanism which through the mediation of brain, stimulates bronchiole to contract and eventually leads to the appearance of an asthmatic crisis. Besides, asthmatic patients are too familiar with the fact that any adverse psychological condition can potentially trigger a crisis or incite an already existing one. In both cases, the triad stress-anxiety-panic mobilizes the brain intervening mechanism via which the brain sends to the bronchiole stimuli for contraction, initiating an asthmatic attack.

The biofeedback training aims at achieving desensitization from stressors or anxiety generating factors responsible for inciting such exacerbations.

The Chest Journal of the American College of Chest Physicians, published in 2004 a research on biofeedback treatment for asthma including 94 asthmatic patients. The results conveyed the usefulness and valuable contribution of biofeedback in the reduction of steroid medication of the patients who received biofeedback training.

A new and very promising biofeedback intervention with respect to asthma involves the ability of a patient to increase the Heart Rate Variability. Asthmatic patients tend to have low 24hour variability. However, an increase of the HRV through biofeedback training brings about significant symptomatic improvement.

S.Diamantidis et al noticed that patients with respiratory symptoms (dyspnoea, cough, fast breathing, shortness of breath, hyperpnoea) who followed biofeedback training for the purpose of management control during the period 1985-2005 presented significant improvement with respect to severity, frequency and duration of these symptoms.

Asthma in children

In recent years, there has been a worldwide increase in the number of children with asthma, and childhood asthma is the leading cause of hospital admittance and school absence.

Comparative clinical studies have been carried out mainly on asthmatic children in Cleveland, Ohio, USA. Fedman in a

similar study, reported that biofeedback training in asthmatic children had better results than choice bronchodilation medication.

As is well known, asthma, diabetes, various gastrointestinal disorders, cardiovascular diseases and viral infections are affected from stress. In the case of asthma, a disease provoked by external and internal triggers, it is noteworthy the role of emotional stress as an internal factor. Research has demonstrated that children suffering from chronic asthma improve significantly when removed from the family environment. This seems to suggest that the improvement of the children could be attributed to their removal from environments that formed stress inducing factors.

In 1994, based on these findings, Libman et al, treated children with serious chronic asthma solely with family therapy, in the sense of smoothing and removing the stress factors existing in the home environment. Apparently, children seem to respond with an allergic reaction which is triggered by an allergen which is nothing but their stress-generating home environment. This is to say they are “allergic” to their environmental stress.

Significant results in asthmatic children reported the researches of:

Zanus, Cracco, Merirca & Ronconi (1984)

Kotses, Harver, Segreto, Glaus, Creer & Young (1991)

Tansey (1992)

C4. Gynecological

Dysmenorrhea

Tubbs, Carnahan & Sedlecek, used EMG and thermal biofeedback in an extensive line of clinical studies on the issue of dysmenorrheal women with significant therapeutic outcome in all cases of normal anatomical tilt, with the exception of cases with larger anatomical uterus tilt, small uterus, or bicomate uterus.

In 1983, Balick, Elfner, May & Moore, in the Pain & Stress

Management Institute of Florida and Florida State University, ran in nine dysmenorrheal women EMG and thermal biofeedback procedures. All women presented significant reduction of symptoms. Finally, the importance of beginning biofeedback prior to the onset of menstrual symptoms in dysmenorrheal women was indicated.

In 1998, S.Diamantidis et al announced the findings of a study on seventeen dysmenorrheal women. All subjects, after EMG and thermal biofeedback training, succeeded controlling muscular tension at the abdominal area, back and pelvis and reduced the circulatory congestion of pelvic region, with a very significant reduction of the severity and duration of dysmenorrheal symptoms.

Vulvar vestibulitis syndrome

Dr Glazer and collaborators conducted in 1991 a study on vulvar vestibulitis syndrome including 50 women who were treated with electromyographic biofeedback. The women performed biofeedback-assisted pelvic floor muscles rehabilitation exercises. Vulvar vestibulitis is a painful condition and when not accountable to degenerative diseases, usually results from the arousal of the sympathetic nervous system due to stressors mostly connected with past psychotraumatic sexual experiences of the woman. The intense pain women experience in vulvar and vaginal area does not allow intercourse. This phenomenon often appears as a defence or reaction mechanism in some women who want to avoid sexual intercourse with a partner they dislike. The results demonstrated significant improvement of introital pain and tenderness.

In 2001, McKey, Kauffman, Doctor, Berkova, Glagzer & Redko, at the Houston Baylor Medical College, carried out a double controlled research on 29 women suffering from vulvar vestibulitis syndrome. They used biofeedback, mainly electromyographic, to release the tension of pelvic floor muscles and reported the following findings: 51.7% of the women demonstrated spectacular improvement, 93.3% were able to resume sexual activity and have uninhibited satisfactory intercourse, 31% had significant improvement and 17.3% did not have significant improvement. The outstanding results

were maintained at the follow up six months after the completion of the research.

In 1995, Glagzer, Rodke, Swencionis, Hertz & Young of Cornell University Medical College, New York Hospital, studied 33 women with vulvar vetsibulitis syndrome and reported that after biofeedback treatment, 95.4% reduction of tension levels of pelvic floor muscles and 83% relief from painful symptoms was obtained.

Dyspareunia

Dyspareunia is a female sexual disorder characterized by intense pain a woman may experience during sexual intercourse, basically, due to extreme dryness of the vagina, chronic vaginal inflammation and sensitivity of vulvar area. In such cases, sexual intercourse becomes impossible even with the ancillary of special lubricants. The basic cause of this syndrome is the over-increased tension in pelvic floor musculature issuing from chronic stress and anxiety. The treatment of this functional problem, breeding disastrous effects upon the sexual life of a woman and bringing about general dysfunction of the organism, relies on biofeedback interventions with protocols employing mainly the electromyograph.

In 1995, Glazer, Rodke, Swencionis, Hertz & Young of Cornell University Medical College, New York Hospital, conducted a study enrolling 33 women with chronic moderate or severe dyspareunia due to pelvic floor muscular spasm. After 16 weeks of biofeedback training, it was reported an 83% reduction of pain and 92% of the patients resumed sexual activity after the end of biofeedback treatment. A six months follow up indicated the maintenance of the therapeutic benefits.

Much research has treated, in scientific studies issues associated to the accumulation of excessive tension on the pelvic floor muscles. These muscles are of great importance, since the function of other organs depends upon their function. For example, when pelvic floor muscles perpetuate increased tension levels, a functional disorder of the large intestine in the form of chronic constipation ensues, which has

no pathological background and is unresponsive to laxative medication. Other implications of increased tension levels in pelvic floor muscles, stemming from chronic stress and anxiety, are urinary and fecal incontinence, erectile dysfunctions, dyspareunia and anal pain in women which do not respond to pharmacological medication and result to immense personal distress.

In 2004, Palsson, Heymen & Whitehead, North Carolina University, screened all scientific research and studies relevant to the above disorders published from 1975 to 2003 and selected those with descriptions for the biofeedback treatment protocols employed and outcomes. After the critical evaluation of thousands of cases they concluded that biofeedback training should be viewed as a valuable method, part of the therapeutic treatment of the above health problems. The contribution of biofeedback training enhances the efficiency of the modern conventional treatments.

Similar conclusions were also reached in 2004, from Jarrett, Emmanuel, Vaizey & Kamm of Saint Mark's Hospital.

Vaginismus

In 2005, Seo, Choe, Lee & Kim of Urology Department, University Medical School Seoul Korea, published their study reporting the successful treatment of 12 women suffering from involuntary spasm of the musculature of the vagina which leads to impossible vaginal penetration and the abstinence of sexual intercourse. Biofeedback training was applied to release the tension and spasm of pelvic floor muscles. After 8 weeks of biofeedback training all 12 women attained satisfactory sexual vaginal intercourse.

Childbirth pain

In 1989, Duchene, in Chicago USA, conducted a study on the effects of biofeedback on childbirth. Using biofeedback treatment on women monitored during labor and delivery demonstrated that the acute pain experienced by childbearing women was significantly reduced and controlled.

Also, it has been reported that women who have attended biofeedback training in the past for any reason, are able to control pain through biofeedback, to release muscular tension and to control temperature and perspiration during childbirth (S.Diamantidis et al, 1998).

C5. Male genital system

Erectile dysfunction

A common serious health concern for men, particularly after the age of 30, constitutes erectile dysfunction. This term encompasses the entire range of disorders associated with erectile function. Erection is regulated by the autonomic nervous system, mainly by its parasympathetic branch. This explains why one cannot normally have an erection under the influence of some stress inducing factor, or when in a state of anxiety or fear. The erectile functions requires relaxation, calmness, positive feelings and balancing of the sympathetic-parasympathetic “seesaw” of the autonomic nervous system. Erectile function biggest problems emerge when one adopts anxiety or stress generating behaviors, thus induces perpetual or almost perpetual sympathetic arousal which antagonizes and undermines the erectile function itself. Efficient erectile function is attained through the proper psychoemotional preparation and primarily by detaching ourselves from anxiety or stress factors. Ordinarily, sexual intercourse preliminaries pass through several and assorted stages: general relaxation, mental withdrawal from worries and problems, a couple of drinks, suitable music, proper lighting and, in some occasions, special movies. This entire procedure aims at the “letting go” of stress or anxiety and brings the intrapersonal communication and erotic atmosphere into the focus of our attention. If there is tension, pressure or compulsion, the longing for result of an erection cannot be reached. Erection and by extension urination or defecation, need relaxation, tranquility and disentanglement from stress or anxiety generating factors.

If you are instructed to get an erection: “I want you to have an erection now”, there is no way you would be effective, simply because the command alone forms a stress factor. The

same thing happens with urination and defecation. A precondition for the effective operation of all the above functions is the relaxation of the pelvic floor muscles.

In 2003, Marijke Van Kampen, W De Weerdt, H Claes & H Feys published research conducted at the Catholic University in Belgium on the biofeedback intervention in the treatment of erectile dysfunction via controlling perineal and pelvic floor musculature spasm. Fifty-one men with erectile disorders of varied etiology were involved in the study. The findings were the following: 47% of the participants achieved normal erection, 23% improved significantly, 12% had no improvement and 18% did not complete the program.

In 2004, Dorey carried out a research including fifty-eight men with erectile dysfunction. 40% of the subjects had complete restoration of erectile function, 34.5% improved very significantly and in 25.5% no change was observed.

In 2004, Dorey, Speakman, Feneley, Swinkels, Dunn & Ewings of the Somerset Hospital, Taunton U.K: because pelvic floor muscles are active in normal erectile function, the researchers hypothesized that weak pelvic floor muscles could be a cause of erectile dysfunction and conducted a randomized study on 55 men with erectile dysfunction, an average of 59 years, to determine the efficacy of biofeedback in the treatment of this problem in comparison to lifestyle changes. The biofeedback group showed significant increase in erectile function and had further improvement in the following 6 months, and concluded that biofeedback is an effective treatment of this disorder.

Biofeedback training gearing at stress and anxiety control improves significantly erectile competence as indicated in the long-term continuing research of the Greek Biofeedback Center (S.Diamantidis et al, 1994-2004).

Chronic aseptic prostatitis

Chronic non-bacterial prostatitis is a common problematic inflammation of the prostate gland. Men suffering from this painful condition have local pain, discomfort or difficulty in urination and moreover concomitant disorders of chronic pros-

tatitis. However the prostate fluid or urine culture shows no evidence of any known infecting agent, thus it is also called aseptic. In this type of chronic prostatitis, antibiotics is not the indicated medication and the patient eventually is led to the neuropsychiatrist or psychotherapist.

In 2005, Cornel, van Haarst, Schaarsverg & Gels of the Department of Urology in Netherlands, studied 33 cases of men, the average age of 44 years, with chronic non-bacterial prostatitis and chronic pelvic pain. The study clearly demonstrated the significant effect of biofeedback on CP patients leading to a significant improvement of all symptoms. It is impressive that the gradual release of chronic, accumulated tension in pelvic floor muscles played most important role in the biofeedback therapeutic intervention.

C6. Endocrine

Diabetes mellitus

Diabetes is a disease strongly affected from stress factors or stressors. Stressors bear a direct impact upon the known neuro-endocrine axis causing its derangement and shifting its susceptible sections to pathological diversion. When you are susceptible or predisposed to a diabetic disorder, stress will induce the diversion that will precisely result in elevating glucose levels.

Somatic, in the sense of physiological, or psychoemotional stress alters significantly the body's need for insulin and stressors often account for either hyperglycaemia or hypoglycaemia especially in diabetes type I, also called juvenile diabetes or insulin dependent. Stressful events and negative moods affecting the general psychoemotional condition, particularly depression, anxiety and daily challenges, were significantly associated with high blood glucose levels (McGrady & Horner, 1999). Diabetes type II appears in adulthood, often in obese individuals and is very often related to stress (Eliott & Icedolfer 1982). In addition, children raised under very stressful conditions, due to material or psychoemotional deprivations, either actual or threatened for the family; especially when such stressful events occur between 5 and 9

years, demonstrate typically high risk factor for diabetes type I (McEwen & Stellar 1993).

Surwit and his associates cured five diabetic patients who were not using insulin. The patients were treated with a combination of biofeedback protocols and elevation of insulin production was achieved with concurrent improvement of glucose tests. In succession, patients were able, albeit following a conservative dietary regimen, to keep diabetes totally controlled.

In 1991, McGrady, Bailey & Good, of Ohio Medical College, conducted a controlled study on eighteen patients with diabetes type I or insulin-dependent diabetes and published their findings in Applied Psychophysiology & Biofeedback. Half of the patients followed their usual treatment and the other half followed biofeedback training based on a treatment protocol consisting of twelve 45 minute sessions. Four weeks after the completion of the training, the blood glucose levels were reduced by 12% in the biofeedback assisted relaxation group, as compared to the untrained group.

In 2005, McGinnis, McGrady, Cox & Grower-Dowling of the Ohio Medical University, carried out a randomized control study on the effect of biofeedback on glucose levels in the blood, with thirty-nine patients with diabetes type II. The very encouraging results demonstrated that biofeedback and relaxation were associated with significant decreases in blood glucose levels and that the patients continued to have low blood glucose at the three-month follow-up after the end of the biofeedback training. All subjects demonstrated decreased scores on anxiety and depression inventories.

In 1991, McGrady & Horner of the Medical University of Ohio, studied the effect of biofeedback on eighteen patients with diabetes type I who were taking insulin. The biofeedback training aimed at treating the overall psychomental condition of the patients, particularly depression, anxiety and everyday conditions. The results indicated significant reduction of blood glucose levels in the biofeedback group. These reductions of blood glucose could not be attributed to an improved activity of the pancreas, thus ensues that stress management plays an important role in the medical treatment of people

with type I diabetes.

In 1999, McGrady & Horner, at the same university, repeated the research in nineteen patients with similar findings.

In 1994, Saunders, Cox, Teates & Pohl, at the Virginia Medical University, announced the therapeutic effect of biofeedback in a case study of a patient with diabetes type II, vascular disease and intermittent claudication symptoms. The latter is a very common problem in diabetic patients accountable to lesions of the peripheral thin vessels, caused from the high blood glucose levels. The patient, when trying to walk fast or run, experiences strong pain and cramping, chiefly in calf muscles. The pain is so intense that it forces the patient to a halt, and is owed to the impairment from diabetes arteries which can not dilate to supply legs with the increased blood and oxygen demands the muscles require when fast walking or running. The researchers reported that the attacks of intermittent claudication were reduced to zero after 12 sessions of biofeedback training. Also, the walking distance capacity of the patient increased by about a mile per day over the course of treatment. These results point out biofeedback as one of the most promising therapeutic interventions in peripheral vascular disease.

In 2001, Rice, Kalker, Schindler & Dixon at the Medical School University of Wisconsin, conducted a randomized controlled study to investigate the effect of combined biofeedback relaxation training on 32 patients who had chronic non-healing foot ulcers, due to diabetes mellitus. In 87.5% of the patients in the biofeedback group ulcers were healed, as compared to 43.8% in the control group that had not followed biofeedback.

In 1983, L. Rosenbaum, in Georgetown University Family Centre Washington, treated with biofeedback, six patients with diabetes who were taking insulin, aiming at desensitizing them from stressors. Four patients decreased insulin requirements, including one woman who remained stable even during two pregnancies. One patient became stable and discontinued excessive drug use. The important thing is that all patients started biofeedback training for reasons other than diabetes, to address stress and anxiety, and follow up ex-

tended for some patients in the following four years. This research supports the valuable therapeutic contribution of biofeedback through the desensitization from stress factors.

In 1986, Shulinson, Lawrens & Lacono of Utah University School of Medicine, applied biofeedback treatment in three diabetic patients with chronic nonhealing ulcers in the toes, ankle and leg. The biofeedback protocol included thermal biofeedback and relaxation home practice. Two of the patients had significant healing of the previous incurred ulcers.

C7. Neurological-Psychiatric

Learning disabilities

Learning disorders or disabilities as are commonly known, are those disabilities interfering with the person's abilities involved in the comprehension or use of oral or written language, in mathematic calculations, in movement coordination and focus of attention. Although these disorders appear in early childhood, diagnosis is usually formed when the child starts going to school.

Having some type of learning disorder does not denote that the person is incapable of learning anything at all, rather that a different strategy must be indicated to this person in order to learn certain things. Subjects with learning disorder are not deprived of intelligence; however they can have difficulties in particular educational sectors, in writing, reading, or in mathematics. This is due to the different way in which the brain of the learning-disabled person processes information received.

Among the common learning disabilities are encompassed by the following:

- **Dyslexia**: Difficulty or inability to comprehend some words, sentences or entire paragraphs.
- **Dyscalculia**: Inability to solve mathematical problems and comprehend mathematical notions.
- **Dysgraphia**: A writing disorder in which the letters

are written inappropriately by size or space; also words are wrong or wrongly spelled despite thorough instruction.

- **Disorders in a processing ability or visual and acoustic stimuli:**

This sensory type of disorder is manifested by a difficulty to understand spoken or written language although that hearing and vision are perfectly normal.

Learning disorders, many times continue lifelong and affect one's personal life on several levels and fields: school, occupation, daily routine, family and sometimes even affect the formation of friendships or playing. While some people may have overlapping learning disorders, others may present only a specific type bearing limited impact upon the rest aspects of one's life.

Some of the early signs that should warn parents on the possibility of a learning disorder include the following disabilities or difficulties:

Pre-school age

- Great delay in speech in comparison with children of the same age
- Disability in speech articulation
- Disability in finding rhymes
- Disability to memorize numbers, the alphabet, or days of the week
- Very intense physical activity and easily distracted attention
- Disability to cooperate with individuals of the same age
- Inability to comprehend directions and routes

School age

- Disability in phonetic mapping (matching letters with specific sounds)

- Confusing basic words (i.e the verbs want, eat, run etc)
- Repetitious mistakes in syllables involving spatial orientation, i.e. confusing b or d, or other pairs
- Misplacing numbers (i.e. 12 instead of 21) and confusing math signs (-, /, x, =)
- Slow recall of incidents
- Memorizing disability
- Impulsivity and lack of planning
- Unstable pen grip
- Disability in learning the time tables
- Poor movement coordination, prone to accidents

Learning disorders are usually long-term and maintained throughout the person's life. The individual simply learns to live with it and finds the proper way to overcome the ensuing problems without disturbing one's life.

Keep in mind that individuals with learning disorders know that they are different, but in the beginning cannot understand why. However, this fact makes them feel awkward and have a low self-esteem, with serious impact upon their psychological condition and possible adverse implications on the development of their personality.

The parents therefore must comprehend that the sooner they identify the problem, the better the outcome. It is also imperative to realize that a learning disability is neither a social stigma nor a disease. They should not feel "ashamed" or try to conceal it by any means. Remember that the longer expert help is delayed, the more likely the condition will "escape control" with unpredictable consequences.

Undoubtedly, a child with learning disorders may be emotionally demanding for the family. Usually, parents undergo various emotional phases: denial, guilt, liability, imputation, anger or/and despair. Also, its siblings may feel ashamed or jealous of the extra attention he/she receives from the parents, on account they may even be bothered by the child's

behavior. For all these reasons, it is suggested that the psychological support is directed to all the members of the family, offering them the possibility to express and discharge their emotions.

In 1981, M.Omizol and R.Williams of University of Houston, examined the effects of biofeedback in thirty-two children with learning disabilities, aged between 8 and 11 years, with respect to attention to task, impulsivity, and focus control. The study spanned 8 weeks and treatment included EMG biofeedback training in conjunction with relaxation tapes. The biofeedback group children had significant improvement on attention to task and impulsivity scores and the conclusion was that biofeedback training gives promise in assisting learning-disabled children in reaching their education potentials.

Biofeedback, with especially designed training protocols, constitutes the most modern and efficient method for resolving this problem, as is shown from the results of the following research:

Tansey (1984)

Lubar (1985)

Holcomb, Ackerman & Dykman (1985)

Tansey (1991)

Othmer, Othmer & Marcks, (1991)

Othmer & Othmer, (1992)

Marosi, Harmony, Sanchez, Becker, Bemal, Reyes, DeLe on, Rodriguezd & Fernadez (1992)

Weiss & Hechtman, (1993)

Rossiter & LaVaque, (1995)

Scheinbaum, Zecker, Newton & Rosenfeld, (1995)

Joyce (2001)

Stathopoulou & Lubar (2001)

Sterman (2001)

Egner, Strawson & Gruzelier (2002)

deBeus, Ball, deBeus & Herrington (2003)

Gruzelier (2003)

Thatcher, Biver & Duane (2003)

S.Diamantidis et al (1985-2006)

Hyperactive or Hyperkinetic Syndrome

Attention Deficit Hyperactivity Disorder (ADHD) is designated as a neurodevelopmental disorder cardinally characterized from decreased learning functions. Studies on ADHD subjects have shown that when they try to focus attention on something, i.e. a task; abnormal activity is demonstrated in their brain cortex.

The scientific research has conveyed that subjects with ADHD trained in electroencephalographic-EEG biofeedback were able to normalized brain cortex function and acquire active attention and in some occasions improved attention was reported, better adaptability and elevation of self-esteem in up to 75% of the cases.

In 2005, Xiong Z., Shi S. & Xu H. in China, treated 60 ADHD children with EEG-biofeedback training. The effectiveness of the method mounted to 91.6% after 40 sessions. All children were assessed pretreatment and post-treatment with respect to attention ability and calmness. It was found that after every biofeedback session statistically significant difference was obtained. Likewise findings and conclusions formulated the following:

Lubar & Shouse (1976)

Prichep, Sutton & Hakeren (1976)

Satterfield & Braley (1977)

Tansey & Bruner (1983)

Linden (1988)

Mann, Lubar, Zimmerman, Miller & Muenchen (1992)

Matochik (1993)

Ernst, Liebenauer, King, Fitzgerald, Cohen & Zametkin (1994)

Monastra VJ, Monastra DM, George S στη Νέα Υόρκη (2002)

Holtmann M, Stadler C, Leins U, Strehl U, Birbaumer N & Poustka F in Frankfurt (2004)

Eisenberg J, Ben-Daniel N, Mei-Tal G & Wertman E, in Is rael (2004)

Monastra VJ, Lynn S, Linden M, Lubar JF, Gruzelier J & LaVaque TJ in New York (2005)

Levesque J, Beauregard M & Mensour B., in Canada (2005)

Loo SK & Barkley RA, UCLA University (2005)

Pop-Jordanova N, Markonska-Simoska S & Zorcee T., in Fyrom (2005)

Fox DJ, Tharp DF & Fox LC, in Texas (2005)

Butnik SM., in USA (2005)

Holtmann M. & Stadler C., in Germany (2006)

S.Diamantidis et al (1985-2006)

Attention Deficit Syndrome

This syndrome consists in an inability to focus attention, most often coupled with hyperactivity. Boys are more likely than girls to present ADS. It must be underlined that although this syndrome does not stand alone as a learning disorder, it can be the cause of serious problems in school performance and is very often combined with learning disabilities.

Its specific characteristic symptoms include nervousness, aggressiveness, impulsive behavior, decreased concentration and increased kinetic activity. These represent common topics of discussion among the parents and childcare givers of elementary school young children. Actually, hyperactivity is a behavioral disorder detected in 3-7% of young children affecting them in various degrees despite a diagnosis of mental disease or mental retardation. It typically occurs by the age of 7 and lasts at least six months or more. Delay of treatment onset may have negative implications on the child's social inclusion and development, as well as learning ability.

Another important aspect is that its incidence is much higher in boys than in girls (ratio 10:1). Hyperactivity in children is not a new condition. Its symptomatology has been known since 1880. Today, scientists believe that hyperactivity is probably multi-factorial, accountable to a combination of specific genetic, environmental, neurological and biochemical factors.

Biofeedback represents the ideal therapeutic approach since it combines the special training with the necessary self-knowledge as the basis of each behavioral change, as it has been documented in the research and studies of:

Lubar & Lubar (1984)

Lou, Henriksen & Bruhn (1984)

Klorman, Brumaghim, Fitzpatrick & Borgstedt (1990)

Robaey, Breton, Dugas & Renault (1992)

Barkley (1990-1992)

Mann, Lubar, Zimmerman, Miller & Muechen (1992)

Dupuy & Greenberg (1993)

Ingersoll & Goldstein (1993)

Linden, Gevirtz, Isenhart & Fiser (1993)

Rapport, Denney, DuPaul & Gardner (1994)

Rossiter & LaVaque (1995)

Klude (1995)

Rassey, Lubar, McIntyre, Zoffuto & Abbott (1995)

Barrickman, Perry, Allen, Kuperman, Arndt, Herrmann & Schumacher (1995)

Lubar, Swartwood, Swartwood & O'Donnell (1995)

Cartozzo, Jacobs & Gevirtz (1995)

Hansen, Trudeau & Grace (1996)

Swingle & Psych (1996)

Habib & Radojevic (1996)

Kaizer (1997)

Rossiter & Vaque (1997)

Alhambra, Fowler & Alhambra (1997)

Kaizer & Othmer (1997)

Boyd & Campbell (1998)

Carmody, Quintella, Radvanski, Sabo & Giorgi (1999)

Hutchinson & Aisaacs

Russell (2000)

Thompson, Thompson & Psych (2000)

Suldo (2001)

Greenberg (2002)

Egner & Gruzelier (2003)

Kropotov (2003)

Peed (2003)

Ross & Count (2003)

Beauregard (2005)

Clarke, Barry, McKarthy & Selikowitz (2005)

Monastra (2005)

S.Diamantidis et al (1985-2006)

Dyslexia

Dyslexia is a reading or writing language processing dysfunction despite a normal intellect. It is a common condition and biofeedback interventions yield very good results.

In a blind study on dyslexic adults conducted by E.Liddle, G.Jackson & S.Jackson, Psychology School Nottingham University, in 2004, biofeedback was used in the intervention to treat dyslexia by improving heart rate variability. Significant improvements were found in reading and articulation speed in the biofeedback group.

Also positive findings have reported the following researchers:

Sklar, Hanley & Simmons (1972)

Isenberg (1978)

Duffy, Dencla, Bartels & Sandini (1980)

Hynd & Clickerman (1989)

Galaburda & Livingstone (1993)

Evans & Palk (1996)

Clickerman, Hooper, Hynd, Hern, Presley & Watson (1996)

Angelakis, Lubar, Vanlandingham, Stathopoulou, Blackburn & Towler (1999)

Angelakis, Koulios, Frymier & Stathopoulou (2003)

S.Diamantidis et al (1985-2006)

Autism

Significant findings supporting the contribution of biofeedback application have been conveyed in the research of:

Sichel, Fehmi & Goldstein (1995)

Jaruisiewicz (2002)

Coben (2005)

Coben, Hudspeth, Clarke & Barry (2005)

Pineda (2006)

Pauleti & Kaiser (2006)

Epilepsy

With electroencephalographic-EEG, biofeedback makes it possible to train the brain to de-emphasize brain rhythms that generate or propagate seizures and emphasize those that make seizures less likely to occur. It has become possible in clinical practice to eliminate seizures or decrease the amount of medication required to control them (Walker & Kozlowski, 2005, Dallas Neurofeedback Centre).

In 2004, Nagay, Goldstein, Fenweck & Trimble, at the Institute of Neurology, in the University College London, conducted a control study and treated with electrodermographic-GSR biofeedback 18 epileptic patients with drug-resistant epilepsy. Seizure frequency was significantly reduced in the biofeedback group. Furthermore, the confirmation that the effect of biofeedback treatment was related to physiological changes highlights the therapeutic value of biofeedback in such cases.

Sheth, Stafstrong & Hsu, in 2005, Wisconsin University, reviewed non-pharmacological treatments and EEG biofeedback in children with persistent seizures difficult to control despite medication and ascertained the very important and evolving role in the management of seizures.

Positive findings emerged from the studies of the following:

Sterman (1972 - 1973 - 2000)

Sterman & Friar (1972)

Sterman, McDonald & Stone (1974)

Sterman & McDonald (1978)

Mirsky & Duncan (1990)

LaVaque, Hamond, Trudeau, Monastra, Perry & Lehrer (2002)

Concgedo, Lubar & Joffe (2003)

Hughes (2003)

Walker (2003)

Tan, Hamond & Thornby (2005)

Walker & Kozlowski (2005)

Parkinson's disease

In 2002, Thompson & Thompson reported that biofeedback interventions in patients suffering from Parkinson's disease are promising with respect to symptom relief and life quality betterment.

Chemotherapy

In 1997, Su, Tan & Zheng, in the University of Medical Sciences, Guang Zhou China, applied biofeedback progressive release of chronic accumulated muscular tension in 60 cancer patients under chemotherapy. The patients were assigned to a biofeedback and control group and assessed with special evaluation tests and questionnaires on physical reactions. Significant improvement was found on psychosomatic factors of the biofeedback patients after the training. The results elevate biofeedback as an effective method in alleviating the unhealthy psychosomatic reactions of patients during chemotherapy.

Remarkable results were also presented by Burish, Shartner & Lyles, in 1981, Tennessee, USA, who used biofeedback to reduce some of the adverse side effects (i.e. nausea, anxiety) of cancer therapy. The results were maintained during the follow up sessions.

D. SUBSTANCE ABUSE

Alcoholism. Smoking. Toxicomania (drug addiction).

Biofeedback training has been employed to address addictive disorders accountable to smoking, alcohol and use of narcotics. The first modest applications ventured in the 1970's encouraged results and formed the basis for the development of novel, contemporary and more efficient biofeedback protocols.

Fahrion, in 1995, Peniston et al in 1990, Denny et al in 1991 and Taub et al in 1994, carried out numerous researches on the treatment of addictive disorders, focusing primarily on alcoholism, with spectacular results. Commensurate results emerged also through the use of biofeedback training in the treatment of smoking.

In 1989, Peniston & Kulkosky published a research of great significance which bred an innovative method for the treatment of alcoholism and relapse prevention. In the past years, a variety of research not only from the biofeedback

perspective, but also in the domains of neurology, psychiatry and psychology have conveyed that a great percentage of individuals with problems such as alcoholism or addiction to substances, suffer from melancholy, have very low self-esteem, exhibit self-animosity and reactive attitude toward society, and are reluctant or lack faith in the notion of self-control over their body.

Biofeedback, as an effective adjunct in the desensitization from all these factors, initiated and substantially underpinned the advances in the treatment of addictive disorders.

The physician Alan Leshner, in his illuminating study on human brain neurobiology, reviewed and summarized almost the entire research literature of the past decade and asserted that addiction to smoking, alcohol or substances ultimately gives the picture of a brain disease. Now that we know with great precision the pathways of the brain through which addictive and toxic substances affect the acute phase of mood, memory, perception and emotions we can formulate a more definite opinion on how therapeutic interventions can or ought to be implemented via biofeedback protocols. What has cardinal importance is that one realizes that the repetitive use of addictive substances for a considerably long period brings about deep and fundamental changes in the brain's functional structure. Because these changes are deep and crucial they can persist, precisely in the sense that they continue even after the substance abuse habit has ceased.

Therefore, addiction is a condition established in the brain in such a manner that produces dependence from the existence of certain addictive substances. In other words, in addiction, some brain functions undergo something like a "short-circuit" and the ensuing results are manifested in the form of the somatic and psychoemotional symptoms of deprivation. Addictive substances induce a series of neuro-adjusting changes leading to the addiction.

Leshner characteristically describes the brain as the victim of a "hijacking" committed by the addictive substances. Instead of following its normal course to its natural destination, the brain is eventually forced to shift to the destination of its "hijackers", namely the addictive substances. In this sense,

the issue of addiction is a complicated and difficult situation. The central and most crucial point is that the individual's first contact with addictive substances is made voluntarily and is based on one's personal decision. This element has special gravity because it is a necessary component of every detoxification attempt of the person's congruous decision.

If the addicted person has not really made up her/his mind on detoxifying, it is highly unlikely that such an effort will yield results. Clinical research demonstrates that in addicted people the brain transmits certain wave patterns. The biofeedback intervention aims at teaching the individual, through proper training, to control the production of these brain waves, leading to their gradual reduction and elimination. Thus, the first positive results are obtained which fortify and support the person's will and decision for detoxification.

Biofeedback protocols of this type are chiefly based on EEG and thermal applications. The objective is to assist people to learn to reject the "hijacking" brain state and in the case they enter to be able to escape easily, taking control and switching the brain function in a different wave range, and diverge from the one produced by the addiction.

Very significant results with respect to the contribution of biofeedback in the treatment of substances abuse and addiction were announced by:

Filkenberg, Sokhadze, Lopatin, Shubina, Kokorina, Skok & Shtark (1996)

S.Diamantidis, Drossou, Polychronopoulou & Kyvelou (1998)

Trudeau (2001)

Davis & Callaway (2003)

Burkett, Cummins, Dickson & Skolnick (2003)

Sokhadze, Martin, Stotts & Potts (2004)

Sokhadze (2005)

Peniston & Kulkosky (1990), on alcoholism

E. CHRONIC DISORDERS

Neuromuscular rehabilitation post-traumatic, post-operative or post brain stoke

In 2003, Kim & Kang, at the University of Seoul Korea, investigated the effect of exercise employing biofeedback training and constraint-induced movement on the upper extremity in 40 patients with hemiplegia. After two weeks of biofeedback training both the amount of use and the quality of motor activity of the affected upper extremity was significant higher in the patients who had participated in the biofeedback group than in subjects in the control group, with no decrement of the improvement at the four week follow up.

In 1996, Moreland, Thomson & Fuoco, at St. Joseph's Hospital Ontario Canada, examined the efficacy of electromyographic-EMG biofeedback training compared to conventional physiotherapy for improving lower extremity function in stroke patients. They reviewed 79 studies on this issue announced and carried out a meta-analysis evaluation study. The results indicated that EMG biofeedback is superior to the conventional physiotherapy in improving lower extremity function after stroke.

Finley, Niman, Stanley & Ender, in 1976, at the Oklahoma Children's Medical Centre, studied the effect of EMG biofeedback in 6 athetoid cerebral palsy patients. All children improved significantly on measures that tapped fine and gross motor skills. Children and parents reported improvements in various speech and motor functions and only two most severely impaired patients had failed to improve on speech measures.

White & Lifeso, in 2005, of the State University of New York, applied EMG biofeedback in patients with asymmetrical limb loading (lameness) after total hip arthroplasty, and reported improved symmetrical gait. They suggested further study of a rehabilitation program with treadmill walking incorporating real-time biofeedback training.

In 1980, Kyoichi Takebe & Kazushi Hirohata, of the Orthopedic Surgery Kobe University Japan, applied successfully EMG biofeedback to obtain the desired renewed function of

dorsiflexion in the transplanted muscle of patients with food drop. The transplanted muscles worked effectively not only in the active movement but also during walking. They concluded that biofeedback training is useful in rehabilitation following tendon transplantation.

Research on similar issues with very positive outcome implemented:

Ayers (1981-1983-1993)

Posthuma & Wild (1988)

Senf (1988)

Bruner (1989)

Thatcher, Walker, Gerson & Geisler (1989)

Niemann, Ruff, Baser (1990)

Thatcher, Cantor, McCalaster, Geisler & Krauze (1991)

Johnstone & Thatcher (1991)

Gray, Ichise, Chung, Kirsh & Franks (1992)

Packard & Ham (1994)

Rattok & Ross (1994)

Hoffman (1994)

Ichise, Chung, Wang, Wortzman, Gray & Franks (1994)

McAllister (1994)

Taylor & Price (1994)

Everhart & Harrison (1995)

Hoffman, Stockdale, Hicks & Schwaniger (1995)

Barabasz & Barabasz (1995)

Herbert & Gross (1995)

Blampied, Barabasz & Barabasz (1996)

Patrick (1996)

Demaree, Creuss & Harrison (1997)

Thornton (1999)

Evans & Arbarbanel (1999)

Toomin & Toomin (1999)

Toomin & Remond (2000)

Kim, Kim & Kang, Seoul Korea (2003)

Armagan, Tascioglu & Oner Eskisehir Turkey (2003)

Parker (2003)

Coben (2005)

Permanent mobility problems

The use of EMG-biofeedback during hypnosis in children with cerebral palsy and spasticity demonstrated improvement in motor functions and reduction of spasticity (Mauersberger, Artz, Duncan & Gurgevich, 2000, Arizona university).

In cerebral atrophy with ataxia, a case study showed that combined biofeedback training-physiotherapy and use of vitamins improves brain function (Battistia, Dalla Toffolab, Verric, Serrab, Dottia, Formichia & Federicoa, 1997, Italy).

Dozza, Chiari & Horak, in 2002, obtained significantly improved balance in patients with bilateral impairment of ear vestibula by biofeedback intervention using audio feedback.

Bodenhamer, Coleman & Achterberg, in 1986, used biofeedback and achieved pain and spasticity control in a case of paraplegia.

Deepak & Behari, in India, treated with biofeedback ten cases with hand dystony with outstanding results: nine patients demonstrated improvement in writing skill and relief from local distress and pain decrement by 37% up to 93%.

Scoliosis and Kyphosis

Biofeedback treatment was tested in twenty-seven scoliosis and kyphosis patients and was found highly effective. All kyphosis patients had rapid straightening of the spine and removal of structural deformities (Birbaumera, Florc, Ceveya, Dworkind & Millere, in 1994, Tubingen Germany).

Relevant results presented Bogdanov, Nikolaeva & Mikhailenok in 1990, Korsakova Russia, and also S.Diamantidis et al (1990-2004) in eleven cases.

Chapter 17

Regulatory applications of biofeedback

- Exploration of talents and qualifications
- Management of everyday stress
- General invigoration and enhancement of performance
- Overall physical condition
- Discharging muscular tension
- Speed reading
- Speed learning
- Pre-exam stress and anxiety
- Pre-exam psychic fatigue syndrome
- Creativity increase
- Athletics-sports

The regulatory applications of biofeedback are to the avail of contemporary women and men who are driven by the need for relief from some symptoms and place emphasis on better insight, exploration of potential and enhancing performance at work or creative expression. They are addressed to people who want to utilize the vast scientific experience biofeedback encompasses for the betterment of everyday regime, to improve life quality and upgrade the relationship with oneself as well as others. The pressing needs every person faces today make stress and anxiety control techniques, via biofeedback training, the most appealing and best-sellers.

Exploration of talents and qualifications

In current societies with intense competition and snapshot opportunities, it is crucial that one knows his inherent abilities. All people are not the same. Each person is endowed with different abilities and talents, however, not many are particularly aware of them. Certainly, a powerful talent will urge you from early on to express it. It will be revealed mainly through certain traits in your character or abilities. In this case, you will have the opportunity to discern it, reveal and expand it. But this transpires only with your most marked talents which spring up automatically and comprise the overt part of yourself. When a talent is covert and you never had the chance to discover it, it resembles an unexploited idiosyncrasy capital waiting for you to unearth and unfold it. Many children with musical aptitude could have made a brilliant career in music, however were not fortunate enough to get a musical instrument as a present and disclose their talent through this. Apart from such great talents which can determine your life course, lesser talents and abilities could be concealed in you remaining yet undiscovered. Despite your ignorance of their existence these talents comprise an important chapter that could enrich your known and developed faculties. Now, more than even before, the systematic life pattern predominates and renders necessary for us to be proficient of our talents and qualifications and capabilities so as to design safely and successfully our professional and social course.

Do you have the required stamina to support your activities?

How do you react to stress and anxiety?

How much and in what ways are you involved emotionally in your relationships?

How would you define your relationship with yourself?

Are you capable of working without a supervisor over your head?

How much do you depend on yourself and how much on others?

Do you function more with the right or left brain hemisphere?

Do you know your secret talents? How big are they?

Do you know your dexterities or skills?

Probably you can reply to most of the above. However, how positive are you that your answers are objective and will not prove false? Are you sure that you neither overestimate nor underestimate yourself? Keep in mind that overrating or underrating is equally dangerous. In the most advanced, therefore more competitive modern societies, no decisions are made unless these parameters are taken into consideration. In societies under development circumstantial life style still prevails and to unearth one's potentialities bears lesser significance. When in need, the person gives his/her best and only then finds out who he really is. As a father, have you ever wondered whether your child possesses the capabilities required to carry on your job? Is your work congruous or will your child be crushed under unbearable pressure? Has it occurred to you that the obsession to breed your successor may actually bury some of his/her talents that could have ensured success and, most vital, his/her psychic satisfaction and health, derived from the expression of creativity? Have you speculated that by forcing your child to become a lawyer, doctor, architect or tradesman and so on, you may impose on your child the life sentence of huge oppression and energy drain needed to cope with your choices? Such challenges have long been met in many contemporary societies by channeling their youth, members to various programs that detect a person's specifications. There is no room for errors given that false choices have heavy cost both

on the individual and the society. Biofeedback through its effective and primarily through its objective personality approach holds the lead among the programs charting one's talents and abilities. The numerous biofeedback protocols are addressed to every age and every condition and many big corporations employ them in personnel selection.

Tattenbau, in 1999, studied and identified the use of biofeedback as an adjunct for individuals targeting maximum performance, and examined parameters such as:

1. The sense of personal mission and vision
2. Agility of attention
3. Psychic strength and recovering techniques from psychic trauma
4. Capability to successfully meet challenges
5. Lack of self-consciousness
6. Leadership and ability to mobilize
7. Specialization in mental imagery
8. Intellectual association with situations
9. Ability to envisage and for imagery sensory recall

Similar studies were made by:

DeLuca, (2005)

Foster, (2005)

Pribram (2003)

Roland (1993)

Rosenfeld (1990)

Rossi (1986)

Diamantidis et al (1985-2006)

Tucker & Williamson (1984)

Cohen & Cohen (1983)

Cohen (1975)

Everyday stress control

Stress control is a very important matter for all modern people, especially those living under unbearable time pressure, oppressive and demanding conditions prevailing in current societies. Stress control techniques are the forefront of the arsenal of most superactive persons.

Biofeedback stress control offers significant services and assets. It is the principal investigation method for stress and its implications on the organism and further is an efficient desensitization process from stressors.

The main targets in biofeedback aiming at stress control are :

1. help you comprehend the way through which stress affects you

2. help you identify the stressors originating in your workplace, family, intrapersonal relationships and self-relationship

3. organize the strategy required to confront these stress sources, and finally

4. help you desensitize from stressors

The valuable gift biofeedback offers to contemporary stressed individuals is the realization of how we get ourselves trapped into needs and expectations irrelevant to our visions, from which ultimately one cannot disentangle without genuine help. One of the basic outlets for stressed persons is to grow a general adaptation syndrome. An adaptation process that escalates at various activity levels and employs diverse escape both from emotional and psychomental impasses.

Biofeedback teaching that precedes the desensitization process, cardinally rests in giving you the opportunity to fully evolve your responses towards alarming situations, to exploit your innate resistances against stress and to avoid depletion always following if the person has not developed potent defences against stress.

The greatest hazard for every man experiencing stress springs from the prolonged action of the stressor due to internal or external factors including the workplace, home, family, company, life style, convictions, education and our overall life attitude.

Biofeedback stress control techniques employed in biofeedback protocols analyze your relationship with all the aforementioned surroundings regarded as stressors, and once you thoroughly comprehend and learn how these affect you, then your are re-trained to experience them as sources of joy and satisfaction for yourself and others.

General invigoration and enhancement of performance

Do you often rise from bed with a feeling of boredom and indifference for everything?

Do you sometimes want to tuck yourself back to bed and escape from the reality waiting you?

Do you feel tired all the time, with no spirit or inspiration?

Are you going through a phase in which nothing can mobilize you?

Have you lost your interest in everything that deeply moved you a few months ago?

Do you seek more and more for isolation and get alienated from your friends?

Do you discover in yourself bulimic or intense anorexic tendencies?

If you often feel like this it indicates that your organism is sending an alarm signal. Your energy batteries need an urgent recharging. Nevertheless, you may find that you lack even the desire to snap out of it and have fun. What you are missing is

something else. You are missing a conversation with yourself.

Biofeedback suggests that you talk with yourself through an interpreter, construing objectively the language of your emotions and responses,so that you better comprehend it. Such interpreters are the biofeedback devices that locate your “short-circuits” and the causes that lead to energy losses. In succession, assisted by your trainer, you will be able to codify your self-communication in such a manner that you no longer expose yourself to a waste of energy and adopt an energy saving attitude. This attitude will yield fruit in short time, recharge your energy batteries and exchange every negative emotion you hold with a novel, more positive and supportive of the preservation of your homeostasis.

Overall physical condition

Physical condition is a term denoting your bodily condition and the senses associated. When you function normally you remain unaware of your body functions. Breathing, digestion, blood circulation and movement are all performed without realizing them or engaging your attention or demanding effort. The senses involved in the intake and processing of external stimuli will form your homeostatic barometer.

When you start feeling your body and its functions it means that something is going wrong. A minor de-regulation has occurred that unless redressed will lead to generalized dysfunction of your organism. Body language is a most expressive and sincere communication path which should never be ignored or underestimated.

Biofeedback protocols give you the chance to probe into your physical functions, offer you a guided-tour in their pathways and enable you to detect possible future malfunctions. Subsequently, you can employ biofeedback techniques to restore deranged functions and reinstate normal, natural rhythms.

Releasing muscular tension

There are many people who are not in need for a particular biofeedback protocol, however need a tactic that will assist the release of daily tension from piling up in muscles and accumulatively pose broader threats for the organism.

Biofeedback has elaborated a special training package showing you how to drive away daily tension from building in the body. Achieving this daily goal within a few minutes, via a special relaxation technique, is usually monitored and confirmed by an electromyograph or thermograph. Today, many people have acquired the habit, especially in the States, to take a break from their busy program for 15 minutes of deep relaxation that invigorates and keeps them active for the rest of the day. It is the so called energy time-off that freshens up and rejuvenates.

EDUCATION

Speed reading

The biofeedback speed reading method has lately become the basic tool of people who are obliged to cope with huge amounts of knowledge, enabling their progress in the science or work field. Few professions could be excluded from this list. Biofeedback speed reading is applied in a wide scale and used by various companies mainly for their high ranking executives. This issue was treated in the studies of:

Lubar (1997)

Stein, Rao, Bobholz, Fuller, Bloom, Cho, Pankiewicz & Harsch (1995)

Ackerman, Dykman, Oglesby & Newton (1995)

Gevins & Smith (1995)

Gazzaniga (1995)

Becker, Mintun, Diehl, Dobkin, Martidis, Madoff & Dekosky (1994)

Gathercole & Baddeley (1993)

Crosson (1992)

Smith (1991)

Gutierrez & Corsi-Cabrera (1988)

S.Diamantidis et al (1985-2006)

Evans (1977)

Speed learning

Speed learning concerns every pupil and student pursuing high performances and selective careers. Biofeedback protocols for speed learning combine speed reading with increased text comprehension and incorporation. Learning speed is usually tripled, however sometimes exceptional, peek performances appear, as evidence the following studies:

Frederick (2005)

Othmer (2005)

Vernon, Egner, Cooper, Compton, Neilands & Shery (2003)

Horvat (2003)

Klimesch (2003)

Kaplan & Zaidel (2001)

Sams το (2000)

Angelakis, Lubar & Frederick (2000)

Iacoboni, Rayman & Zaidel (1997)

Iacoboni & Zaidel (1996)

Schumacher, Lauber, Aqh, Jonides, Smith & Koeppe (1996)

Andreasen, O'Leary, Cizadlo, Arndt, Rexai, Atkins, Ponto

& Hichwa (1995)

Burbaud, Degreze, Lafon, Frankoni, Bouligand, Bioulac, Caille & Allard (1995)

Dolan, Fletcher, Baker, Frackowak, Frith & Shallice (1995)

Fletcher, Frith, Grasby, Shallice, Frackowiak & Dolan (1995)

Baron, Petit-Taboui, LeDoze, Desgranges, Ravenel & Marsal (1994)

Cohen, Forman, Braver, Casey, Schreiber & Noll (1993/1994)

Jonides, Smith, Koeppe, Awh, Minoshima & Mintun (1993)

Hynd, Marshall & Gonzanlez (1991)

Pribram (1991)

Pennington (1991)

Lou, Henriksen & Bruhn (1990)

Hudspeth & Pribram (1990/1991)

Thatcher, Walker & Guidise (1987)

Tansey (1985)

S.Diamantidis et al (1985-2006)

Freidman, Brown, Comblat, Vaughn & Kimling (1984)

Swanson, Sandman, Deutcsh & Baren (1983)

Mac Lean & Papez (1981)

Thatcher (1980/1987)

Pre-exam stress and anxiety

Pre-exam stress overpowers pupils and students with anxiety or/and various phobias. It is manifested through diverse unnatural behaviors and reactions. Over-irritability, aggressiveness, quarrelsomeness, destructive tanglible outbreaks, self-destructive outbursts, psychic misery, insomnia, over-

perspiring, trembling of hands, the feeling that the brain is "choked up", inability to read, vertigo, headache, ear buzzing, poor vision, menstrual disorders, excessive hair-falling and many more symptoms and dysfunctions emerge from pre-exam stress.

Biofeedback training gives excellent results in the treatment of all these conditions and forms a paramount shield protecting the examinee from the disrupting affect of such factors.

Pre-exam psychic fatigue syndrome

Pupils or students under the pressure of pre-exam stress and anxiety develop a complete emotional and psychomental paralysis. They seem to be withdrawn or lost in their world, sometimes with outbursts of hilarity or nervous laughs. Apart from its enormous seriousness, great hazard lurks in this syndrome which, if not treated in proper time, becomes chronic and may lead to overall derangement of the psychoemotional world and personality of the student. Psychic fatigue syndrome often appears in individuals very vulnerable from psychoemotional aspect, although they may never have expressed or revealed this susceptibility before.

Biofeedback provides the solution to this problem and aborts further psychoemotional derailment of the pupil or student.

Creativity increase

Creativity is the ability of a person to bring forth new ideas or imagery and compose novel creations by combinining assimilated ideas and notions.

Your creativeness greatly depends on the freedom of your thought and your disposition to explore ideas and encounter new intellectual domains.

"Running out" of ideas or imagery is commonly found in intellectual creators or artistic people. If while going through such a period they are obliged to meet deadlines bound by

contract, they may present serious disorders due to the anxiety, agony and fear they experience with regard to the possibility of being unable to live up to their reputation and get bad critiques. A vicious circle is thus formed which can exhaust the creators and cause intense somatic problems.

The biofeedback protocols employed to address this issue provide training on “refreshing” your creative skills and stir the utilization of your unexploited faculties. That is why biofeedback is most popular among artists and stars at the Mecca of the Seventh Art, Hollywood.

Athletics and sports

Biofeedback plays a decisive role also at the pre-game training period of athletes and teams. Coaches of big football teams, psychophysiologists of national teams and analysts of Olympic winners use biofeedback to measure, among other parameters, the muscular wearing out of athletes and modify respectively their training so as to be most efficient and yield top ranking and gold medals (Bruno deMichelis, Dr. Vietta Wilson, Currie Chapmen, Andrea Schmidt, Shane Murphy, Jack Donohue etc).

Mueller, is worldwide the first skier, who pursuant to his systematic electrodermographic biofeedback broke the speed record of 210 km/hour in 1987, and won two consecutive international contests.

Dr. Louis Etienne was the first skier who achieved to cross the North Pole alone. Biofeedback played a determinant role in his success, since due to preceding biofeedback training he was able to raise the temperature of his extremities up to 2,2 degrees Celsius and cope effectively with the various stress factors and the extreme survival conditions of his venturesome trip.

More than half of the Japanese Olympic winners of Seoul had been trained in electrodermographic biofeedback. Also similar biofeedback protocols follow in pre-game training hundreds of Japanese athletes who participate in Olympic Games.

Dr. Dan Marici, psychologist of famous grand prix drivers such as Fittipaldi and Senna, applied biofeedback to all the men of the Canadian Olympic ski team. In Canada the national teams of all sport fields use biofeedback techniques, mainly electrodermographic. Botterill, who has worked with swimming and basketball teams, estimates that with proper biofeedback training it is feasible to increase performance up to 20-30%, whereas athletes who, at the risk of their health, use chemical substances (doping) can only hope for an improvement up to 6%.

Many Italian ski champions are trained with electromyographic biofeedback in diaphragmatic breathing. Sylvain, an Olympic gold medalist, is trained with electromyographic biofeedback on quadriceps in order to improve his pre-game ski jumps. Since 1992, thousands of Olympic athletes have improved their visual acuteness by means of biofeedback techniques.

Klein, a veteran ski trainer, and Laderoute, athletic director of the Combat Training Centre in the Canadian Army, deeming that it is important for an athlete to know how to cope with stress and to reach the level that enables him to have peak performance, applied biofeedback in some training teams with such prompt and spectacular results that everybody asked to participate in these programs.

Apart from the biofeedback applications which are targeted for professional athletes and championships, an array of applications is available to everyday sports fans. Nowdays fitness and athletic activity keenly concerns many people who may not be championship competitors, however are intensely engaged in some form of sport.

In this event, certain biofeedback techniques help you expand your muscular sense, increase neuromuscular coordination and control pre-game stress and anxiety, any time you need it.

Most significantly, biofeedback training offers people engaged in sports protection from injuries as well as prevents serious or mild tissue damages on account of wearing out. Group biofeedback protocols can be applied to teams or club members.

Chapter 18

Discussion of clinical cases

- *Child with attention deficit hyperkinetic syndrome and reactionary behavior*
- *Woman with phobia, self-destructive and reactionary behavior*
- *Woman with melancholy, insomnia, peculiar rheumatoid arthritic syndrome and persistent constipation*
- *Case with phobias and panic attacks*
- *Case with anxiety and phobic neurosis*
- *Case with colitis, phobias and antisocial behavior*
- *Case with high blood pressure*

In this chapter a few cases are indicatively discussed with special interest on account of their complexity, nonetheless well exemplifying the issues expounded so far. Keep in mind that this book aims at providing you the option to build a novel, complementary, cognitive edifice that will capacitate you to live more comfortably and homeostatic, more free and happier. This chapter surpasses the endeavorments we have ventured together through the pages of this book; it's your prize.

Child with attention deficit disorder hyperkinetic syndrome (ADHS) and reactive behavior

We will discuss a boy, age 13, from a prosperous family, with a decent and affable character and with good school performance. He demonstrated hyperkinetic behavior since the age of 2 years and lately had considerably worsened. He described his problem as internal tension compelling him to constantly move and repeat stereotype movements, such as rocking his leg all the time or pounding a certain spot on his desk with his pencil. He made great efforts to fight this feeling because, as he said, he wanted to perform well at school and get high scores. At sleep he had bruxism (teeth clinching). He said he was undergoing a conflict with the bad side of himself, which wanted to distract him from his studies. He felt strong fear for darkness and disease. Twice, when visiting seriously ill relatives, being unable to put up with the situation, he vomited. He was feeling internal overtension and asked for help in order to let it out. His parents were overprotective and had great expectations from him, however his relationship with them was good and he tried to satisfy them. His parents had a disturbed relationship and were often quarrelsome however they tried to hide it from the child. Nevertheless, the child experienced intense agony for his parents' relationship and whenever he sensed a friction he acted as the compromise. He said he was feeling deep agony and insecurity for the future of his parents' relationship. He felt better when discussing his problems with someone who could hear him and console him. Six biofeed-

back sessions were applied with very satisfactory results. The child became able to fully control his hyperactivity and retained a very calm and productive state for one year.

A year later the child returned with intense psychic symptoms and marked drop of school performance. In between, his parents had separated and were not living together any longer. The child expressed his complete disappointment from his parents, who despite his efforts had not rewarded him with their reunion he so ardently longed for. “I told them that I would do anything to show them how much this upsets me and to get back at them”, “My grades took a dive, I smoke and hang out with my friends, I have become a bum”. The new elements in his case were easily offended with trifles, although not expressing it, because he “couldn’t care less” for anybody. “No matter what they ask of me, I never answer, I play ignorant”. He often bursts into tears from excessive tension, but does not accept consolation which irritates him up to the point that he wants to smack the person who tries to console him. He is playing with and pulling off hair flocks (a disorder called trichotillomania) and offends his classmates with sexual insinuations, thus becomes obnoxious. He lives with his father and refuses to see his mother. In the discussions with his trainer, he stated that this way he revenges his parents who, despite his great effort to please their expectations for discipline and consistency, they themselves did nothing in return, according to his opinion, to offer him what he so persistently and earnestly pleaded, the family union. Biofeedback training was applied for the purpose of retraining the child with respect to his motives and actions. The biofeedback protocol included joint sessions with his parents, either one or both, to help him realize and define the stressors and anxiety generating factors. Fourteen sessions relieved the child from his problems, and although his parents were still separated, a more serene and understanding mood prevailed. The boy accepted naturally the new situation and was devoted again to his studies.

More than 120 similar cases were treated successfully with biofeedback intervention.

Woman with phobia, self-destructive and reactionary behavior

This case refers to a woman aged 55, with a son 30 years old who rarely communicates with her. She got a divorce 15 years ago, and lives the last 8 years with a man of same age. She does not have steady or permanent job but circumstantially, depending "on her moods", is engaged in side activities associated with her companion's business. She suffers strong desertion fears, due to the fact that her companion, on the pretext of business engagements abroad, left her twice in the past for a period of six months to have affairs with tourists. In each of these cases she presented serious hair-fall.

She has severe death and cancer fears, claustrophobia and sudden major mood shifts, "ups" and "downs". She often wakes up in fear of impending death, due to airways' obstruction, since she is asthmatic 20 years. She stated: "I want people to care and always show me affection". "I never feel happy". "I want to fall in love and forget everything".

During her biofeedback training she exhibited marked reactionary attitude toward the method and instruments. She was very strong-headed and insisted that this way her problems could not be solved unless she met somebody who would fall madly in love with her and stir in her similar feelings. Progressive release of chronic accumulated muscular tension coupled with special techniques helped her relax and start thinking of the possibility of further biofeedback training. She dropped out from training with limited and clearly reserved satisfaction.

She returned after several months of serious hair-fall, subsequent to another love disappointment, suffering also from severe migraine episodes and a diarrhoeic syndrome which lasted over three months with no apparent pathological cause. She felt deeply frustrated, believed that her end was coming soon and had suicidal thoughts to avoid further sufferings. She also had afflicted the past two months severe vaginitis, with great vaginal dryness and dyspareunia, rendering sexual intercourse impossible.

She participated at biofeedback sessions with controversial feelings, in the sense that she displayed alternately great desire or detestation with respect to the training. The biofeedback protocol was designed so as to utilize her positive periods, which lasted up to three or four days. Although she could witness her progress, monitored by the machines, she showed absolute denial to accept that she was capable of exerting self-control over her autonomic nervous system. Remaining constantly under the grip of intense and paralyzing stress, she further aggravated it with her mental imagery and convictions, she adhered to a refusal pattern towards anything positive and drove herself into dead-ends. The biofeedback protocol was modified aiming at enriching feedback with vivid images as much as possible. A special computer program was elaborated employing verbal praising and encouragement each time she succeeded controlling her autonomic system's responses. This modification proved decisive for her training. After 16 sessions she had turned into a different person. She was completely free from the diarrhoeic syndrome, migraine and phobias. She had realized that she used to adopt erroneous approaches to attract the interest and care of the people she was involved with and this led to failure. She revised her values and self-image. Today she is happily married.

Woman with melancholy, insomnia, peculiar rheumatoid arthritic syndrome and persistent constipation

A woman 70 years old, married to a tycoon, with a high living and social status, wealthy and with much spare time spent regarding issues relating to a healthy diet, ancient Greek philosophy and yoga. She had a profile and was a sensible and civilized person with solid moral values who richly invested in family care. A perfectionist, committed to the notions of duty, values and humanity service. Five years ago, when she lost one son 40 years old on account of malignancy, she entered into a melancholic state escalating year by year. She was strongly attached psychoemotionally

to her son, her younger offspring, to whom she had devoted great efforts to help him become a successful member of society, a goal reached and she regarded him as her “pride”. The last two years she suffered from insomnia due to incessant thoughts while lying to bed. Her mind kept running actively all night like a “machine” jumping from subject to subject without any specific interest. One year ago she presented a strange rheumatic syndrome with acute, migrating pains appearing mainly in small joints. She describes this peculiar syndrome as sudden ankylotic rigidity “locking” the knee joints which could not bend. Walking becomes almost impossible and when sitting she has to stretch her feet on a chair. Her “medicine”, as she calls it, is to sit before the TV in the above position and watch videos, usually comedies, and be carried away. Her feet resume functionality after 40 or 50 minutes of rest.

Additionally, she suffered for six months from very intense constipation restricting voiding to once weekly. She describes her feces sticky like “stucco” and feels that her bowels are paralyzed, unable to strain and perform gut transit despite the many laxatives she takes. She mentions that the last year her sister is antagonizing her and, “in alliance” with her daughter, treats her in a manner that hurts her feelings. She feels that all her life she has been offering too much to others without reciprocity. She regards herself as a highly evolved person to be occupied with such trivialities and decided to leave home and move into another town to avoid “spending energy” on arguments and pettiness. She thinks that her sister, who is not a well-evolved personality, is jealous of her and influences her daughter.

This case was handled in a manner enabling the trainee to detect the reasons that led her to react in “flight” instead of “fight” against the distressing way her family environment treated her. She stated that the very beneficial effects from her long-term practice in yoga and meditation techniques had significantly diminished, after her son’s death. The biofeedback protocol aimed at revealing the supportive mechanisms still fuelling her health problems, even though she had escaped from the stress inducing family environment.

After eight biofeedback sessions the tormenting constipation and insomnia were extinguished. As she said, she realized for the first time after many years that at this age she was still challenged by her sister, who had been antagonistic since childhood because unlike her she was not a good student and did not gain family praise and credit. The biofeedback protocol was modified targeting the conflict issue which proved to be the deepest covert confict and omnipresent stressor throughout her life. After another six biofeedback sessions the migrating pains in small joints became rarer and milder, she fully recovered from melancholy and the mysterious knee ankylosis.

Case with phobias and panic attacks

A man aged 45, well-educated, scientist and a director of the science department in a big company. He feels very insecure and lacks self-confidence. This is causing him great anxiety because his position demands powerful and an austere conduct, to gain his subordinates' respect and discipline, something he had so far successfully achieved. However, inside him he feels he is "putting on the whole world", as a dwarf pretending to be the giant. He is not married and lives with his parents. He has had sex very few times in short termed affairs. He feels he is not getting along well with women, that he can't play the role of conqueror and gets panicked before dating. He had to cancel many dates on the excuse of sickness. His few sexual intercourses were made under the influence of alcohol.

In his daily life, he drinks alcohol very little. He mentions that he needs "clutches" offered to him mostly from his mother, whom he loves dearly, complaining only that the high standards she has inspired him regarding love affairs drives him to reject most candidates. He is very interested in his looks, he is compliant and gives up easily in disputes, he supports that "I won't claim my right", "There is no way out", "I don't like myself". He says that "I want you to help me avoid getting sick, I feel as if disease is coming and

will overpower me, I want you to help me raise my defences" and continues "Even insignificant criticisms makes me panic", "I want to disappear", "I am afraid to travel abroad because I might get lost in a strange town". He is afraid of death, illnesses, cardiac disease, heights and to drive his car. He has a reserved expression of self-pity and unhappiness. His biofeedback protocol focused on assisting him to realize and accept his sexual identity and to consolidate in him the conviction that his professional success had not happened accidentally.

He was aided to discover the internal mechanisms that enabled him to succeed in the professional field and in succession to use them also in the life sectors he had failures. In other words, he was retrained to utilize the advantages and positive approach his was applying in job in areas he had never done so before. After the completion of the biofeedback protocol he was relieved initially from the panic attacks and in succession also from his fears. Today he is married and has a 3 year old son. Recently he expressed the fear that his son might go through the same ordeal and wondered whether his problems could have been hereditary passed on. It was explained to him that hereditary transmission considering such problems has not been scientifically proved and if he attends to fully enrich his son's cognitive edifice with correct knowledge he annihilates the risk, save in the susceptibilities stemming from the child's personal idiosyncratic predispositions (Diamantides, 1976, Christides, 1999).

Anxiety and phobic neurosis

A man, age 26, married for three years. He kept a linen shop inherited from his father. About a year ago his wife had an epileptic seizure during their weekend vacation in a hotel. He did not know that his wife was epileptic because she had never mentioned it, believing that it was over, since she had only three episodes in the past. After a week he developed severe disease-phobia co-suffering whenever hearing about any disease. Any reference to disease or symptoms

made him feel exactly the same symptoms and run for medical tests. No rational explanation could avert him from this reactionary pattern. His nosophobia would not cease even when medical tests were clear, fearful that his doctors might have mistakenly overlooked something. During his exacerbations, he wanted to be near a doctor who would promptly look after him in case something occurred. He had a phone list of hospitals and of emergency care units to avoid any transportation delays in case of a sudden sickness. His sleep was interrupted and was often waking in agony and suffocation. His sexual desire dropped vertically and quit working because he was afraid that he could die any moment, thus it was meaningless to keep working. He gradually became isolated from his relatives who irksomely persisted to persuade him that he was an “imaginary patient”. He wanted only his wife to be by his side and asked her to speak only about optimistic or pleasant topics. In succession, he presented great fatigue and nausea increasing with motion. This fatigue reached the point of paralysis when watching unpleasant news on TV. He resorted to biofeedback on the suggestion of his psychologist.

The biofeedback protocol focused on desensitizing and relieving him from the implications the horror of losing his wife in his arms had induced during her seizure. His phobias vanished after completing the biofeedback training.

Case of colitis with phobias and antisocial behavior

A man, age 32, teacher and single. He suffers from (spastic) colitis for three years and has frequent diarrhoeic episodes up to five times per day. His diarrhoeic crises are accompanied from strong abdominal pain and distention. He is obsessed that crisis may occur any time thus avoids going anywhere. He avoids even going on vacations and has started losing his friends. He experiences intense anxiety and anticipation for these diarrhoeic crisis. He feels ashamed to discuss his health problem and wants to keep it secret. He

confides about it only with his mother. He presents paroxysms of nervousness and mentions that “my mind blurs and I want to break everything”. At these phases he kicks objects or throws fragile things on the floor, usually glasses, which break with noise. He demands his immediate relief from his ailments and accuses doctors as incompetent for failing to cure him. He gets upset with every consolation attempt, even from his mother, whom he expects to silently listen to his complaints. The biofeedback protocol targeted at spotting the stress inducing factor which had provoked this psychosomatic response. It was discovered that the stressor was a bad evaluation report from his supervisor jeopardizing his career. The fact that during biofeedback sessions he never had crises was utilized to establish in him the conviction that colitis episodes had clearly psychological background and not a physiological, as medical examinations had also indicated. He concluded his biofeedback training and was completely relieved from his problems. Numerous similar colitis and gastritis cases have been successfully treated with biofeedback.

Case of high blood pressure

This case refers to a 50 year old woman, architect, who runs a big office with many employees. She works exhaustingly long hours, being solely responsible for the management of her firm the past fifteen years. She is extremely active. She says she is pleased with her living pace, explaining that multiengagement and undertaking loads of responsibilities does not wear her out, on the contrary matches her creative mood and fulfills her. Her physical condition is great although she is not paying special attention to it and the occasional medical tests are normal. She smokes and drinks alcohol moderately, mainly during tension at work. Her mother, whom she loves dearly, had a brain stroke last year with kinetic disability at lower extremities and is now bedridden. She feels obliged to find a couple of hours every day to visit and take care of her sick mother.

About eight months before, her husband had a serious acute myocardial infraction and had to stay in the hospital for

two months. After his recovery he continues a life-style full of abuses, exhibiting total indifference for his health's future. As she states, her husband's attitude is what stresses her the most, causing her great insecurity considering their two adolescent children. Four months ago, she presented episodes of blood hypertension, with buzzing and paroxysmal tachycardia. Symptoms did not improve after stopping smoking and drinking. Pharmaceutical medication did not succeed to stabilize her blood pressure which had mild improvement with sedatives and antidepressants. However, since the latter had negative impact on her performance at work she had to quit medication and recourse to a psychologist for support.

Her psychologist suggested biofeedback. The biofeedback protocol she followed included biofeedback assisted progressive release of chronic accumulated muscular tension; thermal and dermographic biofeedback training. Two months after the completion of biofeedback training her blood pressure ranges in normal levels and occasional high blood pressure tendency is successfully self-regulated.

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www.incontinet.com
www.cancer.ucsd.edu

Curriculum vitae of the author

General information:

Name: Spiro

Surname: Diamantidis

Father: Adamantios

Mother: Victoria

Surgery address: 20 Dragoumi str., 11528 Ilissia Greece

Tel: +30 210-7241700, 210-7249492

Fax: +30 210-7213346

e-mail: spdiamantidis@gmail.com

Education-military service-family:

Spiro Diamantidis was born in Thessaloniki in 1948 and grew up in Alexandroupolis of northern Greece. His father was a lawyer.

Studied medicine in the Medical School of Athens University. He was trained in homeopathic medicine near eminent homeopaths, Pierre Schmidt in Vienna and Geneva, S.Stievenson in New York, S.Pascero in Mexico, P.Ortega in Argentina, D.Chand and M. Blackie in London.

He was trained in hospitals in Vienna and London, and did his military service as a Medical Doctor in various army units and the cardiology clinic of the 426 Army Hospital in Thessaloniki

He served his internship term the provincial Medical Doctor at the Tzoumerka mountain range and Kato Kalendini villages in Arta, Greece.

He has practiced medicine since 1976 in Athens and the twenty two clinics operated with his medical group in Greece, Cyprus, Italy, England, Canada, and Japan.

He is married to homeopathic physician Eleni Kyriakopoulou and father of three children, Adam, Victoria-Nourelia and Angelina.

His accomplishments include:

1. Founder and President of the Medical Institute for Homeopathic Research and Applications (M.I.H.R.A), founded in 1985 in Athens, (reg.no. 16797/31.10.85).

2. Founder, member and president of the Pan-Hellenic Homeopathic Medical Association (P.H.M.A) founded in 1988 in Athens, (reg.no. 2731/30.6.88).

3. Former General Secretary of the Ministry of Health Central Health Council Homeopathic Committee by ministerial decision no.Δ1Γ/2284/88.

4. Founding member of the European Council for Integrated Medicines-E.C.I.M (European committee for the promotion of alternative medical systems in the countries of the E.U, headquartered in Brussels).

5. Founding member of the European Council for Pluralism in Medicine-E.C.P.M (coordinating institution for the consolidation of alternative medical therapeutic systems and planning unified policy within the E.U, headquartered in Brussels).

6. Lecturer at Wisconsin University-Stevens Point-E.L.I, 1991-1993.

7. Member of the General Medical Council of England.

8. Visiting professor of Medicina Alternativa.

9. Doctor of Science in Medicina Alternativa.

10. Associate of the Homeopathic Medical School of London Royal Homeopathic Hospital.

11. Fellow of the British Homeopathic Medical Faculty.

12. Member of the International Hahnemanian Association.

13. Honorary president of the Pan-Cypriot Homeopathic Medical Association.

14. Honorary educational committee member of the Atlantic Homeopathic Medical College.

15. Founding Member of the European Observatory of Public Opinion (EUR.O.P.O)

16. Member or officer of 36 additional scientific organizations.

Awards:

Pax Moundy award from Medicina Alternativa.

Merit of Excellence award from Academie Diplomatique de la Paix.

Ordre Mondial des Chevalier de la Paix award and honorary title, for scientific and social contribution to homeopathic medicine.

Albert Schweitzer award, honoured physician for his outstanding medical and social offer.

Educational Work:

As president of M.I.H.R.A and P.H.M.A:

Since 1985 he donates education in homeopathic medicine to medical doctors, dentists, pharmacists, veterinar-

ians, paramedics and students of the relevant schools. He offers his book on Homeopathic Medicine-Theory, Methodology, Applications gratis to students.

He teaches internationally in many homeopathic scientific organizations.

He and his medical scientific team address medical doctors by organizing several round table discussions with the participation of representatives from all the medical institutions/unions.

He and his medical scientific team organize free public lectures (86 lectures in 1984-2007) on homeopathic medicine, biofeedback and health issues (stress, diet, drugs, cancer, AIDS etc) throughout Greece and Cyprus, under the auspices of local authorities and institutions.

He created the International Centre of Homeopathy in Porto Heli, Greece,on a private property of one hundred thousand sq.m near Epidaurus. It is an international conventional and educational centre dedicated to the alternative and holistic physicians and practitioners education globally.

Scientific Research:

He carried out and presented along with his collaborators, 85 scientific medical studies and clinical researches on homeopathic treatment to international and pan-Hellenic congresses regarding a multitude of pathological issues (diabetes mellitus, hypercholesterolemia, malignant anaemia, gastric bleeding, male and female infertility, high blood pressure, bronchial asthma, leukaemia, breast cancer, hepatoma, intestine cancer, stomach cancer, multiple myeloma, carpal tunnel syndrome, goitre etc).

He conducted and presented with his medical team 96 studies and clinical research projects on numerous biofeedback applications in international and pan-Hellenic medical congresses (chronic myalgia, hypertension, respiratory diseases, speed reading, speed learning, substance abuse, dyslexia, attention deficit disorder (ADD), attention deficit hyperactivity disorder (ADHD), learning disabilities, high

blood pressure, peptic ulcer, spastic colitis, chronic back pain, migraine, stuttering, hyperhydrosia, panic attack, phobias, sleeplessness, obesity etc)

Since 1983 he is the general director of biofeedback programs which are applied worldwide, in Greece and Cyprus, on approval and subsidization from the National Organization for Employment, within the framework of program ΛΑΕΚ 045, and in Cyprus approved and subsidized by the Human Resource Development Authority.

He is a pioneering physician who implemented biofeedback applications internationally and designed special seminars on the following issues:

1. Work related stress control and management.

2. Stress control applications for salesmen.

3. Stress control applications for managers and leading business executives.

4. Stress control applications for high performance athletes and athletic teams.

5. Stress management for diplomats.

6. Stress management in handling of crisis.

He thus created a new training school for businessmen, officials, coaches, athletes etc according to which the physician enters the professional training field as a trainer, therapist, consultant, coach and mentor for the control and management of stress.

He created the current theoretic and practical basis of homeopathy, which is founded on his authentic and innovative theory of MAN.I.N.A (Man's Intellectual Normalities and Abnormalities), that enables the doctor to approach the idiosyncrasy (constitution) of his patients and obtain better therapeutic results; a theory greatly welcomed by the most eminent homeopathic schools worldwide.

Authorship:

He has authored the following books:

- Homeopathic Medicine.
- Homeopathic Philosophy and Hippocratic Medicine.
- Chromatics, the correct method for using colours.
- How to compose colour-energy music.
- Homeopathic Pharmacognosy.
- Clinical additions to homeopathic Materia Medica
- Clinical Cases in Homeopathic Medicine.
- Differential Diagnosis in Homeopathic Medicine.
- Lectures on Homeopathy.
- History of Homeopathy.
- Biofeedback, theory and applications.
- Biofeedback applications in everyday life.
- Biofeedback applications in sports and athletics.
- The biofeedback treatment of health problems re sulting from stress and anxiety.
- Biofeedback in the management of work related stress.
- Stress control and management - the art and tech nique of biofeedback.
- Biofeedback strategies for Psychophysiological dis orders.
- The nature and mechanisms of stress.
- Systems in relation to feedback. A path to biofeed back.
- You can control stress now – medical biofeedback for stress control, anxiety and fear.

His books have been published in English and seven other languages including Chinese and Japanese, as well as, 21 more books and papers on homeopathic medicine along with his medical team.

Activities in the Mass Communication Media:

He is regularly writing articles for the daily and periodical press (more than 500 articles and interviews) on homeopathy, biofeedback and health themes and participated in over 2000 radio and TV interviews on medical themes worldwide.

He produced and presented a weekly medical show titled «File Health» onl Athens TV (1999-2001).

Other activities:

He has two patents issued by the Greek Ministry of Manufacture, Energy and Technology regarding qualitative food control, healthy life style and “energobionomics”, the method he invented for cultivating plants without fertilisers and pesticides.

Social Work:

Almost prophetically in 1974, he strived to raise public awareness regarding danger from fertilizers, pesticides and water abuse in cultivation and invented a special method called “energobionomics”, for cultivating and growing plants based on the utilisation of solar energy and the relevant electromagnetic fields.

In 1977 till 1996 he formed, organized and directed the “Don’t Worry We Care” voluntary medical team and spend several months for years offering gratis medical service and remedies to needy people in Africa and Sri Lanka.

For decades he has offered free medical treatment to the underprivileged and groups with special needs, including the National Special Olympics team.

He trained with biofeedback, free of charge, many athletes in various events, including members of the Greek National Athletic Team (1990-1993).

He donated voluntary medical work for a number of years to third world countries in Asia and Africa, and participated in missions of the International Calubovila Academic and

Alternative Medicines Hospital in Sri Lanka.

He organizes blood donation teams from members of the Medical Institute for Homeopathic Research and Application, Pan-Hellenic Homeopathic Medical Association and Homeopathic Hellenic Secretariat.

Interests – Hobbies:

He is currently a member of the alumni chorus of Athens University, a member for six years of the Athens University chorus as a student, and participated in many concerts in Greece and abroad.

He has been engaged in painting since the age of nine and as a painter has held five personal exhibitions.

As a photographer he supported himself while wandering the world and later as professional reporter photographer selling pictures of the places he visited to different magazines and newspapers. Today he is engaged in artistic photography and maintains a fully equipped photography studio.

He plays the trumpet and keyboards, composes music and has a modern sound studio. He composes Colour Energy Music, a type of music he was inspired from the scientific oscillographic sound analysis and his pieces are characterized by the properties of the seven spectrum colours: red, orange, yellow, green, blue, indigo and violet. These musical compositions rely on the fact that the seven notes correspond regarding their properties, to the seven spectral colours, in an upward direction. The musical pieces composed are harmoniously tuned with the help of the electronic oscillograph, so as to contain the properties of the relevant colour. These are described in detail in his book Chromatics, the correct method of using colours, and can thus be used both for entertainment and personal amusement and as well for specific Psychophysiological applications.

He is involved in ecological endeavours and applies the method of energy-bio-cultivation in vegetable and fruit tree cultivations.

He created the International Centre for Homeopathic

Medicine which contains an open amphitheatre with a capacity of 2000 people and excellent acoustics. The theatre is a micrographic imitation of the renowned ancient theatre of Epidaurus, having the same seat angle of 22.5 degrees and other similarities to the original ancient theatre.

Athletic activities:

He was a participant in motor sports and motto-cross tournaments (1969-1973).

He has, since 1976, an official diploma as water ski trainer from the Greek General Secretariat of Sports.

He is licensed pilot for speed boats and licensed skipper for off shore sail boats from the Piraeus Open Sea Sailing School.

He is holder of black belt 3 dan in Shotocan karate since 1972.

Social profile:

His rapid evolution in the fields of homeopathy and biofeedback drastically affected the medical market balance in Greece and the medical company he held with his colleagues got ahead in the race for new developments. In 1994 the Hellenic Secretariat of Homeopathy a non for profit organization, had 22.000 members. All these people were patients cured by his medical team and categorically declared their satisfaction from homeopathy and biofeedback and their gratitude to the Diamantidis medical team which was comprised at the time of 45 Medical Doctors. Simultaneously his executory contract for purchasing a clinic and a TV station by his group of companies was widely published.

Certain individuals tried to stop this progress initiating a smear campaign against him and his colleagues. In June 1995 he faced an enormous coordinated media assault in the form of false and groundless accusations that have since been proven were intended to damage his reputation and profession. It was also intended to trap him and his medical team in a labyrinth of trials so as to render them inactive in

the medical field and to usurp their clientele. Suddenly and without any justification, research, or police investigation a sole prosecuting attorney invaded the homes and consulting room privacy of the author and twelve more colleagues, accompanied by a dozen TV reporters with their cameras.

Until that event none of them had any conflict with the law, pending legal actions and they had an absolutely blank criminal record. The prosecuting attorney arrested twelve people without arrest warrants resulting in the arrested individuals' denial to sign the arrest report. He also holed any item that could help the prosecutor create accusations including even kitchen knifes with blades longer than seven centimetres that according to the letter of the law are named weapons. The twenty eight cases penal load was really havy and many predicted the end of Diamantidis career and "empire". In 1977 the foretellers seemed to be correct when, during the continuing attack, slanderers succeeded to imprison him during a "peculiar" trial. A group of to this day unknown persons, trapped the phone lines of people who were adverse witnesses and succeeded in recording all the triumphant conversations and laughter when discussing the way they stood-up the case. The unknown individuals placed all the cassette evidence outside the door of Diamantidis lawyer and called him anonymously to collect and use them accordingly. The lawyer gave the evidence to the General Attorney and the Supreme Court. After a forensic examination ordered by the Supreme Court all cassettes examined in England and Greece were found to be original and the court accepted their use for the defendants defence. After this procedure and two months imprisonment the author was set free and in the subsequent trial in the appellate court he was found not guilty thus wining a very precious acquittal. In 2000 and after winning several more acquittals he had almost all the evidence to counterattack the slanderers and the prosecuting attorney. He filed a charge for 42 cases and he made a claim for 64 cases against the four main slanderers and all their false witnesses. He appeared in the Supreme Court against the prosecuting attorney and won the case which ruled that "….all actions of the prosecuting attorney in 1995 i.e. home search, office search, individual arrests, confiscation of goods and chattels etc were

not legal and thus null and void and all findings are not able to be used in trials…." This historical decision opened the path to further action and led to the author's three victories at the European Court of Human Rights for unfair trial and presumption of innocence and 5 more cases pending before that same Tribunal. After that, the author and nine more defendants filed a charge of hundred twenty pages against the prosecuting attorney accusing him of criminal abuse of authority and breach of duty.

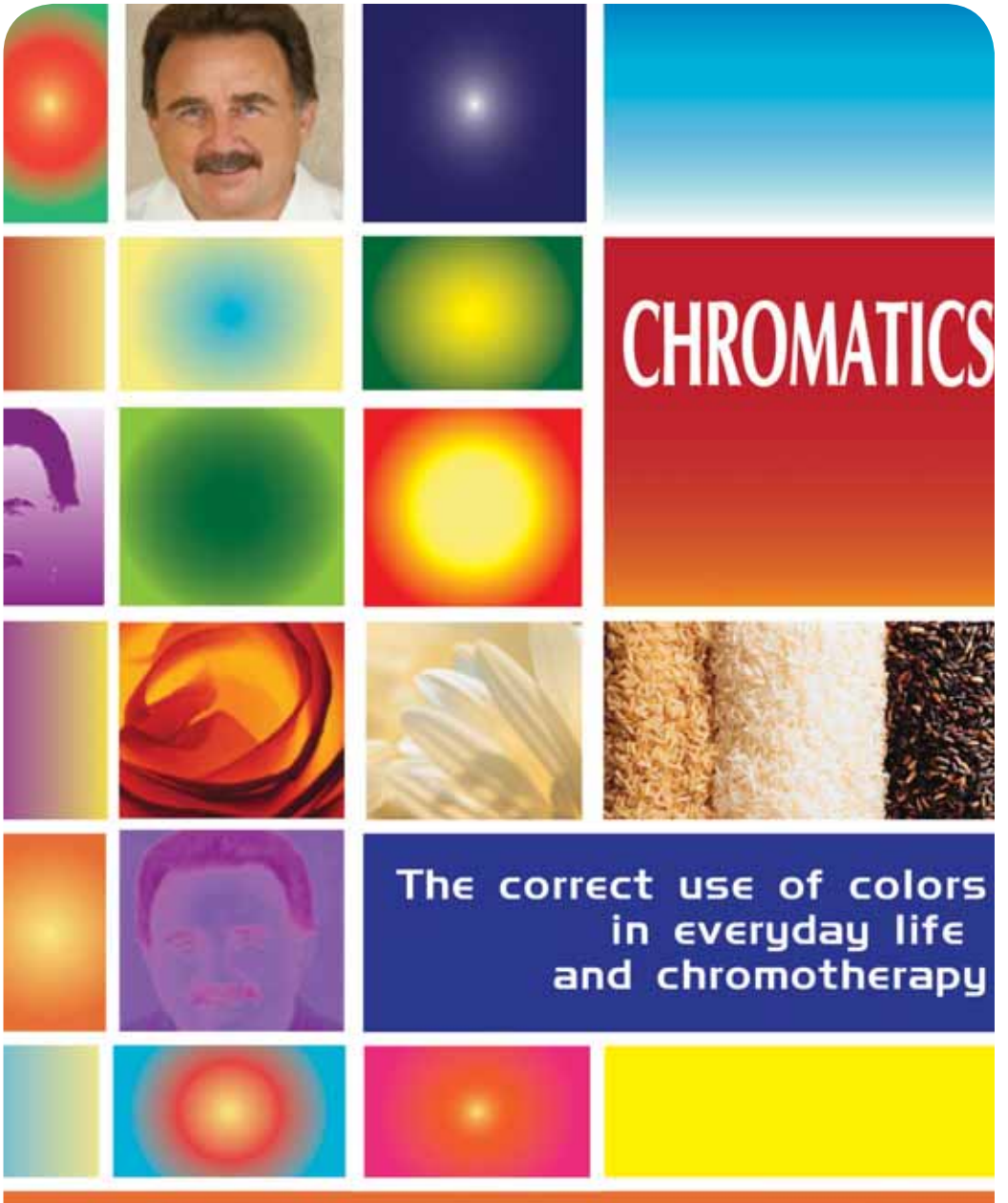
The "Diamantidis case" monopolized the interest of the Media until 2003 when his twenty-eighth and last acquittal from all charges was rendered and left him again with an absolutely blank criminal record. His record, of twenty-eight acquittals on twenty-eight charges, gave him the title of the most-accused innocent person in the Hellenic judicial history.

During these very hard and difficult years the author and his defendant colleagues had the moral support and expressions of love from many people who were benefited by them. Hundreds of people left their work and appeared in the court audience as a demonstration of assistance and support. Many of these people actively participated in the campaign to exonerate him and organized protest marches during his trials. All these warm feelings were consolating and a driving force to continue until final restitution and relief.

Due to his personal experience in defending against groundless and unjustified civil and criminal attacks of slanderers, attain a fully victorious outcome and counter attack lawfully while continuing on with his extensive medical work, he is known in the biofeedback field as the "veteran", the one who has demonstrated through his survival and recovery under extremely adverse conditions that he knows how to cope with stress, anxiety and fear.

For the same reason as a homeopath, in the circles of international journalism he is referred to as the "Mandela" of Medicine.

More books
by the author



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YOU CAN CONTROL STRESS NOW

The author is well aware that you are a terribly busy person with no time at all for reading, so he suggests not to buy this book because it will prove so enticing that you will give up everything else in the next couple of days to read it through.

He also knows that you rarely take decisions to apply something positive to yourself, unless driven to the edge by necessity, that is, when already on the verge of collapse or destruction.

Since everything you do is dictated by pressing necessity, never by from your personal will, do not buy this book.

Give this book as a revenge-gift to a multi-tasked and busy person you wanted to get back at, but don't be surprised if after a few months he declares you his benefactor.

Of course, if he is the "keep-it-all-locked-inside" type you will never get the feedback to read this book.

So, you will miss the opportunity to learn how to desensitize from stressors and anxiety inducing factors that harass and tantalize you.

But you have already read too much. Put it down. Besides, are you sure you want to know what "sharpen the saw" means?

ISBN: 960-630-817-0