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Competitive Sport Shooting

Practical Sport Psychology

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Chairman ISSF Medical Committee

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Index

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Foreword

Successful training in competitive sports or any performance-oriented sport is based on the scientific work up of specific physical and psychological as well as technical and didactic elements required for performance.

As far as sport shooting is concerned, it took longer than in other sports for sport doctors, psychologists and physiologists to decide to work together with experienced trainers to analyze and integrate the numerous elements of the shooting process into a system of learning.

For several decades, the Medical Commission of the International Shooting Sport Federation – ISSF - has been striving to relay general findings of sport medicine as the basic elements of training to its athletes and to back these findings with its own experimental tests and practical experiences.

Many of these scientific lectures have been published in the ISSF NEWS (former UIT Journal) and the "Deutschen Schützenzeitung" or at international congresses.
We plan to deal with topics pertaining to athletic performance in a summary form.

Since situations dealing with psychological problems are of great importance in the shooting sport, I have decided to first deal with the behavioral processing of these complexes.

I would like to take this opportunity to thank our president, Mr. Olegario Vázquez Raña, and our secretary general, Mr. Horst Schreiber, for their support and to also thank Mr. Franz Schreiber, who was responsible for the design and layout of this brochure, and Mr. Wolfgang Schreiber, chief editor of the ISSF NEWS (former UIT Journal), for his advice. My special acknowledgement goes to Mrs. Rebecca Walkiw for the excellent translation.

Dr. Heinz Lösel M.D.
Chairman of the ISSF Medical Committee

Anxiety and Overcoming Anxiety

Psychostabilizing Methods in Sport Shooting

Here, we are speaking of the manifold changes of emotional condition, which, in a larval state, lead to an intrinsic state of psychic tension or anxiety, accompanied by despair under extreme circumstances, and whose effects are characterized in the somatic region by a conditioned, partially genetic influence on the vegetative nervous system which is typical of the personality. In this context, we shall not deal with the unrestrained, tangible anxiety as a pathological emotional disorder within the realm of endogenous depression or other forms of psychotic, false behavior.

It is my intention, dear colleagues, who are striving to become active or who are already active in sport medicine - whatever level it may be - to acquaint you with psycho-stabi-lizing methods and measures in this report.

"I'm anxious about the results of my check-up by the doctor". "I'm afraid to spend the night alone in this house."

"There are nights when I can't catch a wink of sleep just worrying about my children's future". "I'm afraid of falling short again in the next competition which, in turn, could keep my team from making the qualification."

"I'm afraid of ruining a good total result on my last shot." "I'm anxious about", "I'm afraid of", "I'm worried about", "I'm concerned with something."

All of us are familiar with strong, emotionally accentuated reflections which we have to live with and also deal with - sometimes better and sometimes worse - in our daily lives. Reflections which - destiny so willing - take us captive time after time, influence and slow down our thinking process and restrict our creativity. Reflections which often result in psychoreactive patterns of behavior usually regarded by ourselves and our environment as a personality disorder.

Intellectual anxiety has existed since the time the human brain, in the course of its evolution, had developed to the point where a rationally thinking mind evolved with the help of which we are now able to cultivate specific mental activities, to formulate the concept of our own ego, to make decisions, and to reflect the temporal nature of our own human existence.

It is said that animals have no consciousness of self and therefore can only expierence fear which brings us once more around to the concepts of "anxiety" and "fear". The questions posed here are how to differentiate between these two concepts and when to properly apply them.

Let's see what the philosophers, psychologists and finally the physiologists have to say on this topic.

According to Kierkegaard, the concept of "fear" is based on something concrete and is connected with a definite object, whereas anxiety has no definite source and is not an intentional expression of feeling but rather a superfluous mood which is not evoked through a definite object. This distinction between the concepts of anxiety and fear, which is indispensible for a scientific discussion, is generally not heeded in the everyday use of the language. In fact they are often used as synonyms.

Even those who are more "discriminating in their choice of words" often do not use the words fear and anxiety properly, especially when the emotional background first has to be pinpointed and then laboriously analyzed. A few examples of this are as follows:

"I'm afraid of failing because I'm not well enough prepared" ..., "the audience is not well disposed towards me"...., "my speaking technique and means of expression are not appropriate for this kind of discussion and because I" ...

It isn't the anxiety which influences my emotions but rather the fear with regard to some or other facts which I negatively categorize.

"I am worried about the test." Why? I don't know. I'm well prepared; the instructors seem to have acknowledged my work up to now; and I like the topic chosen for discussion. But despite all these factors, my heart still skips a beat each time I think about the test. My skin moistens and I become nervous and uncertain. Why? Perhaps, it is only anxiety, and I have forgotten or suppressed the actual source, or is it the uncertain feeling of anxiety which, according to the philosopher, Jaspers, is necessary to prevent one from lapsing into a state of false security...., or is it a malaise such as a psycho vegetative syndrome caused by excessive stress. Perhaps in the course of time, I have forgotten what anxiety actually is. Perhaps I have conditioned and recalled it many times over through the use of certain signals without actually realizing that this process was taking place." Let's take a closer look at anxiety.

Personal anxiety, a part of universal anxiety, which is not unfounded and can be traced back to primitive times, is the consequence of an environment oppressed by - birth, anxiety about death and the responsibility of making decisions or - as Sartre stated - the uncertainty of taking action.

Christian theologists believe that fear originates from the loss of innocence after the fall from grace and the banishment from paradise. In other words, it means making decisions without the consultation of the "All Mighty Father" or being alone, isolated from God through our acts of sin.

Psychology today no longer makes a distinction between anxiety and fear in experimental and therapeutical realms. It supports the opinion that these emotions are closely connected with the ability to differentiate between social patterns of stimulation. The anxiety about taking action or existing takes on greater meaning during the development of the personality.

The comparison of behavioral researach has shown convincing results which have been made in support of such premises. It is compulsive decision making which triggers the thymogenic type of behavior.

At a conference held on the fundamental phenomenon of anxiety, the behavioral scientist, Professor Lorenz, discussed the research done by his colleague, Massermann. I quote:

"A rhesus moneky was confronted with two possibilities and had to make a relatively simple decision. The monkey had to push a button when a certain picture appeared. He had to push a second button when another appeared. If he made a mistake, he received a light electric shock. The monkey had to work 5 hours in the morning and 3 hours in the afternoon but otherwise could rest. Experience has shown that such a monkey dies in a very short period of time due to high blood pressure, heart-failure and all those symptoms common to a person suffering from management fever. A second monkey, sitting next to him, witnessed the same procedure and was even given the same electric shocks, but was nevertheless able to survive because he simiply didn't let the situation get a grip on him."

Supporters of modern behavioral physiology believe that biochemical reactions are the sole factors governing consciousness and perception. The type and strength of these emotions are conditioned and can become unconditioned by means of proper therapeutic and be-havioral therapeutic care.

What takes place in the central nervous system when it is confronted with anxiety, fear, fright and frustrations? Even though we have won greater insight into the psycho-somatic/somatopsychic processes by experimentation in cerebral physiology and bio-cybernetics, we are still in the elementary stage with respect to the theoretical fundamental research done in the process of thinking and perceiving.

It is a fact that typical expressions of human behavior are closely connected with the most recently developed part of the human brain, the cerebral cortex, the neocortex and the limbic system. Through a vegetative nervous and hormonal regulatory mechanism, the perceptions, triggered by the dopamine-ergic nigro-striatal nor-adrenergic system, lead to processing impulses on physiological motoric and cognitive levels. Through the output of neurotransmitter substances such as adrenaline and noradrenaline, acetylcholine, dopamine, serotonine, the emotions have a centralized effect on the flow and processing of information and a peripheral effect on almost all systems of the human body through the sympathetic nervous system and the tenth cranial nerve.

Anxiety causes the pulse rate and blood pressure to increase, creates a poor distribution of blood, a disruption of the peristalsis in the digestive system, a widening of the windpipe and pupils and further increases the production of the sweat glands. In short, all functions are controlled by the sympathetic nervous system. The opposite, however, can also be activated at the same time. A good example of this is crying, which is a process triggered by the parasympathetic nervous system through the stimulation of the lacrimal glands.

Organ	Sympathetic Nervous System	Parasympathetic Nervous System
Heart	Increase in contractile force and pusle (shortened time of transition)	Decrease in contractile force and pulse (longer time of transition)
Vascular System	Increased tonicity (vasoconstriction)	Decreased tonicity (vasodilation)
Bronchial System	Dilation	Constriction
Stomach/Intestine	Retardation of peristalsis	Increase of peristalsis
Pupils	Dilation	Constriction
Palpebral fissure	Dilation	-
Hair follicles	Muscle contraction	-
Genitalia	Orgasm reflex	Secretion
Stomach, Intestinal Gland, Pancreas	-	-
Sweat Glands	Secretion	-
Lacrimal Gland	Slight secretion	Strong secretion
Adrenal Medulla	Hormonal output	

Figure 1: Effect of the vegetative nervous system on the various human organs (by H. Legewie, L. Nusselt)

Up to now, we still know very little about the amount of neurotransmitters produced and the relation of these transmitters to one another, such as the relation between noradrenaline and adrenaline in the peripheral as well as the central area of the brain, or the substance sertonine, which is activated in the brain during emotional outbreaks of desire, joy, fright, sadness and fear. Therefore, a wide field of speculation exists. Presently, a strong topic of discussion is one based on cerebral research of serotonine metabolism and the possibility of its use for medicinal stimulation. (see UIT Journal 2/87 – now ISSF NEWS).

After the representation of anxiety and its effect on the psyche and biocybernetics, let's take a closer look at the topic dealing with "anxiety in sports".

Many factors are involved in the psychic stress which occurs during the performance of a certain sport. The individual forms of behavior caused by genetic factors are often under-estimated, just as the schematic reactions shaped by the environment and influential people. The pursuit of general or specific achievements and the acknowledgement by others as well as oneself is certainly not only limited to competiton and training.

State before start	Physiological Characteristics	Psychological Characteristics	Manifestation in Sport
Start fever	Acute stimulation of central excitation process; acute vegetative shifts (increased pulse rate, outbreak in sweat, trembling etc.); weakness	Intense nervousness; inability to concentrate; forgetfulness; emotional instability; unmotivated haste; psychomotor restlessness; fear of opponent	Disorganized motor skills; deviation from tactical plan; loss of the time and rhythm; cramping; wild and uncontrolled con-tension
Start apathy	Acute stimulation of central retarding processes; reduced excitability; vegetative shifts (exhaustion, leadenness); weakness	Slackening of perception, intensity of thought and alertness; mental sluggishness; bad mood; aversion to competition; dissatisfaction	Strength only partially mobilized; incapable of warming-up; no energetic fighting spirit (rapid exhaustion); no pep after competition; full potential not used; reactions too slow
Optimally prepared	Concentration & balance of central excitation & retardation processes; optimal intensity of physiological process (breathing circulation, metabolism, hormonal regulation etc.)	Optimal activity level & joy for the competi-tion; positive emotions; self-confidence & performance optimism; optimal alertness; great self control; great stability etc.	Competition according to tactical plan; control; performance level reached or exceeded; performance demands tactically and properly used

Figure 2: (by F. Schubert)

Anxiety plays a major role, where sensorimotor skills such as the finely coordinated processes of movement, are stressed, where a temporary decrease in vitality can not be compensated for by extraordinary efforts, and where a transposition in aggression is not appropriate.

In this case, I'm thinking along the line of figure-skating, gymnastics, many track-and-field sports, and of course sport shooting. An unphysiological tensing of the muscles, which influences the automated process, or a slackening in concentration for only a matter of seconds is enough to cause a decrease in the information flow of unplanned stimulations which can impede the optimal performance in firing a shot and can mean the difference between victory and failure.

Just as in most walks of life, one is chiefly confronted with anxiety to fail in competitive sports. This is based on failure experience in the past or a past victory, which one fears to lose, or a burning desire to achieve victory. When considering an event, which will take place in the distant future, the "overall concept of anxiety" can most often be traced back to an anxiety of unexpected factors, which may occur in a given situation during the course of a competition.

Whereas the general concept of anxiety stems from the comtemplation of the general and disciplinary condition and strength of the opponent, the anxiety about a given situation stems from the thought of making a false decision or taking a false action to no avail. Anxiety in general influences the emotional behavior and not so much the autonomic nervous system. It is seldomly self-analyzed but is usually suppressed instead. "Why should I worry about it? I have plenty of time until then."

The anxiety of a given situation, which largely depends upon a fixed time schedule and can undergo excessive fluctuations before the competition, has a great effect on the biocybernetic regulatory mechanism and largely corresponds to the image we have of distress. Restricting factors which are physically or mentally rehearsed can trigger a stimulus-response. However, superstitious behavior, according to "Skinner", through accidental contingents can not only be observed in daily life but in sports as well. In this case, disturbances in ritual are responsible for fluctuations in mood. A well-known inter-national rifle shooter was once heard saying, "I forgot my 'lucky charm' which I always have by me. I no longer have a chance of winning a good place..." And a considerable decline in his level of performance was indeed noticed at this competition.

In the high-performance sport of shooting, it is not, as often assumed by laymen, the dreadful trembling which causes poor results. An emotional erruption, which affects the ability to concentrate and observe, which brings about a change in the muscular tension such as hypotonia or hypotension or which, more importantly, causes a discrepancy in the tonicity of the agonistic and antagonistic functions of the muscles, plays a major role here.

What can medicine and sport psychology offer to influence psychic or mental/physical processes at work in us? What active or passive methods for that matter can be used to overcome psychic instability? For practical and economical reasons, analytical procedures and heterogenic hypnosis are of not great help, whereas a wide-range of practicing pro-cedures can be used. Let's take a look at some of the most important ones:

In the forefront are the Asian and Western immersion practices in self-contemplation such as yoga, Zen-Buddhism, and experimental meditation which are based on some ideology or for that matter religious practices. There are also methods of behavioral therapy such as autogenous training by Schultz or progressive muscle relaxation by Jacobson; psychic desensitisation; and in more recent years, the many forms of biofeedback training, which include the method of role playing as in development therapy and music therapy; the practice of persuasion used in everyday life; and finally, individual systems for the pro-cessing of distressful situations.

Autogenous Training

Preface

by Prof. H. Weicker M.D., Medical Director of the Department for Internal Medicine VII
Pathophysiology and Sports Medicine Ruprecht-Karls University, Heidelberg

Autogenous training has become an important part of training and competitive sports in recent years and has proven to be an effective psychological means of reducing various physical problems in many of the disciplines which can impair the shooter's ability to perform. This technique, which involves self-awareness and the voluntary control of actions, opens the door to the autonomous regulatory mechanism controlled by the nervous system and hormones. In developing this technique, however, it is important to have some knowledge of the medical, physiological and psychological principles before beginning with the various mental and physical exercises. Autogenous training should, therefore, only be learned under the supervision of an experienced doctor in this field. The practical training can then be carried out by physiotherapists, psychologists or educated specialists in collaboration with the doctor. Knowledge of sports medicine based on medical principles and extensive practical experience should be integrated in the coaching and counseling methods of the trainer. This not only offers the athlete intuitive guidance but also gives him a concrete idea of how the human organism functions which, in turn, enables him to decide whether the practical training is justified or not.

In the chapter on autogenous training, Dr. Lösel offers a good solution to this problem. The introduction to autogenous training, the concrete examples used to describe it, and a practical understanding of organic functions and the sport discipline are a means of acquainting interested readers with this method. Autogenous training is of great practical importance in view of the tremendous physical and psycholgical demands place on today's athletes in competitive sports.

Autogenous Training

- a way of harmonizing psychological and physical processes - during sport shooting

In the 1920's, autogenous training was developed by Professor J.H. Schultz M.D., a neurologist and psychiatrist, for the treatment of psychological and psychophysiological disorders. It was not until much later however, that it was used to influence the general performance ability of a healthy individual as well.

A well planned training program, which is introduced gradually and repeated at set intervals, can transform mental concepts into physical phenomena. From the viewpoint of behavioral therapy, a reaction is merely a preconditioned mental attitude or "trained auto-suggestive response" which influences the unconscious regulatory mechanism of the nervous system (vegetative nervous system) and can be trained to control actions and behavior on a conscious level. Optimal psychological and physical conditions must first be established in order to deal with any type of situation.

This means that during a state of excitement, the unconscious regulatory mechanism must be overpowered. If physical stress, apathy or tension caused by "stress hormones" (catecholamine production) occur, the I-ought-to-be form of thinking must be overpowered by the I-am form of thinking.

In recent years, an ever increasing number of people wishing to develop and shape their character traits or improve their own mental and physical capabilities have been turning to autogenous training, especially to the upper level of this training which involves self-hynosis. Schultz stressed the fact that this method is a direct intervention in human physical and psychological processes and should therefore only be taught by doctors. However to compensate for the lack of psychotherapeutical practitioners, teachers, health gymnasts, masseurs (physiotherapists) and exercise teachers at sport federations have taken it upon themselves to teach autogenous training.

Autogenous training for sport shooters

Sensorimotor skills, general and specialized physical condition, and psychological behavior are all factors that determine performance ability in sports. Although the physical factors usually remain stable, an abnormal processing of experience is not at all uncommon prior to and during a competition: the symptoms range from a reduced feeling of well-being and insomnia - caused by increased excitability - to depressive moods or physical and psychological disorders which affect the cardiovascular system, digestive tract, and the musculature.

To take conscious control of the vegetative regulatory mechanism, excessive emotions and affections must first be brought under control. This technique is not only beneficial for competitive athletes but also for those who are interested in shaping their character.

Experimental tests have shown that the behavioral repertoire of an individual is shaped by his predisposition and upbringing, whereby the latter is considered to be of greater relative importance nowadays.

To influence psychological and physical processes, both passive and active psycho-therapeutic methods are used which affect the psyche. Whereas the procedures of self-analysis and heterosuggestion are not commonly used for practical and financial reasons, other training procedures can also be conducted on a larger scale.

The following can be used for this:

1. Role-playing in a formation therapy.
2. Asiatic yoga, Zen and oriental meditative practices as described in a modern study on "Experimental Meditation" (A. Deikman).
3. Behavioral therapeutic measures and desensitizing methods
4. Autogenous training according to J.H. Schultz with the "upper level" of self-hypnosis as well as relaxation training, the so-called progressive muscular relaxation (E.Jacobson) which is closely related to autogenous training.

The latter methods are based on the hypothesis that every physical and psychological behavior can be learned. Therefore, each behavior can also be unlearned if it has proven to be unsuitable.

Whereas autogenous training has been used for the psychological training of an athlete in German speaking countries for more than two decades now, this technique was not introduced to the sport psychology of socialist countries until after the Olympic Games in Tokyo.

Polish and Czechoslovakian psychologists largely use autogenous training for the following purposes: "to increase the effectiveness of rehabilitation during the day, espe-cially before training; a natural means to fight insomnia or counteract the negative consequences of long lasting emotional stress; and to alleviate the excessive emotional stress prior to a competition, immediately before its start and between the individual competitions" (quoted by H. Smieskol).

In sport psychology in the USSR however, a "psychoregulating or idiomotoric (control of cognative and psychological processes and movements) training" is used to "calm down" as well as to "activate". For the activating phase ("tonicizing"), set resolutions (the upper level of autogenous training) are selected which correlate to the athlete's particular situation and to his physical and psychological condition.

The effects of heterosuggestion and autosuggestion on the human body

As studies with placebos have shown, correlations between the psyche and body (psycho-somatic correlations) are for the most part independent of folk groups or social factors.

The relation of "reacting persons" (reactors) to "non-reacting persons" (non-reactors) is therefore just about the same in all cultural groups. However with respect to the specific autosuggestive regulation of physical processes, natural peoples are far ahead of us, since they acquire the ability from childhood on to influence their locomotor and sensory systems with their thoughts. For them, "day-dreaming", which has been replaced in our society by mass-media consumption, is an ability worth striving for.

Therefore, it is no wonder that our athletes are only able to acquire "conscious" (mental) forms of training through an unrestrained, long and wearisome learning process.

The power of thoughts over the body (mind over matter)

Only a few decades ago, reports of extraordinary physical phenomena observed among natural peoples during oral and manual rituals or while practicing magical methods of treatment would have been inconceivable for western thinking. However, today's scientifically substantiated findings on the interaction of the body and psyche and the power of thoughts over organic functions and structures have given us an understanding of many of these "wonderful" processes.

In the spring of 1974, Dr. Beamanoir, supervisor of the laboratory in charge of assessing electro-encephalograms in the Geneva Canton Hospital, obtained permission from pa-triarchs of the Annastenaria Sect, living in the region of Saoniki, to register the electro-encephalograms of several members during a ritual fire dance.

After preliminary, fervent praying, the believers, bearing their holy images before them, proceeded to move barefooted in a trance over glowing coals to the rhythm of the drums and lyra music without burning their feet. The registered graphs showed - as presumed - a considerable slow-down of the brain waves as defined by an alpha rhythm which is typical for a state of rest and passivity and is also frequently observed in hypnosis and during meditation.

As early as 1927, Professor Dennert described the religious ceremony of fire walking which is practiced in Polynesia and India. "A surface, about the size of a small room, was covered with the glowing cinders of burnt brushwood, and the image of a god was errected next to it. The fire walkers, who had prepared themselves by fasting, praying and sleeping in the temple, then walk barefooted over the burning surface under the guidance of the temple priests. In doing so, they appeared to be in a type of hypnotic trance. Their faces were rigid and their eyes stared blankly into space. When they resumed walking on cool ground, they usually awoke by themselves."

The general explanation for such phenomena is an abnormally strong transpiration of the feet which is unconsciously generated (emotionally evoked or psychosomatically con-ditioned). However, other physical factors certainly play a role as well, such as a special walking technique, which promotes cooling, and a reduced sensitivity to pain through the abnormal swelling of the soles.

Autogenous training as a therapeutic measure for organic diseases

Experiments have shown that the functional organic processes in healthy test persons can be changed through hypnosis or autosuggestion. This means that not only the quantity and quality of digestive juices and hormone production but also the blood circulation, the function of sensory organs and the body's power of resistance can be positively or nega-tively influenced.

Today, autogenous training has become an essential factor for the treatment of functional and structural diseases in psychosomatically oriented medicine as well as in behavioral therapy. It has not only been successfully used for disorders of muscular activity, such as writer's cramp, wryneck, tic or stuttering, but also for allergeric skin diseases. The healing rates are especially high for ulcers of the stomach and duodenum, inflammation of the large intestine (colitis ulcerosa), constipation and spasms of the esophagus, urinary organ and sex organ.

Apart from medical and dietary treatments as well as kinesitherapy (motion therapy), concentrative self-relaxation is used ever more frequently for cardiovascular diseases. Among patients with high blood pressure, Matzdorff observed a convincing drop of blood pressure after the heaviness and warmth exercises, and Hallhuber views autogenous training as an important element in precautionary (cardiological) measures for the heart and circulation.

Experiments to illustrate psychological and physical correlations

For persons inexperienced in psychology, the pendulum test by Galton is astounding. He demonstrates the influence of thoughts on the holding and locomotor systems of man (motoric ideoplasty).

With a propped-up elbow, a 20 cm long pendulum is held between the thumb and forefinger. By intensively imagining a pendulum movement, the pendulum actually starts to swing in the desired direction according to the laws of ideoplasty. This experience is often described as being free of active consciousness. "The pendulum starts to swing by itself in response to the thoughts" (Schultz). **(Figure 3)**

Figure 3:
Whereas the Galton Test usually has positive results, the fall test by Hack-Tuke has not been realized very often. For this test, the test person stands before a chair with his eyes closed and is instructed to concentrate on the sentence, "I am falling backwards". If the suggestion is realized, this usually happens unexpectedly. **(Figure 4)**

Figure 4:

In order to demonstrate the growing awareness of body feelings, I also suggest the following method. Fold your hands loosely together and concentrate on a certain finger until you are able to perceive it irrespective of the other fingers (ideosensory test). **(Figure 5).**

Figure 5:

The "ability to feel" voluntary muscle relaxation has become unfamiliar to psychologically and physically cramped people. It must therefore be re-learned and newly stored in the memory.

Complete relaxation is a prerequisite for the success of autogenous training

Selective and deliberate relaxation of the lower arm and hand musculature by stretching the arms upward, after increasing muscular tension to the point of trembling, leads to the spontaneous experience of a completely relaxed musculature. **(Figure 6)**

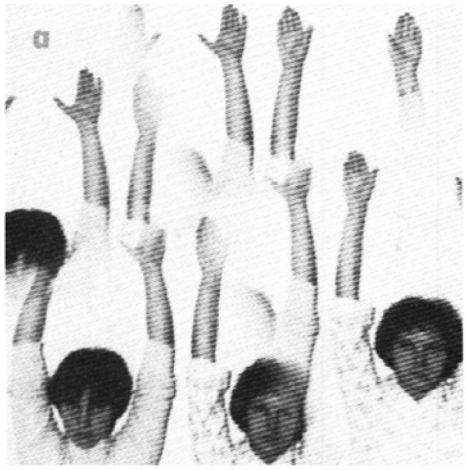

Figure 6a:

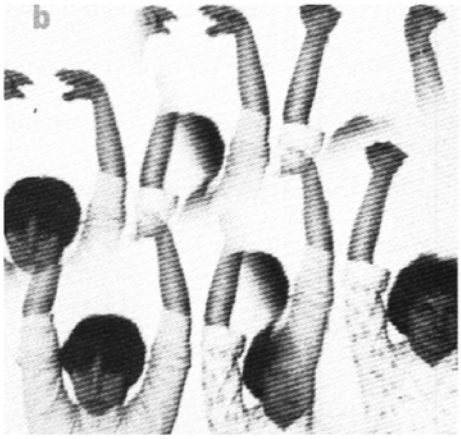

Figure 6b:

Technique of autogenous training

After the reciprocal actions between psyche and body have been perceived as a totally natural process, the practical exercises can begin.

To guarantee individual welfare, the training exercises should be practiced in small groups of up to 15 participants. In the beginning, personal contact with the "trainer is especially important, whether it be to check the body's posture or to explain the processing of experience. To start with, a one hour meeting should take place every 8 days and then every two to three weeks after the fundamental exercises have been mastered.

Cabman's posture

With closed eyes, the pupil assumes the "cabman's posture" recommended by Schultz, which allows the body to maintain its balance despite extensive muscular relaxation. The back is rounded and the spinal column slumped. (Bending the upper body forward would cause the diaphragm to elevate and thus impair the respiratory function and cardiac reaction.) The head is bowed until the chin rests upon the breastbone.

The arms, which are bent at the elbows, rest on the middle to lower third portion of the thighs, while the hands hang loosely downward without touching each other. The legs are spread the width of the pelvis. The feet are placed flat on the floor with the weight equally distributed on each of them. **(Figures 7a and 7b)**

Figure 7a:

Figure 7b:

Should there be any structural disorders of individual sections of the spinal column, the classical position may not be forced. To avoid forced positions, individual variations are permitted here. **(Figure 8)**

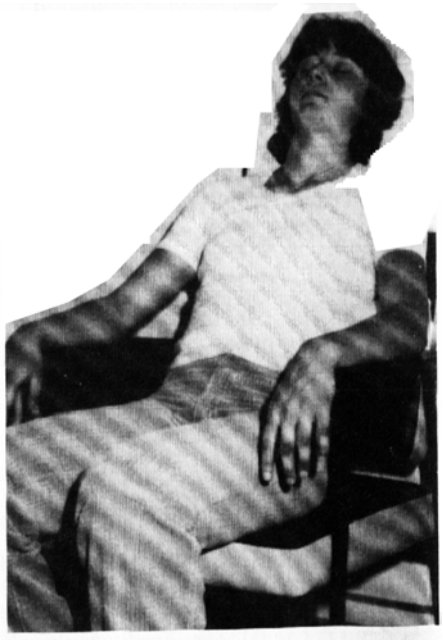

Figure 8:

Back position

For training at home, the comfortable back position is perferred to the cabman's posture. The legs are spread and turned slightly outwards, while the palms of the hands rest on the mat beside the body with elbows moderately bent. **(Figure 9)**

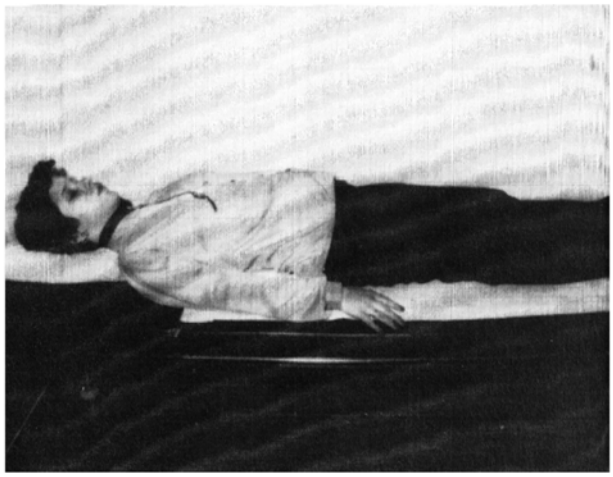

Figure 9:

Relaxing position at the sport ground

To psychologically prepare for a competition at the shooting range or sport ground, the athlete can achieve extensive muscular relaxation without chairs or benches by simply sitting on the ground with slightly bent legs and leaning his back against a wall, while supporting his neck with a roll (a towel or something similar) and letting his arms hang loosely downward (H. Lösel). **(Figure 10)**

Figure 10:

Formulated resolutions and goal concepts

Based on the theory of learning, it is advised to only practice when relaxed and mentally fresh and to mark the beginning of training with a signal phrase such as, "now, only po-sitive thoughts and fully concentrated."

The first practice phrase then follows: "I am completely relaxed."

Goal concept: maximal reduction of the state of tension of the voluntary musculature as defined by a general resting tonus.

For this "change over", enough time should be taken to check the individual parts of the body, including the facial musculature, and to ask the following questions. "Are my feet relaxed?" "Are my legs fully relaxed?" "Is my back also relaxed?" "Are my arms ... my hands ... my neck ... my facial musculature fully relaxed?"

The heaviness exercises should not be started until an absolute state of relaxation has been achieved.

Heaviness experience:

Practice phrase: "My right (left) arm is heavy" (left-handed persons should choose their left arm to start with).

"My right arm is completely heavy." According to findings in behavioral therapy, learning to condition the state of muscular tension, hormone production, blood distribution and many other bodily processes (conditioned reflexes) with an external or internal stimulus is jeopardized by a minimal variation of the signal.

Learned (conditioned reflexes)

I.P. Pavlov, a Russian researcher distinguished with the Nobel Prize in 1904, was accre-dited with having developed the theory of "conditioned reflexes". The fundamental test for today's behavioral research was conducted back then as follows:

A tone was played for a dog in a room screened off from external stimuli. The stimulus caused the dog to secrete more saliva. This reaction only lasted a short while and then became habit forming. When food was placed in the immediate proximity of the dog, it ate the food, whereupon the secretion of saliva started up again. The effect of the food on the secretion of saliva is called an unconditioned reflex.

If the sensory stimulus, produced by the tone, took place during or immediately before the feeding over an extended period of time, the tone alone would trigger the secretion of saliva. This process is called a conditioned reflex, and the learning process responsible for it is called conditioning.

The process of combining such a stimulus and reaction becomes jeopardized, if the stimulus - in our case the tone - undergoes a change of pitch, intensity or duration.

When transferred to a practice phrase, such as "I am completely relaxed", which is used as the "stimulus", it must be carefully heeded that the same wording is always used during autogenous training.

Although the phrase, "my right arm is completely heavy", is certainly not equivalent to what the training person perceives at first, the correct formulation, "... when I master this method ... my right arm will be completely heavy", is not suitable.

"My right (left) arm is completely heavy" is emphatically repeated - about six times - in your thoughts. Avoid "counting", since it disrupts your concentration. Feeling the heavi-ness of the arm is facilitated by conceiving the goal: "heavy, as though it were very tired".

This is followed by the phrase, "I am completely relaxed" (check this over!) "I am completely calm".

Then again, "my right (left) arm is completely heavy" (six times).

In the long run, this should be practiced for two to three minutes in this sequence.

To prevent undesired after-effects and to formally end this process, the autosuggestions are then withdrawn. According to Schultz, this is done as follows:

1. The arm is bent and stretched a few times with a sharp, "militant" tug.
2. The breathing is deep, in and out.
3. The eyes open, or in a shortened form:
   a) "Arm firm!"
   b) "Breathe deeply"
   c) "Eyes open!"

Autogenous training can only have the desired success, if it is intensively practiced two to three times each day for no less than two minutes each - if possible at the same time each day.

A feeling of heaviness in the arm can usually be acquired after four to six days. Later on, this sensation can be extended to the other arm and legs. The generalization of the heavi-ness formula can be supported with supplementary phrases such as, "my arms are com-pletely heavy; my legs are completely heavy; I am completely heavy".

A delayed effect is less likely among sceptics than among the overly conscientious. In the latter case, training with reduced emotional involvement is recommended.

Skin and muscle circulation

After conditioning the heaviness experience, let's turn to the warmth experience.

The practice phrase here is as follows: "my right (left) arm is completely warm".

Goal concept: increased circulation of the musculature or the skin.

Circulation of the extremities at rest or during a reduced work performance is dependent upon several factors. For example, the blood supply of the musculature is reduced to a minimum at night due to the self-active (autonomic) regulation of body temperature, while that of the skin is increased. Contrary to this, physical work increases the circulation (hyperaemia) of the working musculature while decreasing the flow through the body's surface area.

An experiment with a middle-distance runner illustrates the sensitivity of this control system and its rapid response to autosuggestion and heterosuggestion and consequently to thoughts and concepts. Under hypnosis, the immediate start of a competition was announced to the runner. Based on this suggestion, his active blood volume was spon-taneously redistributed

into his lower extremities, and the circulation of his skin was throttled at the same time. **(Figure 7a and 7b)**

The goal concept of a track-and-field athlete or a sport shooter of dynamic disciplines (rapid fire, trap, skeet) should especially focus on **increasing the blood circulation in the musculature**: "warm, as though I were physically working".

However in static sports, **a warming of the body surface**, which sensitizes the receptors of pressure and touch, is a good goal concept: "warm, as though I were lying in the sun".

The phenomenon of warmth can be learned in several weeks and then quickly generalized. To strengthen this combination of stimulus and reaction - an intensive warmth concept to increase the circulation of the musculature or skin surface - a process similar to biological feedback (biofeedback) can be useful, such as:

1. Practice phrase: "My right arm is completely warm."
2. Questioning the sensory nerves: "Is it completely warm?"
3. Feedback: "It has hardly warmed up."
4. Increased concentration on the warming process.

Previously learned phrases

Phrase:	**Repetition:**
"I am completely relaxed"	one to two times
"I am completely calm"	once
"I am completely heavy"	six times
"I am completely relaxed"	once
"I am completely calm"	once
"I am completely warm"	six times
"I am completely calm"	once, etc.

The withdrawal of the autosuggestion may by no means be neglected, since it can otherwise have an extended effect on the psyche and body beyond the period of autogenous training.

Therefore, a short phrase command:

1. "Arms firm!"
2. "Breathe deeply!"
3. "Eyes open!"

Once these exercises have been mastered, this training can be safely practiced over a longer period of time.

After conditioning the experiences of heaviness and warmth, consciously influencing the automatic activity of the heart is our next task.

Heart experience

When concentrative relaxation is exclusively practiced to "relax" the heart, the ability to control factors that influence the rate and stroke volume are advantageous in cases of psychologically triggered disorders of the cardiovascular functions.

The increased heart rates triggered by stress must be suppressed and the consequent in-crease of peripheral vascular resistance, which leads to excessively high blood pressure, must be reduced through the warmth experience.

For endurance athletes, who have an enlarged heart stroke volume and an extremely slow pulse rate (ergotropic bradycardia) in comparison to non-athletes, a distinction must be made between a useful suppression of a psychologically increased rate during a pre-com-petition phase and a deliberate stimulus directly before an athletic activity.

In the latter case, a suppression of the psychological and physical regulating mechanisms would cause a delayed increase of the heart rate, heart stroke volume and concentrated force of the heart chambers. The undesirable consequence would be a delayed functional adaptation.

In static sports like sport shooting, the problems are different. Tests have shown that a reduced state of stimuluation through the activation of factors important for blood circulation has a more favorable effect on sensorimotor skills, attentiveness and the processing of experience than vegetative relaxation or stress hormone catalysers (catecholamines) that increase the output of the adrenal medulla hormones, adrenaline and noradrenaline.

Since heart exercises could cause disorders of the heart action by consciously influencing its normal regulation, and since the growing awareness of heart actions occasionally gives rise to anxiety and subjective discomforts in the cardiac region (discardia) among sensitive test persons, these exercises can only be done without risk - at least in the learning phase - under the supervsion of a doctor.

A healthy wrestler, for example, experienced heart racing (paroxysmal tachycardia) for several minutes right after a competition, when he tried to reduce his physiologically exhausted pulse rate by relaxing his heart.

To "locate the heart experience" during the exercises, Schultz suggests to feel the pulse beat on the left side of your chest with your right hand. With modern electronic display and registering instruments, changes of heart action can be quickly and accurately assessed today.

The growing awareness and selective influencing of this physical process, combined with a constant control, must be integrated in the field of biological feedback (biofeedback). **(Figure 11)**

Figure 11:

The heart exercise phrase is as follows: "my heart is beating very calmly and evenly" (normal phrase). "My heart is beating calmly and strongly" (such as for low blood pressure [hypotonia]. "My heart is beating slowly and calmly" (for anxiety syndrome and rapid pulse rate [tachycardia]). "My heart is beating strongly and rapidly" (for the selective vegetative change before competitions in dynamic sports).

Breathing experience

For the adjustment of breathing, let's select the formulated resolution: "breathing very calmly."

To eliminate any false, intentional breathing, Schultz also recommends the phrase: "IT breathes me" with the conceptual aid: "breathing as though passively lying on one's back while swimming on slightly turbulent water".

Contrary to other organic functions, breathing can be voluntarily influenced to a great extent, even to the point of a temporary respiratory arrest. Whereas deliberately restricted breathing (alveolar hypoventilation) has no practical significance, excessive breathing (alveolar hyperventilation) is an important symptom which accompanies psychic states of stimulation and is usually not subject to volition. Consciously controlled, it is used to prepare for a short-term suppression of breathing, such as in the sport of skin diving. In earlier times, it was falsely practiced in sport shooting.

Today, "abdominal breathing" as compared to thoracic breathing is considered the ideal type of breathing due to its positive effect on the lung capacity (vital capacity) and on the function and circulation of abdominal organs. This form of breathing, which is very easy to learn, is also suitable for autogenous training.

Bascially, no deliberate attempt should be made to "adjust breathing" during the self-regulation of breathing. Consequences of excessive breathing, which can occur after only a short while, are a respiratory acid deficiency of the blood (alkalosis) with a reduction of organic phosphates and potassium in the serum; an overstimulation of the integrated nerve and muscle systems; feelings of discomfort (paraesthesia) especially in the fingers; a reduction of the cerebral and skin circulation; an increased pulse rate and an increased flow resistance in the lung's bronchial tubes. All of these factors impair both the general and the specialized physical condition in daily life as well as competitive sports.

The occurrence of cardiac disrhythmia (premature ventricular contractions) among athletes with a slower pulse rate during a "breathing experience" is due to the fact that the cardiovascular reflexes are less effective during the phase of inhalation than the phase of exhalation. However, this phenomenon is very rarely registered subjectively.

It takes about 14 days for the breathing adjustment to become automatic.

Experiencing abdominal circulation

The next to the last exercise promotes the regulation of the abdominal organs.

Originally, the exercise phrase was as follows: "Solar plexus flowing warm." Since the term "solar plexus" is hardly used in today's language, this phrase can be easily realized with the concept: "my body is flowing warm." As a conceptual aid, the following can be used: "as though a heating pad were placed on it."

Pathological conditions in the abdominal cavity such as gases and cramps can be favorably influenced through "body warmth. With the use of so-called skin-and-intestinal reflexes (Head's zones, cuti-visceral reflexes), the functions of the urinary, sexual and intestinal tracts can be selectively inhibited or stimulated.

Shooters with a disposition towards circulatory disorders (orthostatics) who practice sport shooting in the standing position, should refrain from doing this exercise due to the danger of a reduced blood circulation in the periphery - comparable to the condition after the consumption of food before or during training.

Experiencing the forehead

The last exercise phrase, "the forehead is pleasantly cool", is usually promptly processed. This is probably why a strong, visible and tangible linkage between emotions and skin circulation in the head and neck region is noticeable in daily life, such as blotched skin among women caused by agitation.

Work physiologists established proof of a close interaction between the temperature of the forehead and the temperature inside the body (mouth and anal temperatures) with the help of instruments used to measure thermoelectric heat conduction and thus confirmed a long known phenomenon in folk medicine.

A cool forehead is therefore not only considered a symbol for cool thinking but is actually a criterion for the internal body temperature (basal temperature).

However, a formulated resolution, such as an "ice-cold forehead", would lead to vascular cramps and thus massively intervene in the control circuit of thermoregulation.

This exercise can also be learned in two weeks, so that autogenous training can be mastered in about three months time.

Summary

Sequence of the exercise phrases of autogenous training:

Phrases:	**Repetition:**
"I am completely relaxed"	one to two times
"I am completely heavy"	six times
"I am completely calm"	once
"Rest"	
"I am completely heavy"	three times
"I am completely warm"	six times
"I am completely relaxed" (Am I really fully relaxed?)	once
"Rest"	once
"The heart beats evenly and calmly"	six times
"Rest"	once
"Body (solar plexus) flowing warm"	six times
"Rest"	once
"Forehead pleasantly cool"	six times
"Rest"	once

Withdrawal of all autosuggestions as follows: arms firm, breathe deeply, eyes open.

Comparable to athletic training, in which sensorimotor skills lose their perfection after only a few weeks of non-practice, the skills acquired through autogenous training to regulate psychological and physical processes are also unlearned after a fairly long period of non-practice.

Whoever wants to make the most of autogenous training must train "autogenously" on a regular basis and with total dedication.

Possibilities of the exact examination of phenomena produced autosuggestively

By continuously checking the pulse rate before and during concentrative self-relaxation, it is possible to prove the physical change which occurs during autogenous training. Only electronic devices, which project the minute value by means of a heartbeat-to-heartbeat (bit-to-bit) measurement, are suited for this. Just like the examination of physical strain (ergometry), the pulse can be easily taken with photo-electric sensors. These apparatuses are also suitable for biofeedback training. **(Figure 11)**

A further criterion is the proof of increased skin temperatures during the warmth experience. In 1925, Schultz came to the conclusion that an increased radiation of warmth occurs only five minutes after an appropriate autosuggestion.

To be able to distinguish between such a consciously controlled thermal change of skin temperature and the unconscioulsy controlled regulatory mechanisms of the human body with respect to blood distribution and thermal regulation, which occur after only minimal physical strain and positional change, I took long-term temperature measurements on a rather large number of test persons from various age groups who had NOT been confronted with autogenous training before.

In a resting position - with humidity and room temperature remaining constant - thermosensors were attached to the back of their hands and on their finger tips, whereby great care was taken not to impair the circulation of air. The skin temperatures were taken at intervals of one minute on both hands of the test person with a calibrated, transistor-amplified thermomenter (with an accuracy of up to 0.1° Celsius) **(Figures 12 a and 12 b**), and the values were registered over a period of one to two hours.

Figure 12 a:

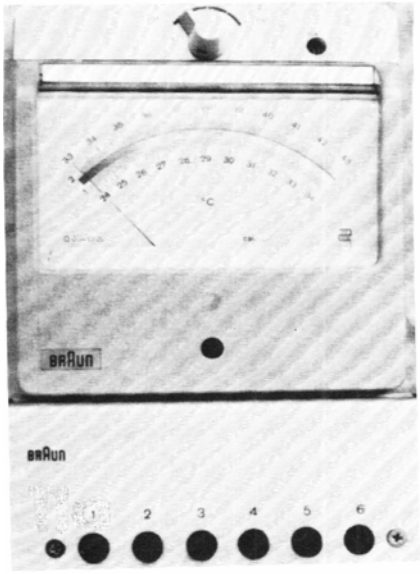

Figure 12 b:

The graphs clearly differed from each other. Even with the same test person, the graphs, which were compiled over several days, were not comparable with one another.

The temperatures of the hand most commonly used by the person, that is the working hand, were usually several tenths of a degree higher than the opposite hand. In the course of 10 to 60 minutes, the skin temperatures increased in the form of waves, dropping off and then rising again. In these rough temperature fluctuations, a fine regulation of plus/minus one tenth degree per minute was registered. **(Figures 13a and 13b)**

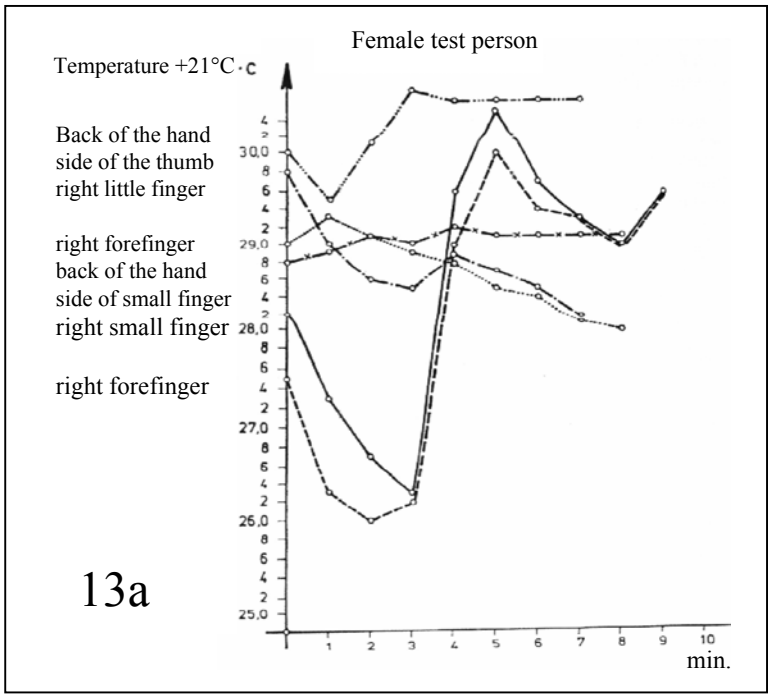

Figure 13a:

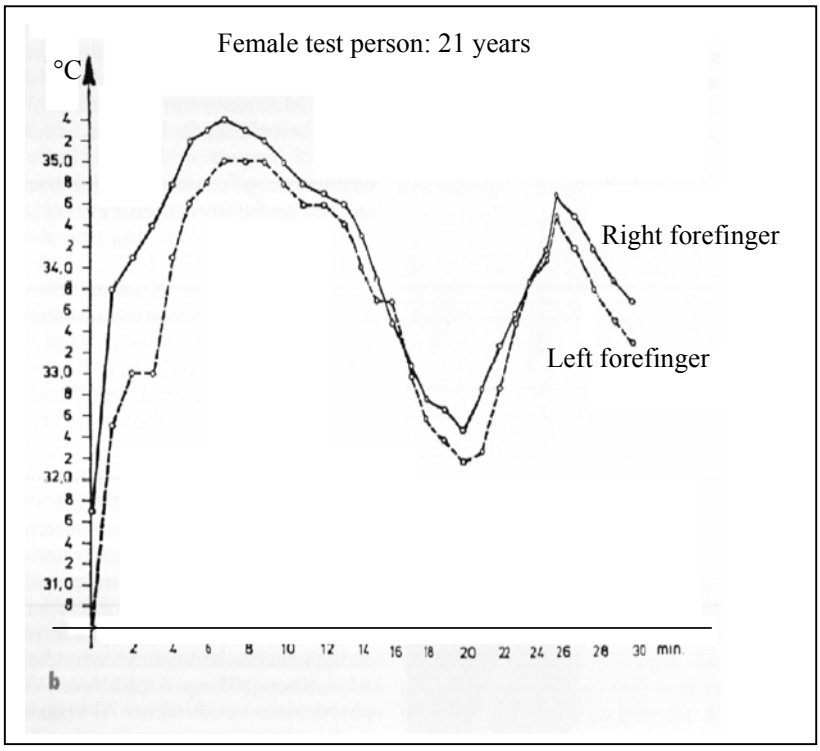

Figure 13b:

This showed that the regulating processes are more intense during adolescence than adulthood. With older persons, the temperature rise was practically linear **(Figure 14).** This

justified the assumption that short-term measurements are unsuitable as evidence of a possible warming effect in autogenous training.

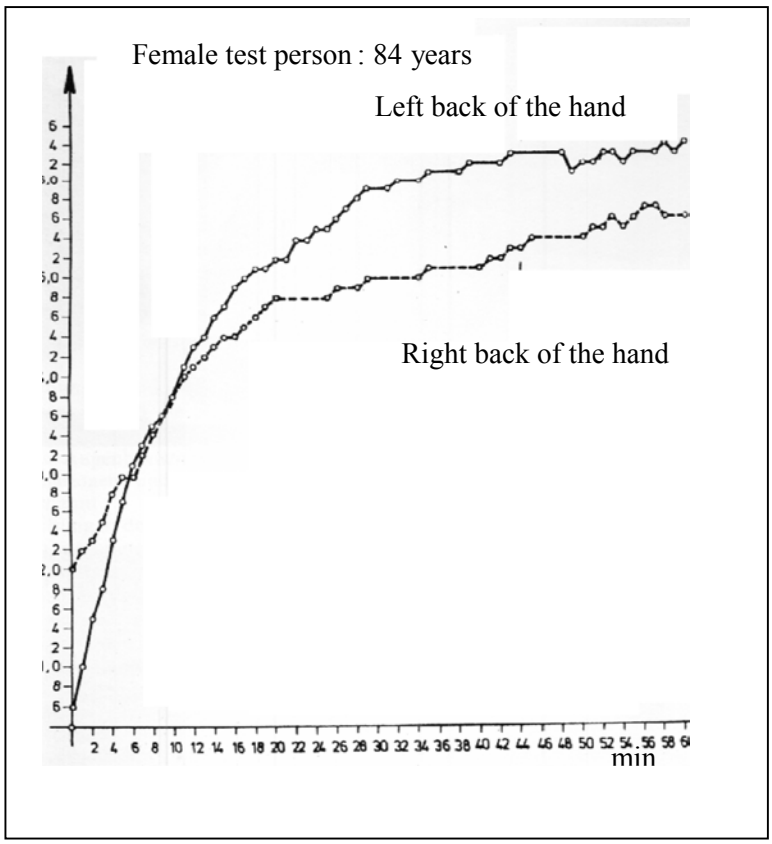

Figure 14:

Such experiments can therefore not be started until the autonomic thermal fluctuations have come to rest. Based on these considerations, the doctor and not the test person must determine the start of the experiment.

Based on the aforementioned reversed circulation of the skin and musculature, the test person should be urged during the autosuggestive concept of the warmth experience (formulated goal concept: "my right arm is completely warm") to make use of an appro-priate inner picture ("as though it were resting in the sun" and not "as though it were working hard"). In the reverse case, the circulation of the musculature increases and the surface temperature of the skin drops.

The experiment is deemed successful, if the temperature in the autosuggestively controlled hand (irrespective of the opposite hand) clearly increases at once. **(Figure 15)**

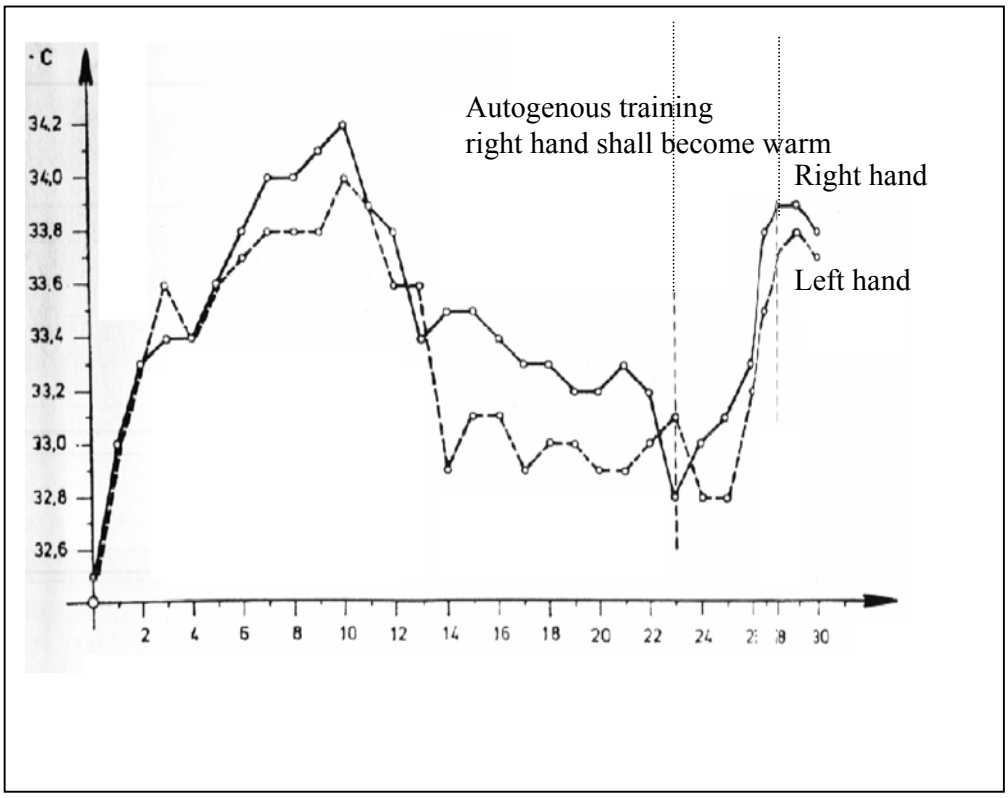

Figure 15:

Formulating a set resolution

By means of a specially formulated resolution, a person experienced in autogenous training can not only change the status of his individual personality factors over an extended period of time but can directly influence the type, the basic characteristics and the extent of his experience.

The formulated resolutions should correspond with the test person's personality and speech habits and even more importantly should be positively formulated. For those with less experience, the formulation of set resolutions should be done at the end of autogenous training. For those who already master the upper level of self-hypnosis, this can also be used independently of the "physical experiences" of autogenous training.

Following are examples of general formulations: "Learning is easy, and my memory is retentive"; I shall succeed"; I have and shall retain peace of mind"; "Sounds are completely trivial" (K. Thomas); "Courage is victory" (J.H. Schultz), "Digestion occurs half an hour after getting up"; "Intestine works calmly and punctually" (H. Lindemann).

Possible formulated resolutions in sport:

For the track-and-field athlete: "I give my utmost". For the finger: "swift and powerful". During breaks, "muscles completely limber and relaxed". For the boxer: "full power in the short blow". For the rapid fire shooter: "alert and swift". For the pistol shooter: "pull continuously".

Muscular Relaxation (Jacobson)
Tonus Relaxation (Stokvis)

Progressive muscular relaxation (Jacobson)

Another method used to overcome anxiety - with a special emphasis on the promotion of relaxation - was introduced in psychotherapy by E. Jacobson in 1934, which was termed "systematic muscular relaxation" or "progressive muscular relaxation" and was later applied in sport medicine. Jacobson agreed with Schultz that the main objective of this method was to overcome anxiety through muscular relaxation. However, he did not support a radical change in the animated organism itself or in the specially formulated learning techniques, and demanded a minimal degree of consciousness. Comparable to autogenous training, "muscular sensibility" must also be established beforehand in this case, which then provides the individual with the critical basis to judge the degree of tension.

Learning methods

To start with, the individual parts of the body are consciously relaxed, and upon completion of this process, a switch-over is made, and full concentration is focused on the relaxation of the entire musculature. Relaxation can be subdivided into several phases:

1. Inducing tension through movement
2. Maintaining and observing tension
3. Observing the switch-over from tension to relaxation
4. Experiencing relaxation (according to Huber)

In a book written chiefly for laymen, Jacobson summarized his therapy in a system consisting of several steps.

1st Step: Relaxing the Arms

Exercise 1: The test person (TP) lies down on his back with legs together and eyes closed. He tries not to move or at least to restrict his movement to a minimum. Muscular tension is not focused on at the start, since relaxation is the objective of the entire learning process. Duration: when possible, 30 minutes or longer.

Exercise 2: Lying on his back with closed eyes, the TP raises his right arm and makes a tight fist. During this time, he should carefully note the sensation of muscular tension. This process is then followed by relaxation. The arm drops back into place; the fist is released; and the fingers are straightened. After a short break, the exercise is repeated two to three times. Afterwards, a 20-minute break is taken.

Exercise 3: Exercise 2 is conducted from this point on with both arms. In the first step, the TP learns the sensations of tension and relaxation, but the process of relaxation has not yet been completed in its entirety.

2nd Step: Relaxing the Legs

Exercise 1: Lying on his back with closed eyes - as in the preceeding exercises - with legs placed together.

Duration: Maximum period of 50 minutes, if this can be accomplished without any serious problems.

With outstretched legs, the TP should extend his feet towards the sole of the foot while digging his toes downward with all his might and should hold this position for several seconds. A short break should then follow this procedure. Alternating from tension to relaxation and taking a break as well should be repeated twice.

Exercise 2: The feet and toes should gradually be relaxed, not suddenly.

Exercise 3: The TP should "be conscious" of the feeling of tension and relaxation in the musculature of the arms and back - as with a generalized effect - when exercising the feet.

3rd Step: Breathing

Exercise: A ten-minute break with closed eyes. Breathing should be somewhat deeper as usual. When inhaling, the chest is extended, and when exhaling, relaxed. This alternation between tension and relaxation should be consciously experienced.

4th Step: Relaxing the Forehead

Exercise 1: Standing in front of a mirror, the TP

a) raises his evebrows causing his forehead to wrinkle, then relaxes his muscles;
b) he knits his brow and gradually relaxes again.

Exercise 2: Lying down with closed eyes,

a) the forehead is wrinkled in a frown, and afterwards, the muscles are relaxed;
b) the brow is very slowly knitted and then relaxed again.

Exercise 3: The TP should observe or consciously experience the generalized tendeny of other parts of the body - such as extremities, chest, and back - to tense-up or relax when the forehead, for example, is wrinkled or relaxed, or when the brow is knitted or relaxed.

5th Step: Relaxing the Eyes

Exercise 1: In a reclining position with eyes opened, the TP looks to the right and experiences the tension in the orgitalis muscle during this period of time. He then looks straight ahead without focusing on an object and continues the exercises by looking to the left, then upwards and downwards.

Exercise 2: Conscious awareness of generalized tendencies

6th Step: Relaxing the Muscles of the Speech Organ

The TP lies on his lack. His eyes are opened and his legs are uncrossed.

Exercise 1: The test person counts to 10 out loud, moving the muscles of his tongue, lips, jaws, and throat intensively. Afterwards, these muscle groups are relaxed for 3 to 4 minutes. This exercise is repeated twice.

Exercise 2: Now, the TP no longer speaks loudly. He lowers his voice and ultimately only speaks in a whisper.

Exercise 3: The TP counts mentally or in other words only imagines counting. Ultimately, a conscious relaxation of the speech organ is achieved.

The progressive muscular relaxation has been varyingly modified over the past years. As a result of practical experience, brief and spontaneous relaxation, or relaxation without previous muscle contractions has proven to be of considerable value.

Tonus Relaxation (Stokvis)

According to Stokvis, the active regulation of tension is still widely unknown. In competitive sports, this is not only suitable for a resonance depression of emotions, but can also be applied to psychosomatic symptoms. In the practical conduct of the active regulation of tension, the TP must repeat the following:

a) Depending on the position: "Now I am lying very still."

b) Depending on the region of the body to be relaxed: "I am relaxing the muscles of my entire body; the muscles of my hands, the muscles of my forearms and upper arms, the muscles of my shoulders. I am relaxing the muscles of my feet, of my lower legs and thighs, the muscles of my stomach and chest. I am relaxing the muscles of my head, my mouth, my nose, my eyes, my ears, my forehead, the back of my head, the muscles of my neck and my pelvis."

c) Switch-over: When the muscles of my entire body are relaxed, my mind is relaxed, and my body and soul, in harmony."

d) Autosuggestive wording: "When my body is in a deep state of total relaxation, the images, that I cultivate in my mind, will materialize. Now concentrate." Following this step, the specially formulated phrases, which the athlete has worked out alone or in cooperation with his trainer or doctor, will be applied.

e) Influencing symptoms: "I am now acquiring a state of complete inner relaxation and calmness; a feeling of harmony, where symptoms, pressure and cramping are dealt with, assimulated, resolved and removed. Now, I am in a complete state of rest, rest .... My performance in sports (or at work) shall be relaxed, joyful, refreshed etc."

f) Quietly say to yourself or imagine: "On the count of one, the feeling of heaviness will be gone; on two, the eyes will be opened; on three, refreshed and full of energy." (according to Wiesenhütter) Figure 17.

A. GOALS:	SCHULTZ	JACOBSON	STOKVIS
1. Auto-hypnosis	Yes	No	Slight auto-hypnotic reduction of consciousness
2. Relaxation	Yes	Yes	Yes
3. Recuperation	Yes	No	Yes
4. Repose	Yes	Yes	Yes
5. Psychom. change	Yes	Undesirable	Yes
6. Meditation	Yes	No	"Automatic"
B. VARIOUS TECHNIQUES	SCHULTZ	JACOBSON	STOKVIS
1. Concentration	Parts of the body as means of transition	Idem	Adhere to surrounding parts of body or functional system
2. Guidance of emotions	Aimed at certain parts of the body or organs; generalization "automatic"	Idem	Distribution of associated feelings over the entire body
3. Phenomena of relaxation	"Bypass"	Goal	Goal
4. Method of relaxation	Systematic: 6 exercises subdivion	Unsystematic: 6 arbitrary steps	Topographical systematic (see directions)
5. Transition experience	Existing	No	Extreme individualization
6. Length of exercise	2 - 20 minutes	Half an hour	1 - 15 minutes
7. Length of treatment	Months	Months	Weeks

Figure 17:
Differences (Schultz, Jacobson, Stokvis)
(According to Berthold Stokvis and Eckart Wiesenhütter)

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Desensitization, Implosion Therapy, Behavioral Therapy

Systematic Desensitization

Another possibility used to influence psychological processes is behavioral therapy which is largely based on results obtained through learning psychology and is, therefore, tra-ditionally oriented to the relief of symptoms or in other words systematic desensitization. Intensive research has been conducted to determinie all possible situations which induce anxiety. A hierarchy of factors, which result in the formation of anxiety, will be worked out in collaboration with the test person (TP):

Physical relaxation and mental preparation are prerequisites in the process of desen-sitization which can be obtained by means of progressive muscular relaxation or auto-genous training.

Example of a "hierarchy of anxiety" (Wolpe):

1. Derogatory remarks by one's husband.
2. Derogatory remarks by one 's friends
3. Ridicule by husband or friends
4. Insufficient criticism
5. To address a group
6. To join in the company of four or more people
7. To apply for job
8. To be excluded from a group gathering
9. To be confronted with a person, who treats one unjustly

Following are examples of possible situations in competitive shooting which can lead to anxiety:

Disordered:

When I find out that the most successful shooter, X, will be shooting right next to me; when the opposing team is so good that we more than likely will have no chance of winning;

the remark of the Operations Manager, "we'll have to exempt you from training and com-petitions if you shoot that bad again";

the thought of becoming extremely nervous during the competition after firing a bad shot.

Following are the same situations, which give rise to anxiety but are no longer listed in an ordered hierarchy.

Ordered:

The opposing team is so good, that we don't have any chance of winning;
the remark of the Operations Manager;

the thought of becoming extremely nervous during the competition after firing a bad shot;
the successful shooter, X, will be shooting next to me in the competition.

How does desensitization function?

The athlete concentrates on a situation which causes the least amount of anxiety. As soon as this is accomplished, the experiement will be interrupted and repeated at given intervals, until the situation can be managed without anxiety. After repeated sessions, the athlete learns to cope with situations which previously gave rise to anxiety. He is then de-sensitized.

Implosion therapy

Contrary to systematic desensitization, the behavioral therapists, Marks and Marset, re-commended that the TP not try to combat his anxieties but, on the contrary, to experience and endure them in all their intensity. This method, the implosion therapy, is supposed to be better than desensitization, provided that the state of anxiety can be maintained long enough. According to experience in the field of therapeutical learning, a temporary state of anxiety would only result in an evasive reaction by strengthening the affect.

Biofeedback therapy

The biofeedback therapy has been used since the 60's in dealing with behavioral disorders and in the field of psychosomatic medicine. The physical functions, which are largely processed on an unconscious level, are transmitted back and thus made perceptible. One of the co-founders of the biofeedback therapy aptly described it as a probable form of vege-tative learning. Whereas an indepth study of psychosomatic relations is not necessary for this procedure and the time needed for preparation can be kept to a minimum, the required technical know-how is quite extensive. By means of biofeedback, physiological processes and the situations, which alter them, can be perceived and then regulated and applied to everyday situations, as learned in the laboratory. According to Legewie and Nusselt, these physiological processes can be conditioned without feedback.

Electromyographs and electroencephalographs are provided for experimental and clinical use in detecting and registering body signals. A galvanometer is most commonly provided for personal use. Figure. 18.

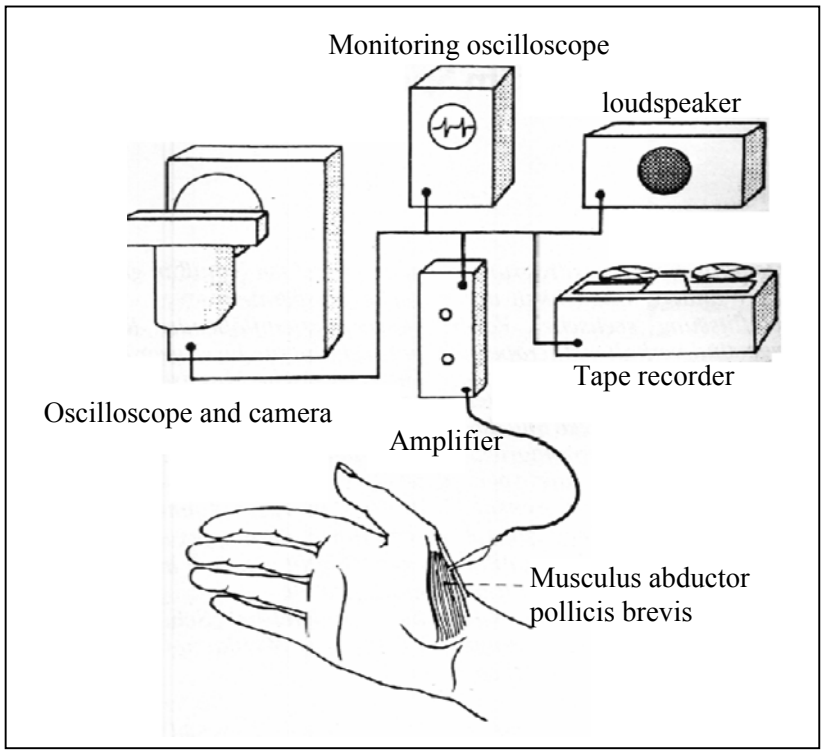


Figure 18:
Derivative technique on the thumb muscle (according to H. Legewie and L. Nusselt)

With the use of these devices, it is possible to judge the conductivity of the skin and, if necessary, the increased secretion of sweat, which positively correlates with psycho-vegetative states of excitement. The comparison of the desired state of being with the actual state of being can be registered by means of optical, acoustical or tactical signals. Acoustical signals, which change somewhat in pitch, have been found especially suitable for this purpose. With this method, the eyes can remain closed which makes it easier to give one's undivided attention to the procedures necessary for controlling information with-out any visible distractions.

According to Budzynski and Stoyva, a biofeedback electromyogram is especially suitable for measuring the degree of excitement during therapy and, in addition to this, also offers an exact training method for relaxation. The ability to relax at will during real or imaginary situations, which give rise to anxiety, can be of major importance in the successful treat-ment of anxiety, especially during states of global anxiety. Tests have shown that TP's, who have not specified their anxieties, experience a greater degree of emotional tension than those, who have specified their anxieties.

In the realm of sports, reprecussions affecting the tonicity of the musculature and the palpitation were experirenced as a result of emotional tension; the cardio-pulmonary, circulatory, and digestive systems were carefully controlled; sleep disorders and pathological sleep patterns were influenced. Fig. 19.

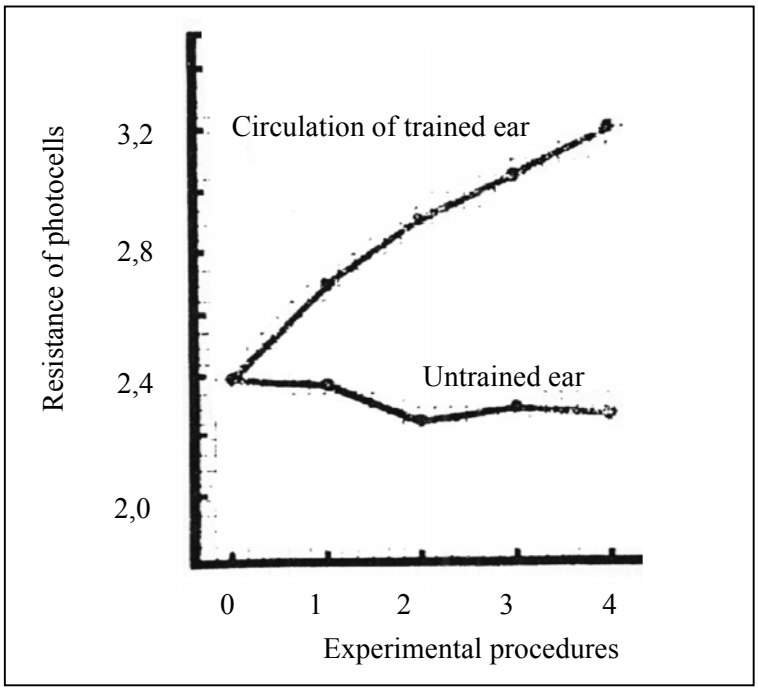


Figure 19:

Biofeedback training in the circulation of an ear

(according to H. Legewie and W. Ehlers)

However, contrary to autogenous training, one of the basic elements in the success of this treatment is the communication with experienced people or therapists.

An Example:

The TP imagines the following situation, "I am totally relaxed: my heart is beating slowly". He then reinforces this process by means of autosuggestive commands such as, "remain completely relaxed, completely relaxed". The pulse rate actually sinks, which is signalled by a lowering in the pitch of the pulsimeter, which operates on a bit-to-bit system. The results, which are rewarding, are used as a means of strengtheninig the effect. After a while, the TP is then able to regulate his heart activity without the aid of a pulsimeter.

At the present time, experience has shown, that the best results can be achieved when a systematic desensitization coupled with a biofeedback therapy is conducted on a TP, who has achieved a state of relaxation either through autogenous training or progressive muscular relaxation.

Music Therapy

Psychoregulative Effects of Music

Apart from psychotherapeutic treatments of an external or self-induced nature, a new form of psychotherapy, which is being used today, is music. As can be seen throughout the course of medical history, the treatment of psychic and physical disorders by means of music is one of the oldest forms of therapy known to mankind.

Thousands of years ago, mankind used melodies and rhythms in rituals to honor the gods and spirits, to find favor with them, to appease them, and to request healthiness and happiness. Illness was considered an intervention of spiritual forces on individuals, which could only be removed by a medium between this life and the next by means of pre-determined rituals.

For the layman, the astonishing influence, which music has had on mankind, can still be studied today through the rituals and exorcisms used by medicine men and shamons to heal illnesses. Take for example the fire dances of the Anastenary Sects in Macedonia, the exorcisms of the Bantus, or the magic drumming of voodoo.

Although music is perceived as an entity, the individual components of melody, rhythm, thematic and dynamic are signals which are carried to the central nervous system through the sense of hearing and processed there as information, evoking mental, psychic and physical reactions.

Kohut, whose focal point of interest centers above all else on the cognizant process, which takes place while listening to music, sees the essential prerequisite for experiencing a music phenomenon in the fully conscious and solemn recognition of a structure or formal legalities. Music has a specific symbolic function for music lovers and can recall moods and incidents, which have been suppressed or stored away in the mind, into the preconsciousness through its melodious elements. This is one of the reasons why a lasting, unalterable approach, especially to "this music composition", does not exist. With each change of situation or social context, it can be altered, and through the continual repetition of a piece, which is very pleasant at first, a feeling of boredom and superfluousness can develop in the course of time (according to H.P. Reinecke).

Music is an individual experience, and the reactions evoked through music are dependant upon the individual's personality. The character is responsible for shaping the special approach to, expectation of, and love for a certain musical competition. In our cultural realm, accentuated, rapid rhythms have a stimulating and motivating effect but can also increase feelings of aggression with given associations.

Ordinary marching music "goes right to the legs", increases self-consciousness, and creates a feeling of solidarity. On the other hand, solemn music is found to have a calming and subduing effect. In its psychological effect on the masses, it often gives a feeling of soli-darity during a time of mourning or state of emergency. A totally different effect, how-ever, is experienced during a waltz or polka, whereby spirits are lifted and feelings, soothed.

During mental cognizant processes, the music lover experiences a feeling of relaxation and, under given circumstances, a state of excitement. Physically, he experiences a state of re-laxation, excitement or tension.

As for the effect of music on the vegetative nervous system, both melody and rhythm have proven to have an influence on the regulative processes in almost all organ systems by way of the sympathetic and parasympathetic nervous systems. Considering the effect that the music phenomenon has on the state of mind and the autonomic nervous system, these factors must be taken into condieration, if music is to be used as a functional method of healing.

Depending on indication and personality structure, the following factors must be considered: Music should not be played for less than three minutes nor for more than twelve minutes. Many low and few high frequencies are especially suitable for a state of deep relaxation, whereas many high and few low frequencies are suitable for a somewhat lighter state of relaxation. Especially favorable to this effect is a timing of 56. Uniformity but also high contrasts reduce tension, feelings of aggression, and anxiety. Musical pieces, which evoke strong emotions or demand special attention, distrub the process of relaxation (E. Lecourt).

The questions, which arise from these facts, are why are slow signals with a consistent level of intensity more appealing to the ear and thus have a relaxing and calming effect, whereas signals with a rapid and alternating level of intensity and a high range of frequency have a stimulating effect.

Many theories can be found for the explanation of this phenomenon. Aesthesiophysiology has shown us, that the activation of a modality hinders the processing of stimuli in other modalities. This is how today's music psychology explains the relaxing effect of some musical pieces. Behavioral therapists are convinced that an individual's approach to music with its cognizant and emotional processing is shaped in the child's early formative years of development. The more frequent a musical piece is heard during an emotionally significant situation, the greater the emotional intensity associated with this music, when it is played (Schultze-Görlitz). An even earlier conditioning is attributed to the individual emotional reaction to rhythm. It is assumed that a sequence of stimulus-responses develops even before a child is born. This assumption is supported by the following working hypothesis: The pulse rate of a healthy pregnant women at rest and free of stress is between 55 and 70 beats per minute. The "stress-inducing hormone level" in the blood is accor-dingly low. The unborn child - who is still adjoined to the mother's circulatory system - perceives the mother's slow heart-beat, boom-da ..., boom-da..., as a sign that no danger is at hand. However, during a state of excitement or anxiety, the hormone level in the mother's blood is increased, whereupon the child's vegetative nervous system is simultaneoulsy activated. A continually rapid heart-beat, boom-da, boom-da, boom-da, indicates danger.

However, still another hypothesis is forced upon us here. Under the influence of stress, which occurs when one is inundated with stimuli or strong feelings of reluctance, the organism prepares itself for flight or defense, which is quite a natural reaction. This reaction not only increases the circulation of a pregnant woman, giving rise to higher blood pressure, a faster

pulse rate and other signs of vegetative stress, but furthermore increases hyperactivity. This, inturn, could be a factor which causes instability in the position of the foetus. By kicking and swimming motions, it must then take care that the given physiological position is maintained. During the period of maturation, a sequence of stimuli may also occur here, such as stress, increased cardiac rhythm, change in foetal position in the womb, correction through changes in the muscular tone of the extremities. The fact that fast rhythms have a stimulating effect on the locomotor system could be a possible explanation for this

Music as a stabilizing measure for the psyche in sports

More and more often, an athlete can be observed with head phones, absorbing the effect of a musical composition before a competition. By random test, I have come to the con-clusion, that this is chiefly considered as a means of passing time. Only very few shooters actually use music with the intent to suppress conflict situations, to relieve psychic and physical tension, or, in some cases, to create a stimulating effect on the psyche and nervous system. Others listen as a group to musical compositions, which have been specially selected by the trainer.

According to research on mass psychology, it has been learned that there is a strong ten-dency in a group to counterbalance sexual repression and that the activities of a group have a special influence on the feeling of self worth in an individual. The use of this procedure as a possible means of influencing the given experience in a specific way is relatively un-certain. The melody and context of a musical piece can evoke feelings of reluctance through sudden associations and reminiscences which cannot be foreseen by the trainer and even catch the athlete off guard at times.

An example of this is as follows:

During conflictual suppression, a symphony concert is played on a cassette recorder before a competition. By almost all team members, this resulted in the elimination of negative feelings which impair the athlete's ability to act and think. Only in one case did this musical composition evoke sad and depressing memories. He lost his feeling of self-assurance and superiority and became irritated.

Assuming that a calculated risk is downright uncertain without first compiling a psychogram or gaining more insight into a shooter's psychic and vegetative reactions to the melody and thematic of a musical piece, the special use of rhythms in the preparation for competition is preferable.

Pilot study on the influence of rhythms on vegetative regulation

An experiment for orientation purposes was supposed to provide information on the extent to which a person reacts to rhythmic and acoustic signals. For this experiment, twenty adults volunteered as test subjects in my practice. While resting, they were subjected to a beating signal for three minutes over headphones. This signal was recorded on tape with a frequency of 60 beats per minute and a number of phons which was less than 60 dB (A). In intervals of fifteen seconds each, the high frequencies fed into the comoputer (bpsp-cardR) and calculated according to the bit-to-bit system were registered over a three-minute period by a photo-electric pulse-reading instrument. Afterwards, this test was repeated under the same conditions with 80 beats per minute.

Result

Even though the procedure of this test - not the anticipated effect of rhythms on the pulse rate - was explained to the test participants in a preparatory conversation, all subjects, with the exception of one, experienced a temporary increase in pulse rate from 5% to 10% immediately after the presentation by both slow and rapid rhythms. Two to three seconds later, it resumed its normal rhythmic frequency.

With this phenomenon, one can see that every change of sensory perception, be it qualitative or quantitative, leads to an alarm reaction, and that the inner organic balance can then only be resumed after the signals have been examined and categorized as undangerous for the individual.

By 50% of the test people, the slow rhythm had a subduing effect on the autonomic nervous system and the rapid rhythm, a stimulating effect. While 25% of the subjects experienced the opposite effect, the other 25% registered no reaction at all.

Although no significant theory can be derived from these test series, it can nevertheless be said that slower rhythms give rise to physical relaxation in many cases, and that a stimulating effect can be achieved through rapid rhythms.

To be able to use rhythmic therapy in the psychological training of competitive athletes, further studies on a larger collective must be made.

Provoking Anxiety

Practice shooting under manipulated states of anxiety

Occasionally, sport doctors are confronted with questions from trainers and active shooters as to whether or not anxiety can be artificially produced by athletes during training, so they may learn how to succeed in competitive sports even under great psychological pressure.

There are three possibilities which can be discussed:

Anxiety brought about by the simulation of singular, seemingly threatening situations. Only after a few attempts, a person, capable of mental differentiation, would easily recog-nize the actual facts and realize why this method is unrealistic.

The next possibility for consideration would be to create anxiety under the state of hypnosis. With the exception of security problems, this method cannot guarantee much success, since a hypnotized shooter in a restricted state of consiousness would not be able to cope with the numerous alternating tactical and technical demands. In turn, the influence of the post hypnotic instructions misses the aim of the experiment.

Apart from the effects of adrenaline on the vegetative symptoms and signs, questions for consideration in the thrid possibility are whether or not the mood situation is influenced by administering the "stress hormone", adrenaline, and whether, aside from the physical symptoms of anxiety, a subjective feeling of anxiety occurs as a result.

As early as 1924, Maranon had already experimented with adrenaline. Questioned on their findings, the test subjects only reported of a certain feeling of agitation. A change in their emotional feelings was only observed during the course of a conversation while the subject was under the influence of adrenaline, which activated certain memories of intense emotion.

Just 40 years later, the scientists, Schachter and Singer also administered adrenaline, a stimulating active substance on the central nervous system, to some members of a larger collective, while the others received an ineffective placebo. "Of the subjects, who were given the substance containing adrenaline, only every other two were informed of the preparation's stimulating effect. This was the very group, however, that displayed a totally different behavior from the rest participating in this test. They were not especially spontaneous in their actions nor could they be motivated to activities by the others while waiting. They also only reported experiencing weak emotions. The behavior of those uninformed, who were handled with adrenaline, did not differ much from those who were handled with a placebo. The knowledge of the stimulating effect of adrenaline probably led to a counter-regulatory reaction in the group in question. Where agitation appeared without this knowledge, an explanation would be given and the appropriate action taken according to the otherwise available information on the prevailing situation" (quoted from R. Bösel).

In this context, Bösel points out that adrenaline does not lead to a reaction of relevant feelings in this case, but rather increases the cortical awareness as a stimulating hormone (of the central nervous system).

The effect is well known from clinical medicine. A sympatheticomimetic working drug activates the heart, increases the blood pressure, influences the muscular metabolism, leads to muscle tremors by higher dosages and can suppress the feelings of tiredness. The patient experiences an emotionally neutral agitation in this state. Only when the physical symptoms are falsely classified due to insufficient knowledge on the pharmacological effect of the medication - since it appears to be dangerous - do feelings of anxiety occur.

From these tests, we can conclude that adrenaline and comparable medications are not suitable to premeditatively produce feelings of strong emotional anxiety. A tolerance training to cope with anxiety created by expectations, match decisions and failures is only an illusion at the present time.

Totally apart from this, however, particular training methods can not be recommended from either an ethical or medical point of view. These methods, undoubtedly, belong to the category of misused medications in sports, since "doping is considered to be the administering - or misuse - of exogenous substances to a healthy person in any form, or of physiological substances in abnormal quantities and through abnormal means for the sole purpose of increasing performance ability for a competition by means of artificial and unfair methods" (according to 1963 European Council). As for the adrenaline hormone (Epinephrine) - regardless of the form in which it comes - the administering of this drug is related to considerable health risks. By a previously damaged heart, it can result in acute heart failure.

Beta-Blocker and Psychopharmaceuticals

Psychostabilization through the Administration of Pharmaceutical Medicine

The psyche can be manipulated. Millions of people assume this as a fact and react accordingly. They take psychotropics – substances used to influence the mind and reduce the effect of stress on the functions of the sympathetic nervous system in order – as they believe – to improve the quality of living through relaxation, reduced anxiety, neutralization of one's basic mood, or suppression of aggressive feelings.

In general, psychopharmaceutical medicines are categorized as follows:

1. Hypnotics, sedatives (used to induce sleep or to relax).
2. Tranquilizers (used to suppress the functions of the central nervous system).
3. Neuroleptics (used to suppress the autonomic nervous system and also as a compensatory agent for certain mental disorders).
4. Thymoleptics (predominantly used to lift spirits and also as an antidepressant).

1. Hypnotics

Hypnotics reduce the excitability of the central nervous system according to the responsiveness of the individual. All hypnotics, including sleeping pills, consequently result in a psychic and physical addiction when administered over a longer period of time.

Sedatives suppress the vegetative centers by intervening in the control mechanism of the sympathetic and parasympathetic nervous systems.

2. Tranquilizers

The therapeutic effect also results from the suppression of the vegetative centers in the brain. However, the excitability of the central nervous system as well as drive and emotional responsiveness are also weakened by this effect. They cause tiredness. Moreover, they induce muscular relaxation and bring about spasmolysis. With psychologically disturbed patients, they give rise to a harmonious and imperturbable state of mind.

Tranquilizers can by no means be considered as a substitute for essential psychotherapeutic measures. They are also just as unsuitable for the treatment of continual stress resulting from overwork.

3. Neuroleptics

Their effect is attributed to a strong influence by the central as well as peripheral areas of the vegetative nervous system, whereby the sympathetic part is suppressed and the parasympathetic part is, thus, relatively activated. As far as the psyche is concerned, the psychic energy level is usually reduced, and, as for the physical realm, the impairment of finely coordinated movement occurs.

4. Thymoleptics

The medication compiled in this group is antidepressant and thus causes a lifting of spirits.

Through experimentation, it has been established that modifications in character and behavior occur after taking small quantities of tranquilizers, neuroleptics, as well as suppressive antihistamine preparations and sedatives. This in turn diminishes alertness and the ability to associate and reason. The processing of signals perceived through the sense organs is slowed down, and the spontaneity and creativity used in the realm of intellectual reasoning are diminished. Muscular tremors and twitching impair physical dexterity.

Under the influence of psychopharmaceuticals, the sensory and sensory motor functions are impaired, and therefore the individual is no longer able to make decisions in certain situations or to actively drive in traffic.

A person under the influence of a suppressive drug behaves differently under euphoric or distressful circumstances than is customary to his usual repertoire of behavior. His behavior can no longer be classified as realistic, since the psyche, when manipulated in this way, is no longer capable of experiencing great joy or deep sorrow. An emotionally sensitive individual is especially vulnerable after discontinuing his medication, since he has forgotten, in the meantime, how to build up his power of resistance against the stress of everday life. He doesn't feel capable of coping with the "threatening" world around him without the rose-tinted filter of psychodrugs, and, in many cases, returns to the use of the "old reliable" tranquilizer.

In sport shooting, psychopharmaceuticals may not be used as a potential means of increasing the shooter's performance, since a very minor decline in physical condition has already given rise to doubts on the quality of sensory motor skills and has negatively influenced such strategies as tactical behavior.

Psychostabilizing effect through the use of beta adrenergic blocking agents?

Beta adrenergic blocking agents (=beta blockers) are substances which inhibit the effect of the sympathetic nervous system or the catecholamine on special receptors – the so-called betareceptors. The latter are found accumulated in the heart tissue, in the musculature of the blood vessels and in the bronchi. Depending on the chemical structure, some exceed the bloodliquorschranke relatively fast and therefore become effective in the central nervous system, while others almost exclusively affect the peripheral autonomic nervous system.

The primary areas of indication are diseases of the cardiovascular system, over-production of the thyroids, increased intra-ocular pressure, and certain neurologically psychiatric disturbances.

Some of the side effects of this medication include bronchial muscular spasms (bronchial spasms), cardiac irregularity, a drop in blood pressure when standing (orthostasis), constriction of arteries in the hands and feet (Raynaud syndrom), release of carbohydrate and fat depots as well as depressive psychosis. Apart from the beta blocker withdrawal syndrom, the strengthening of the stress effect after an abrupt withdrawal (rebound effect) has only been known for a short time. After taking beta blockers, a provocative increase of the betareceptors has not yet been thoroughly discussed.

Beta blockers must be administered initially by gradually increasing the doses and discontinued at the end by gradually decreasing the doses. The intermittent (occasional) use of beta blockers is considered as malpractice in medical therapy. Consequently, beta blockers cannot be considered as indifferent substances. They require medical indication and medical supervision.

Since it is known that the brain has its own adrenergic system, where the adrenaline, which affects the central nervous system, is mostly responsible for vigilance, escape, and defensive reactions, beta blockers are also used for certain psychic and psychosomatic diseases.

As for competitive sports, the favorable influence of the beta blocker on certain cardiovascular parameters of the athlete before the start and during a competition was already established years ago in scientific publications. As a natural consequence of this, athletes, who compete in static disciplines, such as race car drivers, alpine downhill skiers, bob sledders, parachutists and sport shooters have made use of the beta blocker as anticipated.

It was shown that physical symptoms of anxiety, a slightly increased pulse rate, a reactive hypertension and, occasionally, even body tremors could be reduced. The subjective, intellectual feeling of anxiety, however, remained primarily unchanged.

A double blind test, which I conducted on six high performance athletes in 1976 over a period of 28 days of training and competition, proved that the use of beta blockers in comparison to placebos do not result in a significant improvement of the athlete's performance in sport shooting.

In this study, the results obtained were registered and the subjective characteristics evaluated both before and after the application of a placebo or 50 mg of the beta blocker, alprenolol = Aptin-Duriles(R), which was administered one to two hours before the shooting started. Figure 20.

Shooter no.	Before treatment	After placebo dose x for 4 series	Difference: Value at start / placebo	After Aptin-Dur. (R) dose x for 4 series	Difference: Value at start / active sub.	Difference: Placebo / active sub.
1	134	134+/-4	-3	133+/-2	-1	+2
2	135	133+/-3	-2	134+/-3	-1	+1
3	141	142+/-5	+1	142+/-3	+1	+/-0
4	174	180+/-4	+6	179+/-3	+5	-1
5	90	89+/-2	-1	91+/-3	+1	+2
6	94	93+/-2	-1	94+/-3	+/-0	+1

Figure 20:
Shooting results before and after application of placebos or Aptin-Duriles(R)

The results can be seen in figure 20, where the shooting performances are listed both before and after the application of Aptin-Duriles(R) or a placebo. By taking a look at the numerical values, it can be seen that while the results achieved with the use of a placebo were even slightly better, the results with alprenolol caused a minimal decrease in performance. The different appearance
is quite evident when a distinction is made between placebo and active medication. A significant conclusion is not possible with these numerical results as long as the statistically different values are not presented.

When considered separately, shooter no. 4 could be included. An intra-individual comparison is possible here. This athlete achieved better scores with both the placebo and Aptin-Duriles(R), which becomes even more evident with a look at figure 21.

Shooter no.	Before treatment	After placebo dose x for 4 series	Difference: Value at start/ placebo	After Aptin(R) dose x for 4 series	Difference: Value at start / active sub.	Difference: Placebo / active sub.
1	134	137+/-4	+/-3	136+/-4	+2	-1
2	135	135+/-3	+/-0	133+/-3	-2	-2
3	142	141+/-4	-1	140+/-5	-2	-1
4	174	177+/-4	+3	175+/-4	+1	-2
5	90	90+/-3	+/-0	90+/-2	+/-0	+/-0
6	94	94+/-2	+/-0	94+/-3	+/-0	+/-0

Figure 21:
Shooting results before and after application of placebos or Aptin(R)

The increase in performance with the use of a placebo is probably due to the fact that shooter no. 4, as a matter of principle, usually anticipates a positive result after taking medication and that he therefore influenced his psycho-autonomic nervous system through autosuggestion.

Statistically speaking, figure 21 also shows that no definite distinction could be made between the individual groups and that the effect of the placebos in this case did not improve the ability to perform. The average increase with the use of the active preparation is also so minimal that it must be considered unchanged from a statistical point of view.

As for the shooters, their subjective observations under the influence of placebos or active substances were related to their basic moods before every application. All subjective characteristics were counted during three rounds of shooting. Figures 22, 23a and 23b.

	Yes, but not disturbing	Yes, disturbing
(1) Heart beats fast		
(2) Heart beats too slow		
(3) Heart palpitation		
(4) I'm uneasy, nervous		
(5) I'm too calm		
(6) I'm somewhat unconcentrated		
(7) I feel tired in general		
(8) Tired musculature		
(9) Muscle tension is too great		
(10) Slight trembling		
(11) Slight dizziness		
(12) Sweating		
(13) Cold hands		
(14) Stomach disorders		

Figure 22:

Observations during a day of shooting

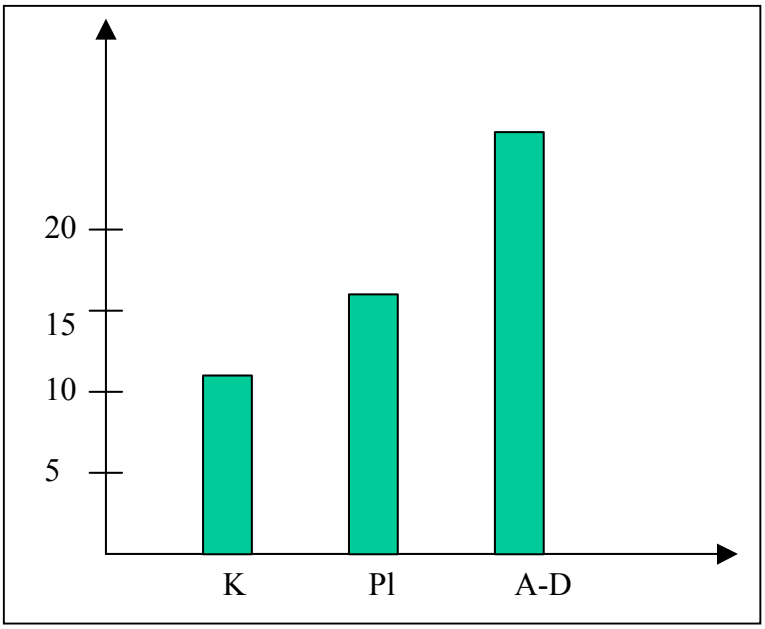
	Before treatment	After taking placebo	After taking Aptin® tabl.
1 □	Somewhat unconcentrated (3)□	Somewhat unconcentrated (2,3) Difficult breathing (2) General triedness (2)	Somewhat unconcentrated (2) Difficult breathing (2)
2 □	Uneasiness (1)□	Somewhat unconcentrated (1,2)	Somewhat unconcentrated (2)
3 □	Tachycardia (2)□	Trembling (2)□	Somewhat unconcentrated (1,2) Tired musculature (1,23) Uneasiness (1,2)
4 □	None□	Difficult breathing (1)□Trembling (1,2,3)□Uneasiness (2,3)□Sweating (1,3)□Hheart palpitation (2)□	General tiredness (2) Tachycardia (1) Difficult breathing (3) Trembling (1,2) Uneasiness (2,3) Sweating (1) Strong muscle tension (2) Bradycardia (3) Somewhat unconcentrated (3)
5	Upset stomach (2)	Trembling (3)□Cold hands (3)	Difficult breathing (3)
6	General tiredness (1) Somewhat uconcentrated (1,2) Difficult breathing (1) Trembling (2) Uneasiness (1,3) Tired musculature (2)	General tiredness (3) Somewhat unconcentrated (1) Difficult breathing (3) Trembling (3) Uneasiness (1,3)	General tiredness (3) Trembling (3)
	12 Characteristics	24 Characterisitics	24 Characteristics

Figure 23a:
Table of subjective characteristics observed by shooters (n=6) during 3 rounds of shooting

	Before treatment	After taking placebo	After taking Aptin-Duriles ® tabl.
1	Somewhat unconcentrated (3)	Somewhat unconcentrated (2)	None
2	Uneasiness (1)	Somewhat unconcentrated (1,2)	Somewhat unconcentrated (2)
3	Tachycardia (2)	Somewhat unconcentrated (3) Difficult breathing (2) Heart palpitation (2) Sweating (1)	Uneasiness (1,2) Strong muscle tension (2) Somewhat unconcentrated (3) Difficult breathing (1)
4	None	Difficult breathing (1,2) Tachycardia (1,2) Uneasiness (2) Sweating (1) Trembling (1) Heart palpitation (1)	Somewhat unconcentrated (3) Trembling (1,2) Difficult breathing (3) Tachycardia (3) Uneasiness (1,3) Sweating (2)
5	Upset stomach (2)	Somwhat unconcentrated (2)	Trembling (2)
6	Trembling (2) Difficult breathing (1) General tiredness (1) Somewhat unconcentrated (1,2) Uneasiness (1,3) Tired musculature (2)	Somewhat unconcentrated (2)	Sweating (2) Upset stomach (1) Difficult breathing (1,3) General tiredness (3) Somewhat unconcentrated (3) Uneasiness (3) Trembling (1,2,3)
	12 Characteristics	17 Characteristics	28 Characteristics

Figure 23b:
Table of subjective characteristics observed by shooters (n=6) during 3 rounds of shooting

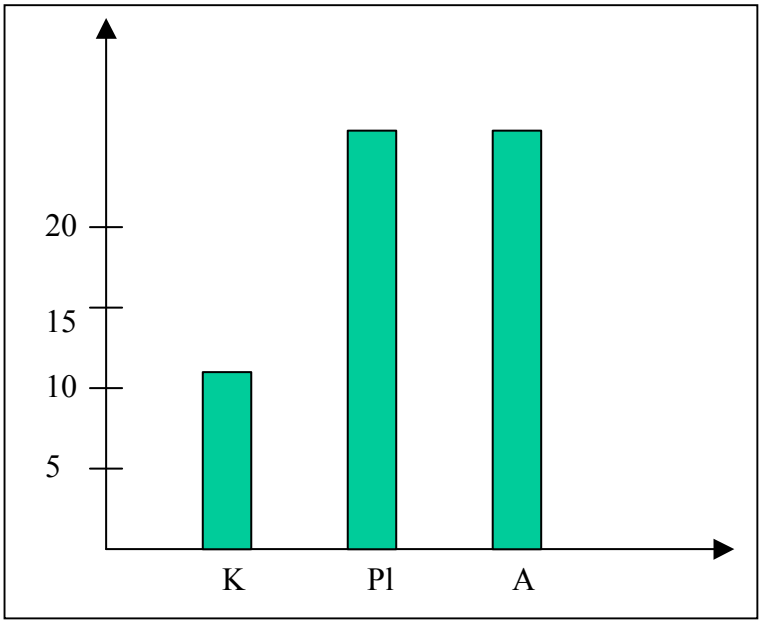
If we summarize the results of the major comparisons made, we can draw the conclusion that the administration of pharmaceutical preparations, whether they be active substances or placebos, bring about a psychic excitability when the shooters are in a particular emotional state of mind. I feel to be justified in my statement by the fact that in both experiments, the group taking the placebo and the group taking the active medication both showed a considerable increase in "side-effects" compared to the group used as a control – with no medication and no placebo. Tables 24a and 24b.



Subjective characteristics

K = Control value without medication
Pl = Application of placeblo tablets
A-D = Medication with Aptin-Duriles(R) tabl.

Table 24a: Comparison of subjective characteristics observed by shooters (no. 6) during 3 rounds of shooting



Subjective characteristics
K = Control value without medication
A= Medication with Aptin(R) tablets
PI = Application of placebo tablets

Table 24b:

In conclusion, one further comment should be made on tables 23b and 24b to the effect that the unusual increase in the subjective characteristics experienced by shooter no. 6 after taking Aptin-Duriles(R) was probably due to the fact that he experienced practically no side-effects after being treated with placebos.

Also, all the double blind experiments, which were conducted later in accordance with statistical factors, confirmed that an increase in performance in highly competitive sports cannot be achieved through the use of beta blockers.

An analogy should make this clear: A psychically unstable test candidate, who is insufficiently prepared for an exam, cannot find essential notes directly before his appointment to take the test. Anxiety of anticipation and failure, which is already existent, becomes greater. The pulse rate and blood pressure rise. He takes a beta blocker. Shortly afterwards, the heart does beat considerably slower and the high pressure caused by stress almost returns to its normal value. The test anxiety, however, which has a negative effect on the psyche as well as the sensory motor functions and which poses a threat to the test results, remains undiminished, just as before.

In the overall field of sports, a “reduction in anxiety” might occur following a biofeedback effect such as: “my pulse is astonishingly slow; my heart is not throbbing in my throat – a condition which I always have observed when I am in top form – therefore I must be in great condition (circular reasoning) and can calmly proceed with the competition”.

Negative effects of the beta blocker

Apart from dependency, the use of beta blockers restricts the individual spectrum in the regulation of organ systems. In unusual situations, the athlete can no longer fully mobilize his physiolgical reserves for use. The fluctuating function of the pupil in adapting to lightness and darkness as well as the ability to focus are impaired. As a result of reduced circulation in the extremities, the sense of touch and the ability of nerve conduction are hampered. The release of glucogen from muscle cells reduces the muscular endurance and also favors a lowering of the blood volume in the lower extremities.

Complementary Transaction between Shooters and Reference Persons

Inter-personal, alternating relationships
A factor not to be underestimated in psychic balance

As far as the inter-personal, alternating relationships are concerned, which develop during athletic training and activities, the trainer, as father symbol, has the single greatest effect on the psychic behavior of an athlete. He is the reference person, and his instructions or presence alone are enough to provide the shooter with a feeling of well-being and security. In total command of the sport, he is able to picture, from his own experience, the individual stages of a competition as well as the emotional stress involved. He can also selectively intervene when extremely strong emotions are displayed due to his psychological understanding of sports. For only he knows the dynamic, psychic functions, which take place in an athlete, and how he behaves under special circumstances. With his help, it is not only easier for the athlete to cope with fear and anxiety but to also overcome these feelings and to perhaps even transform them into positive emotions.

Aside from personal relations, which may develop, the relationship with the trainer is determined by the respective abilities and skills of an athlete in specific areas of sport. In accordance with this, transactions with top shooters usually take place on an equivalent, adult-to-adult basis by means of complementary transaction I (structure diagram by E. Berne) and with less qualified athletes on a child (shooter) to parent (trainer) basis (complementary transaction II). Figure 25.

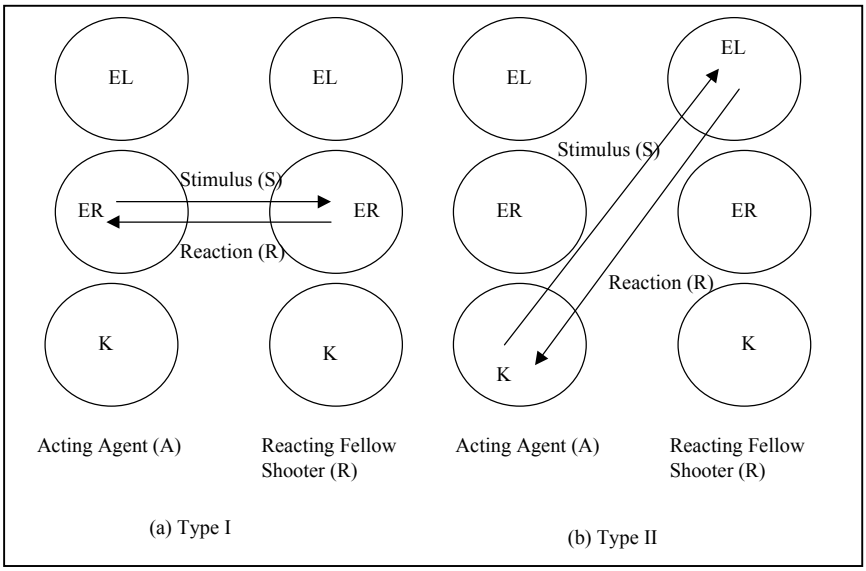


Figure 25: Complementary transaction type I and type II (by E. Berne)
One of the main principles of sport psychology is to never directly intervene in the relationship between trainer and athlete. It is left up to the coach to determine which type

of psychological influence he feels will be most suitable for a given situation. A psychologist, who would like to give advice to an irritated shooter, who he does not know, during a competition, would be overtaxed. It would lead to confusion, if the psychologist, on the one hand, would suggest to the athlete in the stadium suffering from anxiety: "you're in top form; you only have to firmly be-lieve so", and if the trainer, on the other hand, wanted to shake him up with a comment such as "pull yourself together!" Figure 26.

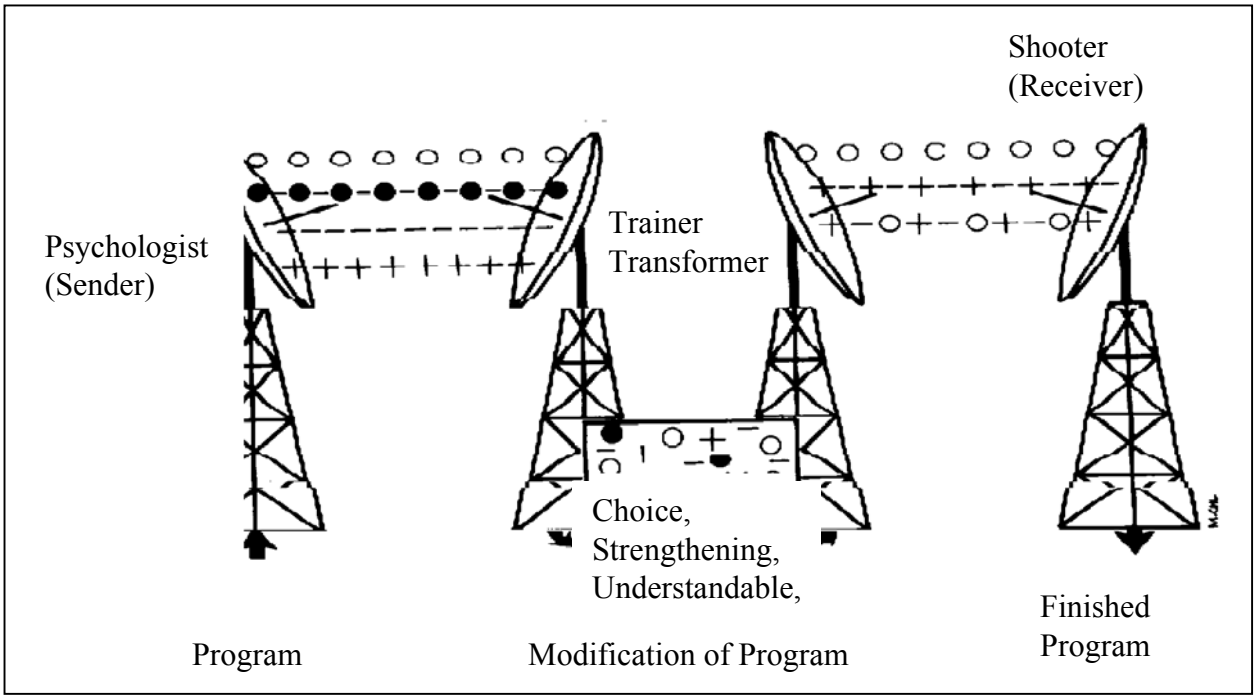


Figure 26:

An incident in regard to this:

A rifle shooter at the European Championships, who was one of the favorites, couldn't manage to get into the swing of the competition. The experienced trainer took her off the shooting range and reprimanded her with harsh words. After that, the athlete only scored "tens". Later on, after pointing out to the coach that modern behavioral psychology strictly prohibits such verbal punishment, she answered, "I have known this athlete for many years now and was absolutely sure that the only way of breaking through her anxiety was with a minor shock."

Individual Psychostabilization

Individual Methods for Stabilizing the Psyche

A person, who is confronted with danger time and again in his daily line of work but is unwilling to assume psychological practices based on scientific evidence and established for the general public, is incapable of developing the psychostabilizing methods exclusively suited for his personality. This holds absolutely true in every respect for athletes as well.

Physical work reduces the subjective feeling of restlessness and induces relaxation

Experience has shown that anxiety, which stems from feelings of anticipation or fear of failure, is subdued by physical work. The catecholamine depots are released, and the hormone level, which gives rise to stress, sinks.

Examples:

At a world championship in clay target shooting, a typical situation arose, in which two contenders from the ranks of the world's best athletes were in a deadlock with tied scores. A so-called "shootoff" then took place to determine which of the two athletes was better. This type of psychological stress is especially great for the majority of athletes. One of the two involved was unable to hide his fear. His face redened, and his hands trembled. The federation's doctor recog-nized this state, which degenerates performance ability, and challenged the athlete to jog a few kilometers with him to loosen up. Afterwards, the shooter recovered his emotional equilibrium and then became the champion.

Distraction by "taking action"

The fact that so many shooters often occupy themselves with their sporting equipment up until the start of a competition should not only be regarded as a means of passing time but also as a means of distraction.

The practice of certain activities such as knitting, crocheting or letting the strings of sensitization, concentration, and contemplation glide through your fingers can largely be classified under this type of behaviour.

We know from Mr. Werner Beier, the world champion runner-up in rapid fire pistol shooting, that he works over the grip of his pistol with laminated wood and file up to the "last moment" before the competition. The effort to form the pistol grip to optimally fit the immediate form of his hand is undoubtedly his foremost intention. However, above and beyond that, he is also able to detach himself from the emotional stress involved – unconsciously for the most part – by devoting himself to physical work.

There is little place for anxiety while concentrating

Some experienced competitive shooters use the time prior to competitions to carefully check their equipment, while others work out plans and strategies to overcome obstacles which may unexpectedly arise. A feeling of security can be created and emotional stress reduced by taking preparatory measures such as mentally "rehearsing" the possible problems which may arise in the course of the event. Table 27.

The analysis of extraordinary conditions during a competition in order to work out appropriate behavioral strategies			
	Prior to competition	During the competition	After the competition
Undesired factors	No preparation rooms. Insufficient training possibilities. Lack of gun stands for making repairs. Insufficient hygiene.	Unaccustomed climate. Unfavorable weather conditions (humidity, rain, strong wind development, squall). Poor visibility. Contrasts in light which are too weak or too strong.	Long periods of waiting due to transportation difficulties.
Station assigned by drawing of lots	A point during competition when the performance level drops low. Great strain on vision through reflection of light and color.	Varying rays of light. Turbulent winds. Distracting noises. Lack of technical facilities.	----
Behavior of opposition	Athletic rank of opposition. Behavior off the shooting range. Success or failure in previous competitions. Techniques formerly unknown. New types of equipment.	Announcement of intermediate results. Tactical behavior.	---
Activity of other people	The conduct of the trainer, teammates, judges and spectators.	Conduct of coach, teammates, judges and spectators.	---
Disregard of sport regulations	Unreliable pieces of equipment.	Unsportsmanlike conduct such as: bandaging of joints, changing the trigger weight, using prohibited aids, contact with others without permission, high level of noise.	
Determining winner by "shootoff"	Apprehensive conversations with coaches and companions. A lapse with regard to physical activity, smoking, eating, drinking during the break.	Influence caused by people crowding behind one's own range or the opposition's range or by the cheering spectators.	
After the competition	------	------	Rating the success. Reactions of coach and companions to the results achieved. Check for a mistake.

Figure 27:

The behavior of those, who have careers involving great responsibility and danger, is very similar to this.

Examples:

Let's take a look at what Mr. Günter Wetzel, a pyrotechnicain, has to say on this subject: "Immediately after I have been assigned a new task, which is long before the actual work to defuse the bomb begins, I contemplate the problems I will have and draw up a plan of action. As soon as I arrive at the site, I fully concentrate on my work and have no time left for feelings of anxiety. Long years of experience and skill have given me the feeling of self-confidence which is essential. I feel that the probability of becoming injured is scant."

The pilots of airline companies are urged, according to their service manual, to act comparably in situations of danger. They have the task of reviewing special check lists point by point. This demands their full concentration, and anxiety is thrust out of the foreground.

Thoughts which trigger anxiety can be suppressed

Some experienced athletes are able to purge their mind and soul of distracting thoughts to a certain degree when they avoid thinking about past failures before and during a competition. They realize that such thoughts can easily trigger trained anxieties and give rise to a stressful situation. This programed method of "avoiding to think about" or "not wanting to think about" emotionally charged, negatively categorized thoughts, is also the most commonly used method in overcoming conflict in daily life.

However, the mental confrontation with anxiety can also trigger feelings of anxiety

Do I have any feelings of anxiety at all? Do they exceed the point necessary to ensure reliable reactions? Are they a result of insufficient training or are they connected with the outstanding condition and equipment of the opposition?

Dividing the anxiety complex into its individual components and analyzing them give the athlete a chance to recognize the type and intensity of anxiety he is confronted with. Then depending on the athlete's personality structure and character traits, he will then be able to find a way to overcome this anxiety.

Examples:

"I believe everything will run smoothly this time. If I do my very best and have a little luck, and if the others have just a pinch of bad luck, this'll certainly lead to the victory I long for – just as it has many times before in my athletic career."

Or...

"The more that's demanded of me, the better I perform. My victories have never been accidental but rather a result of hard work. I have a real chance against the others. I can calmly approach the competition. I even enjoy just thinking about it. If anxiety should arise in the meantime, I'll be sure to overcome it and be proud of the fact."

The famous lion trainer, Mr. Gerd Siemoneit, who deals with anxiety on a daily basis due to his dangerous profession, gives a similar answer.

"Even in my line of work, one is never completely free of anxiety, since predatory animals, just like people, are also subject to moods. It can, therefore, come to pass that aggressions build up during a performance, and the only way for me to finish the act is by energetic intervention. Worry is my constant companion up until the next performance. However, I have never considered substituting a dangerous number by a less dangerous one. My will of self exertion always becomes extremely strong directly following such incidents. I know that the animals trust and accept me as their alpha-animal. This hierarchy has never before been challenged. I await the next performance. I remain fully alert during an act and am always aware that something could happen. But every possible situation can be mastered if one is properly prepared for it. I am absolutely determined to succeed and shall never yield to failure."

The mind can be purged of anxiety through discourse

Unlike those, who suppress feelings of anxiety, some manage to purge their minds of anxiety through discourse. A shooter, who has acquired his own experience in competition, or a friend is usually chosen as a partner to converse with. The process itself is similar to role playing, where the person involved takes on the role of a child seeking advice in a given situation, and the person offering consulation assumes the role of the parent ego. The dialogue proceeds as a ritual of stereotyped formulas composed of simple complementary transactions.

Whereas A (the shooter) dramatizes his fear of failure, B (the experienced friend) attempts to play down its influence through the use of logic and insight.

A: "I am so afraid of losing. I am so anxious, and you alone can help me."

B: "I really can't confirm that. Others impress me as being much more nervous. And besides, a little anxiety isn't bad at all for a competition."

A: "My condition today isn't as good as I had anticipated. Physical ailments – perhaps the first stages of an illness – are distracting me from practice training."

B: "Actually, you have always experienced such physical symptoms before a competition. But at those very times, when you were not quite sure, you always achieved the best scores. Let me remind you of the last time you felt this way about your chances of winning but, nevertheless, became the champion. You only have to believe in your victory."

A: "You're right. Our conversation has helped me. I already feel much better."

Anxiety, a feeling that I don't know

Mr. Wilhelm Herz – the world's fastest motorcyclist – responded as follows to the question of whether he has ever experienced anxiety while performing his sport:

"I'm not familiar with anxiety in sports. Before the start of a competition, I occasionally feel somewhat tense, and my heart probably beats faster than usual, but it has always been a pleasant type of anxiety which is not depressing. With the best possible physical and mental preparation, I have conscientiously rehearsed all the dangers that could possibly arise beforehand. No, I was never familiar with anxiety. If I had actually felt anxious, I would have abandoned my motorcycle in a corner somewhere."

Some professional competitive athletes react quite differently by screaming as loud they can that they are the "greatest" and "undefeatable". In this way, they transform their anxiety into aggression.

In the following examples, one can see to what a great extent the emotions can be influenced:

One of our most successful pistol shooters, Mr. Gerhard Beyer, who has intensively studied methods of psychostabilization for years now, placed himself at my disposal for an experimental lecture on autogenous training. Beforehand, I secured his permission to make several comments in front of the audience which would presumably place him in a certian state of anxiety.

This then occurred as expected. The pulse rate – taken with a bit-to-bit projecting instrument – increased from just barely 50 beats per minute to 130 immediately after my comment and sank within three to five seconds back down to 100 beats per minute. Ten seconds later, it resumed its initial value. The first rate athlete, who was familiar with autogenous training, had his autonomic nervous system fully under control.

With the Olympic and world champion in rifle shooting, Mr. Bernd Klingner, the heart rate – recorded by a telemeter – was registered with an electrocardiograph during an elimination competition. The astonishing phenomenon discovered here was the fact that the heart rate did not exceed 70 to 75 beats per minute as the last shot was fired in both the standing and prone positions – an astonishingly low value for the given stress in such a situation. And immediately afterwards, before he even had a chance to check his score through binoculars, his heart rate increased to 120 beats per minute. As soon as the shooter started preparing to fire his next shot by inserting the cartridge in the barrel and aiming the rifle – even before holding his breath – his heart frequence sank back down to its previously registered rate of 70 to 75 beats per minute. The slow heart frequence during the aiming and firing stages must, therefore, entirely be attributed to a trained immobilization of the vegetative functions evoked through autosuggestion.

Summary:

The author's intention in this lecture was to give a general idea of the psychostabilizing methods relevant to medicine in sports. Apart from autogenous training by J. H. Schultz, the progressive muscular relaxation by E. Jacobson was also dealt with here along with the so-called active regulation of the tonus, developed by B. Stockvis for the resonant sedation of effects, which is also recommended in highly competitive sports.

From a medical point of view in the sport world, autogenous training may be highly recommended, due to its universality, to those who seriously occupy themselves with psychology – and have a trained instructor for consultation – in order to improve the quality of their lives and their abilities to perform in sports. As for systematic desensitizing, it can only achieve its desired effect in collaboration with doctors and psychologists.

A much easier method which especially affects the function of the vegetative nervous system – biofeedback training – should be practiced, as a matter of principle, along with the methods of relaxation described previously.

Music therapy has specific effects on body and soul. Making special efforts without having greater knowledge of the athlete's emotional world is not advisable. To what extent rhythms can be used to stimulate and sedate must first be clarified by further experimental tests. No objection can be made against the use of musical pieces as a means of distraction or passing time – with the exception of exceeding a phon intensity which gives rise to stress.

With the exception of undesirable side effects, which may arise, and legal provisions in sport, psychopharmaceuticals and beta adrenergic blocking agents are not suitable for stabilizing the athlete's performance.

From a physiological point of view, the spectrum available with regard to stimulating and activating processes in exceptional situations is restricted by all these agents. The influence of trainer and coach on the athlete's emotional state of mind was briefly covered, and finally, the methods of psychic relaxation worked out individually by the athlete himself were dealt with.

Anxiety is two-faced. Depending on the situation, anxiety can warn and protect us from recklessly misguided behavior and challenge us time and again to critically analyze our external environment as well as our innermost thoughts. The "disproportional build up" of anxiety can trigger irrational behavioral patterns and set the autonomic nervous system in a state, which is only intended for classical stress situations, where "flight" and "attack" serve as means of maintaining the well-being of the individual. This would be detrimental to the performance ability in a static sport, since apart from the condition and sensomotoric skills, the psychostabilization is one of the three pillars of the competitive shooting sport.

The Use of an Electro-Encephalogram to Evaluate Concentrative Meditation during the Aiming and Triggering Processes in Sport Shooting

by Dr. H. Lösel M.D. and Prof. F. Funk M.D.

A substantial factor on the way to high athletic performance is the ability to concentrate on the respective dominant event, while simultaneously fading out less relevant sensory impressions.

During an optimal aiming and triggering process in sport shooting, the sphere of consciousness is narrowed to such an extent that all surrounding sensory impressions, which are unimportant for the process, are only registered by way of exception. The concentration is solely focused on the conditioned, finely coordinated processes.
That's why highly qualified shooters put down their pistols or rifles during the competition, when they perceive the crack of their neighbor's gun.

To achieve this state, they take enough time before the beginning of the competition to acquire the right frame of mind for the essential elements of the competition.

When I asked a successful pistol shooter about his methodology, he answered, "I suggest composure and calmness to myself - not in the sense of physical relaxation - but rather for keen attention and alertness. Even in my childhood, my father did exercises with me to develop my will and to promote my concentration; such as sitting completely still for several minutes with opened eyes."

Various forms of mental training methods are used in this discipline, which is strongly defined by static elements, to perfect specific sport shooting techniques and to selectively alter states of consciousness.

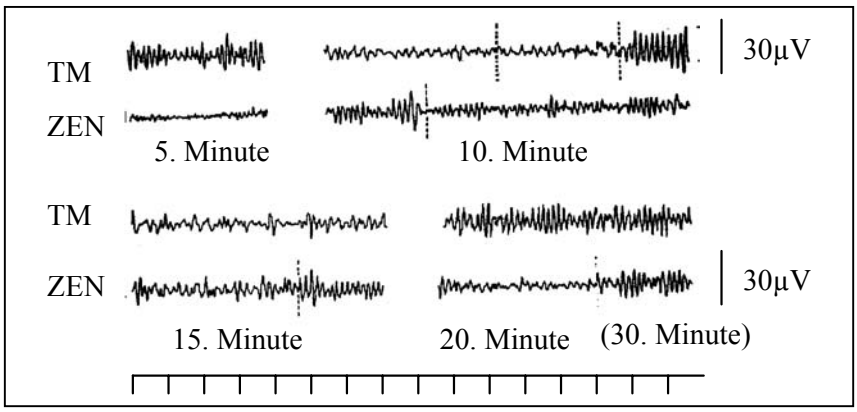
The most common forms are "Progressive Muscle Relaxation" (Jacobson), "Autogenous Training" (J.H. Schultz), certain forms of experimental meditation (Deikmann) and to an increasing extent the Zen Meditations (Zazen) derived from Buddhism.

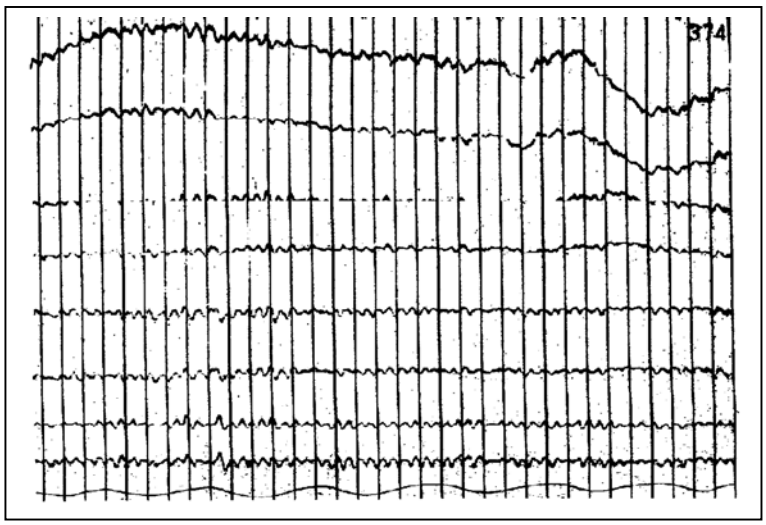
The group of athletes, which make use of such scientifically safe and extensively defined psychological learning systems, must be compared to a further group. Namely those athletes, who have worked out their own methods of personality development, depending upon their cultural group, religion, upbringing, intelligence quotient and other factors that affect the EGO.

In most cases, the athlete is not able to verbalize his method, and only seldomly is a doctor or psychologist able to make an analytical assessment of its components. Furthermore, it is not without risk to consciously recall and discuss the individual elements of conditioned processes.

The use of an electro-encephalogram to evaluate concentrative meditation during the aiming and triggering processes in sport shooting

On test persons, who are active Zen Buddhists, Japanese scientists have been able to prove that higher and slower alpha waves are recorded by an EEG only 50 seconds after immer-sion in meditation depending upon its intensity. By this means, the degree of the meditation can be estimated. Figure 28.





Sections of an EEG conducted on the same person during transcendental mediation (TM) and Zazen meditation (ZEN). In both cases, the EEG was unipolar and recorded by a P3 attached to the ear lob. The dotted lines show the characteristics. Below are intervals recorded in seconds. During TM, the eyes remained closed throughout the test; during Zen, they remained opened. An alpha rhythm is recorded from start to finish, which is partially suppressed by waves of a lesser amplitude and slower frequency. A beta rhythm occurs at the beginning of Zen, but obvious alpha waves occur soon afterwards (despite opened eyes) and remain dominant until the end of mediation. In "immersion" phases, a delta rhythm also appears (according to Rainer Bösel's "Physiologische Psychologie").

Figure 28:

Based on these facts, the suggestion was made to look for comparable changes in the electro-encephalogram during the highly concentrated process of aiming and firing.

Professor Funk M.D., who is a neurological specialist in Mannheim, was willing to conduct the necessary experimental tests.

The first test person was a highly qualified female riflist and multiple German champion in the junior category, and the second test person was a well known international pistol shooter.

The question was whether or not any changes in the EEG of an adolescent rifle shooter occur while aiming, and, more importantly, whether or not alpha frequencies are suppressed during this procedure when the test person is highly concentrated and tense. This procedure requires that the subject hold his breath for several seconds. The changes anticipated in the EEG will then most likely occur during the following phase of shallow breathing and highly concentrated activity. The test was conducted in the usual manner with an eight-channel recorder. The test person, fully equipped, lay prone on the observation mat about 2 1/2 meters away from the target. Aiming and firing with the air rifle were observed.

EEG:

1. Established findings of an EEG taken at rest while sitting and conducted in the usual manner:

A medium to low stress EEG-amplitude showing alpha rhythms radiating from the occipital at intervals of 9 to 10 seconds. Fade-in of occasional intermediate waves at intervals of 6 to 7 seconds. No lateral difference. No focal findings.

Hyperventilation:

Stable activation of the basic rhythm. Minor increase in the fade-in of intermeidate waves at intervals of 5 to 7 seconds. But altogether, no substantial change.

Assessment:

The alpha rhythm in the EEG of an adolescent. A slight fade-in of intermediate waves in some parts. The electro-encephalogram is normal and fully correlates to the age group.

2. The aforementioned test conducted during prone aiming and firing with an air rifle showed considerable movement each time upon cocking the rifle and resuming the correct firing position. Massive artifactitious productions of movement were observed between each sighting procedure. Furthermore, during hyperventilation, only minor restless movements were observed; otherwise only a normal alpha rhythm and an occasional fade-in of intermediate waves.

Finally, another sighting procedure lasting about 20 seconds was registered after hyperventilation which did show in the interim a slight increase in the production of intermediate waves but provided no substantial evidence. As the period of suppressed breathing and intense concentration while aiming came to a close, the alpha rhythm fully returned to normal.

Assessment:

According to the test results presented, there were no substantial changes in the electro-encephlogram of the test person while aiming an air rifle.

The next question was whether or not changes in the EEG of a pistol shooter occur while aiming, since a high degree of concentration is involved in this procedure which does not include hyperventilation but does greatly limit the awareness of environmental influences.
The test was conducted under normal conditions while standing but with the shooting target placed only about 2 meters away.

EEG:

1. Taken at rest while sitting. Conducted under normal clinical conditions with an eight-channel recorder and electrodes fixed in the usual places.

Findings:

A medium to low stress EEG-amplitude showing alpha rhythms radiating from the occipital at intervals of 9 to 10 seconds. Occasional minor artefactitious fade-ins. No lateral difference. No focal findings.

Hyperventilation:

Stable activation of the basic rhythm; otherwise no change and especially no production of intermediate waves.

Assessment:

EEG of a male adult with a stable alpha rhythm and no pathological findings.

2. Conducted while aiming and firing a pistol in the standing position. This test also conducted with electrodes fixed in the usual places and with the use of an eight-channel recorder.

Findings:

Here again, alpha rhythms were observed at intervals of 9 to 10 seconds. However, during the continuous testing of various rounds, stronger intermediate waves were registered more frequently at intervals of 5 to 6 seconds. This became quite evident in the second and third rounds and could be clearly seen during the simulation of a prolonged aiming period in the second round for purposes of control. The intermediate wave activities could be well seen here.

Another impressive feature was the normalization of the alpha rhythm after the simulated aiming procedure showing a steady alpha rhythm at intervals of 9 to 10 seconds under the same aforementioned test conditions.

Assessment:

A test conducted on a neurologically healthy, 37-year-old pistol shooter with a normal, routine EEG confirmed the suspicion that an increasing alpha suppression and the production of intermediate waves known to occur during meditative contemplation and autogenous training can also result during a period of extremely intense concentration while aiming. At least today's findings support this thesis.

The evidence is, of course, somewhat limited due to the suppression of alpha waves which occurs while fixedly staring with open eyes. Control tests conducted during simulated aiming procedures with closed eyes would certainly have been meaningful.

Even though a pilot test did not produce any scientific evidence, it, nevertheless, substantiated the hypothetical assumption that changes in the shooter's EEG can occur during the process of aiming.

What are the consequences of these findings? (Dr. Lösel)

Contrary to the tests on the changes in the electro-encephalogram during transcendental or Zen meditation whose characteristic traits can be noticed shortly after one minute, a temporary suppression of alpha waves can be detected with our pistol shooter during the relatively short period of concentrative tension, and normalized alpha waves can be easily recognized during cognitive relaxation.

How can it be explained that even "Zen Masters" (according to Akira Kasamatsu and Tomio Hirai) need more than 50 seconds to acquire a meditative state with the relevant EEG alpha suppression and intermediate wave production, while the tested pistol shooter is able to do this in a much shorter time.

If you observe the competition behavior of sport shooters, you will notice that those athletes, who make use of a mental preparation, keep their distance from the rest of the group before the beginning of the competition in order to acquire their desired state of consciousness in "isolation".

This narrowing of consciousness with the aim of concentrating on the essential up to the start of the competition varies considerably from one athlete to another.

When the moment of intermittent sighting and firing has come, a minute-long pre-meditative or semi-meditative state - undetectable by an apparatus thus far - gives way to a meditative narrowing of consciousness, according to the analyzable EEG, lasting only a few seconds each time.

An evaluation of the various neurophysiological processes involved in the aiming and firing stages of highly competitive athletes is not possible at the present time due to the limited equipment at our disposal and also certainly the authorization for research which needs to be improved. Further studies are recommended to optimize training strategies when possible and to evaluate the shooter's immediate special condition.

Target Pills!?

To continuously increase one's performance capability, to surpass one's own potential, to achieve goals which are commendable, and to rise up the ranks of the social hierarchy are all themes which not only play a significant role in the sub-culture of sports but are also prized as a normal behavioral pattern in all sociological and professional groups, where goals and the intensity of their pursuit are largely shaped by age, physical condition, edu-cation and upbringing, and the mental ability to differentiate.

Whoever approaches the limit of his physical or intellectual capacity by means of arduous work, intensive studies, or training based on scientific viewpoints will sooner or later ponder the question of whether or not a medication exists which can enhance his intelli-gence, creativity, strength, endurance and reaction time, even if for a limited period of time during an important conference, an exam or a competition. In short, he would like to know if there is a medication which can make him more successful. There is a variety of known active pharmaceuticals which are capable of manipulating the immediate condition of an individual. If this were not the case, then the time-consuming and costly efforts involved in the anti-doping controls at athletic competitions would be unnecessary.

There are pharmaceutical products on the market which can relieve the feeling of pain to the point of anaesthesia. While tranquilizers depress psychic and emotional stimuli, there are other preparations which stimulate physical and psychic functions by releasing hormones. Anabolic substances can promote muscular growth to a pathological degree and can also provoke undesired side effects such as mutations in specific sex characteristics. Other types of medicine block certain regulatory mechanisms of the vegetative nervous system and reduce the increased cardiovascular functions caused by stress. We know of co-enzymes which activate cell metabolism. For the sport shooters, these tranquilizers and sedatives which "enhance performance capability" are worthless since they either interfere with the transmission of stimuli to the central nervous system by way of the sense organs, slow down associations, promote false behavior, or lead to disturbances in the vestibular system, vision and especially in the ability to focus and adapt. They, therefore, question the reliability of the automated sensorimotor skills. In general, stimulants increase blood pressure through the secretion of catecholamine and also increase the heart and respiratory rates. They cause a dialation and fluctuation of the pupils, promote anxiety and rest-lessness, and increase muscular tone while at rest or in motion. As for alcohol, exami-nations on a large collective have shown that neither physical nor mental abilitites can be increased through its use.

However, all of these pharmaceuticals used as drug agents conceal the performance reserves which are stored away for use during a dire emergency and are thus autonomically protected through the blockage or mobilization of biologically protective mechanisms. In addition to this, these pharmaceuticals jeopardize the athlete's health due to the drug addiction which results after a short period of time.

What relevant reasons are there for some artists, speakers, or athletes to use a certain drug before their appearance or a competition, whose effectiveness they are fully convinced of, and to be unwilling or even unable to do without it.

There a singers, who believe to improve their voices by chewing dried prunes shortly before their performance. I once knew a pianist who only felt capable of starting his musical performance after eating ice cream. In the fifties, glutaminic acid was prescribed to intellectual workers and became a smashing success. Today, we realize that it was fully ineffective. Women felt more active and younger in the morning, as they spooned out the contents of a hen's egg in the first stages of hatching.

Furthermore in 1842, a time when mankind already possessed basic medical knowledge in anatomy and physiology, Most described the following methods to treat bleeding in his book of proven sympathetic prescriptions: "Take a freshly laid hen's egg and crack it open at one end. Drain the egg white off and let several drops of fresh blood from the person bleeding trickle into the opening; then place the egg upright so that nothing can flow out and carefully stir it around in its shell with a chip of wood until it coagulates somewhat. At this point, the egg should then be set in a moderately warm place. When the egg's contents coagulate, the individual's blood should also rapidly build a blood thrombus, and the bleeding should subside." With today's scientific knowledge, the suppression of superstition has still not proven successful. It even appears as though it is enjoying a new period of fruition under a different name. Some people have their horoscope drawn up, visit a fortuneteller, believe that 13 is an unlucky number, or refuse to make important decisions on Friday. Furthermore, a black cat, tripping with one's right let, an ugly old hag, a hunchback, or a hearse are all considered to be heralds of misfortune. However, a piglet and a chimney sweeper are supposed to bring luck when they are touched. Amulets and talismans in the form of necklaces, bracelets, rings or belts are also considered to bring luck just like the horseshoe hung over entrance ways.

Whereas our first example could be explained by the placebo effect, the latter was a result of superstition which, according to Goethe, is a part of the human soul and recedes back into the wondrous places and corners of the soul when we believe to have supressed it completely, only to emerge again when it more or less feels safe to do so.

Placebos can be described as a medication in the form of pills, drops or ointments with no active substances, whose effectiveness is a mere result of the test person's or partient's expectations and the conscious or unconscious attitude assumed by the doctor and nursing personnel or other environmental factors which may promote or impede these expectations.
During the past decade, attempts have been made to study the placebo effect with the aid of filed scientific methods. The results of these attempts have shown that 30-40% of the population respond to placebos when they are neutrally administered. Jellineck and his colleagues were able to prove that about 60% of all patients suffering from headaches responded to positive suggestion and that 30-40% found relief from pain through the injection of a mere saline solution.

Asmatic patients were freed of their attacks through placebos. Lasagna discovered that 14% of the patients with severe post operative pain responded in the same way to placebos as to morphine. Wied reported on his observations of 120 women, who had come to be treated for problems with menopause and menstruation. In the first group, 20 women were treated with a placebo and informed that, unfortunately, the medication's effect had been questionable up to that point. Only three women showed signs of improvement. The same placebo, however, was given to a second group with the remark that the medication's effect had been quite reliable. The result: 12 out of 20 women found relief from their afflictions.

If the placebo was substituted by a tested hormone preparation and then administered along with the comment that it was not very effective, only 4 of the 20 women treated reported alleviation of their symptoms. With the use of positive suggestion, however, 14 women were relieved of their afflictions.

Even gastric ulcers and haemorrhages, skin diseases, allergies, insomnia and psychic depression can be influenced by placebos.

Also the psychogenetic tremor, a muscular trembling caused by stress, which is a serious problem for sport shooters during competition, was reduced or eliminated in 30% of the cases treated with placebos. Wolf and Pinsky noted the same high rate of success by administering milk sugar pills to patients suffering from sever anxiety.

The astonishing discovery in the research of placebos is the fact that they not only have a healing effect but also show side effects which are generally known from medicinal therapy.

After administering placebos to a larger collective, Beecher reported that 50% experienced numbness, 25% headaches, 18% tiredness, 15% reduced concentration, and 10% sleepiness. Even the placebo's color plays a role which should not be underestimated. Whereas blue has a tranquilizing and relieving effect, red has the opposite effect.

Pharmaceutical depressants and stimulants are, as already shown, not suited for sport shooting. However, placebos also harbor the danger of a vegetative effect on the shooting results. According to today's findings in sport psychology, a shooter can only place on a continual basis if he succeeds in reaching his optimal condition for competition through intensive psychoregulatory training which can be achieved by either relaxing or activating psychic and physical processes. In addition to this, he should take the time to perfect his sensorimotor skills through idiomotor training (mental training).

He who commands the methods of active self-regulation has no need of target pills and no need whatsoever of magic.

The So-Called Russian Sleep Machine

At the 1978 World Sport Shooting Championships in Seoul, the capital of South Korea, I served as the federation doctor for the German national team. In preparing for the championships, we studied the typical forms of behavior, ways of living, and last but not least, the specific diseases on this continent. Our studies also covered the climatic conditions of this region as well as the reprecussions of the local time change on the performance of our athletes.

A ten-hour time difference between Germany and South Korea means that a number of biological control systems and especially the wake-and-sleep center need several days to adjust to the changed time of day.

In sport medicine, there are naturally recommendations on how to accelerate the adaptation to changed time conditions. Physical activity correlating to the given local time is therefore advised, and if need be, a light sleeping pill is recommended. In my opinion, the latter is unsuitable for sport shooters. Due to the undesirable effects of such medication on the different phases of sleep and the vigilance of an athlete during morning training and competition times, a drop in performance can not be ruled out.

Perhaps there is another alternative, I thought, such as a device developed by Russian neurologists at that time and discussed in literature as the "Russian Sleep Machine". This device was based on the concept that the sleep center in the human brain can be stimulated by specific low-frequency electric impulses of low intensity which ultimately cause tiredness and promote the urge to sleep. The electric currents generated by a battery operated power unit are conducted to the brain, via the eyes, by means of a special close-fitting glasses.

A German company was licensed to build this device, and one such unit was kindly placed at my disposal for testing at the world championships. We first tested the apparatus for several weeks in my practice with quite some success. Sleeping disorders could particularly be improved with this unit in only a few days. Convinced of its practical use, I took it with me to South Korea.

On the second day after arrival, one of our shooters came to me and said, "I didn't catch a wink of sleep last night, doctor. And now I'm dead tired early in the morning. The damned time change has really got me down. Could you try out your sleep machine on me?"
"Why certainly, just stop by my room later this evening."

Round about the time to sleep, he laid down on the examination bed. I placed the special glasses over his closed eyes and asked him to completely relax.

"Let your muscles relax, fully relax and breathe calmly in and out, in and out.

Listen to me carefully.

I am now going to turn on the unit and increase the intensity of the current very slowly. When you feel a light tingling sensation in your eyelids, do not speak but indicate this to me by moving the forefinger of your left hand. If the effect is too strong, then clench your hand into a fist."

The intensity regulator was subdivided into 9 bands. Somewhere around position 3, the shooter moved his forefinger. He therefore felt something. I then turned the device up a little more, whereupon he moved his finger more vigorously, probably because of the increased intensity.

To test this, I then told him that I was going to increase the current even more. If it becomes unpleasant, then make a fist, as we discussed.

Several seconds later, he made a fist, and I turned the regulating knob back down a little.

It was now pleasant and just right.

The shooter breathed calmly and evenly. His head tilted somewhat to the side. His breathing became deeper and he began to snore. About 15 minutes later, I carefully wakened him and removed the glasses from his eyes.

"That's really a fantastic thing" he said, "I actually fell asleep".

The news of this success not only circulated among the shooters but also among the functionaries. I therefore had a lot to do on the following days.

Back in my practice, I told my assistants of the great success with the Russian Sleep Machine. The power unit was then unpacked. And after all the patients had left the prac-tice, my assistant in charge of this unit asked, "did I understand you correctly, doctor, when you reported that the sleep machine was a success in South Korea?" "Why of course, it was a complete success. Why do you ask?" "Very strange, very strange indeed", she said and shook her head pensively, "almost incomprehensible for me. You namely neglected to put the batteries in their compartment, which I couldn't help but to notice when I unpacked the unit."

"I find that fantastic, simply fantastic. That' just another astonishing proof of the power of thoughts and ideas and the effect they have on the function of our psychological and physical systems."

Nevertheless, this placebo effect says absolutely nothing about the effective influence of the so-called Russian Sleep Machine, since effective as well as ineffective measures and methods are subject to suggestive and auto-suggestive mechanisms.

The Russian Sleep Machine was undoubtedly beneficial for our team, even if it was only used as a placebo.

Insufficient Sleep Restricts Performance Ability

The ability to perform during the day largely depends upon the quality of sleep during the night. Although sleeping problems usually do not occur at home, the many unknown factors intrinsic to an unaccustomed environment can cause problems in one's normal sleeping-waking rhythm. An uncustomary bed, the wrong room temperature or too much noise are all factors which affect the depth of sleep and often lead to troubled dreams; they also give rise to the inability to "relax" and to halt the continuous flow of emotions into the unconscious mind. These factors, combined with a lack of sleep, prevent the customary process of revitalization.

Sleep, an active recuperative process of the cerebral metabolism, which is regulated by the hypnogenic center, is closely related to the day-and-night rhythm of the central nervous system. Up until recently, it was assumed that "fatigue toxins" were responsible for sleep. Since no such substances were detected in the central nervous system or in other organs, despite precise analyses, this hypothesis had to be dropped.

Due to recent findings in sleep labs, we have gained greater insight into the essence of sleep. Today, it is well known that the sleeping-waking rhythm is regulated by an inner clock which is synchronized by an external timer to a 24-hour-day period. The main factors for synchronization are not night and day or light and day, as erroneously assumed in the past, but rather much stronger environmental signals which involve the social aspects of our daily lives. It then became apparent that excitatory and inhibitory processes were also largely responsible for one's degree of awareness. This was evident through the increase and decrease of electrical impulses in the cerebral nerve cells. Furthermore, a substance was found which plays a major role in transmitting impulses to the regulatory points of the nervous system - the so-called neural transmitters, serotonine and noradrenaline. Their relation to one another appears to regulate the sleep cycle and depth of sleep.

What happens during sleep? The first sign of sleep appears when the conscious mind is switched off. Due to changes of excitability in individual cerebral regions:

physical reflexes are slowed down,
muscular tone is reduced,
heart rate is slowed down,
respiratory rate drops,
inhalation deepens,
glands produce less hormones,
blood pressure values drop below the day-time level,
blood circulation decreases in the muscles.

All of these signs indicate that the vagus nerve (parasympathetic nervous system) dominates its antagonist, the sympathetic nerve.

As mankind started to dispel the mysticism associated with sleep midway through the past century in the wake of newly developed experimental psychology, it was concluded - by "evaluating the soundness of sleep" - that sleep deepens "rapidly at first and then reaches its peak within half an hour. At this point, the depth of sleep starts to abate, quickly at first, and then gradually subsides until the point of awakening in the morning" (E. Kohlschütter). With today's level of scientific knowledge, this statement is no longer valid. With the use of long-term electro-enzephalograms (brain wave graphs = EEG), the various stages and depths of sleep can be distinguished by the waves and rhythms recorded. The EEG waves slow down as the stage of sleep progressively deepens, and graphic changes known as sleep spindles or K complexes can be recognized according to their form. The so-called delta waves with large amplitudes appear during the period of deep sleep. Three to five phases of deep sleep occur each night and then gradually level off towards morning.

In principle, five stage of sleep can be distinguished as follows:

a) relaxed state of wakefulness with alpha rhythm;
b) process of falling asleep with abating alpha rhythm and the appearance of level delta waves.
c) light sleep in progressively shorter intervals until delta waves finally occur. At this state, sleep splindles appear in
d) a semi-deep sleep where delta waves and K complexes are found; and
e) deep sleep is characterized by large, slow delta waves. Fig.29.

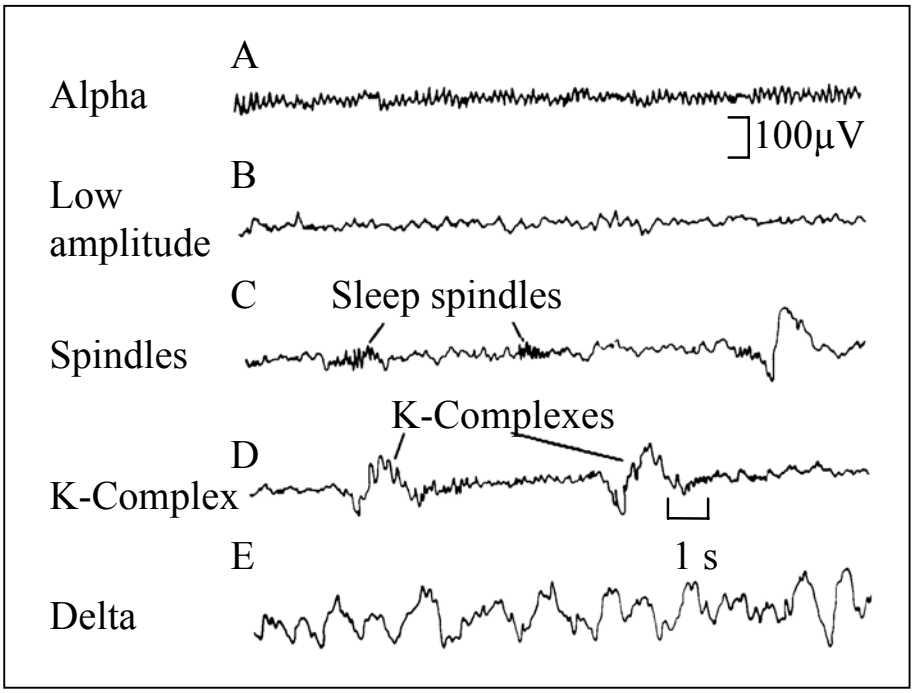


Figure 29:

REM and NREM - Rapid Eye Movement

Stage "b" is deserving of special attention. Although the sleep deepens, the heart and respiratory rates increase, relieving muscular tension and reducing movement of the body and limbs. An exception to this occurs during REM sleep, a stage of sleep named after the term "rapid eye movement". Although the EEG registered during this time correlates to the one recorded while falling asleep, the waking threshold remains just as high as the period of deep sleep. Scientists have tried to account for this extraordinary behavior by referring to REM sleep as a paradox. All other stages of sleep are referred to as NREM sleep (non-REM sleep). A REM period usually lasts about 20 minutes and appears in a 90 minute rhythm. Fig. 30.

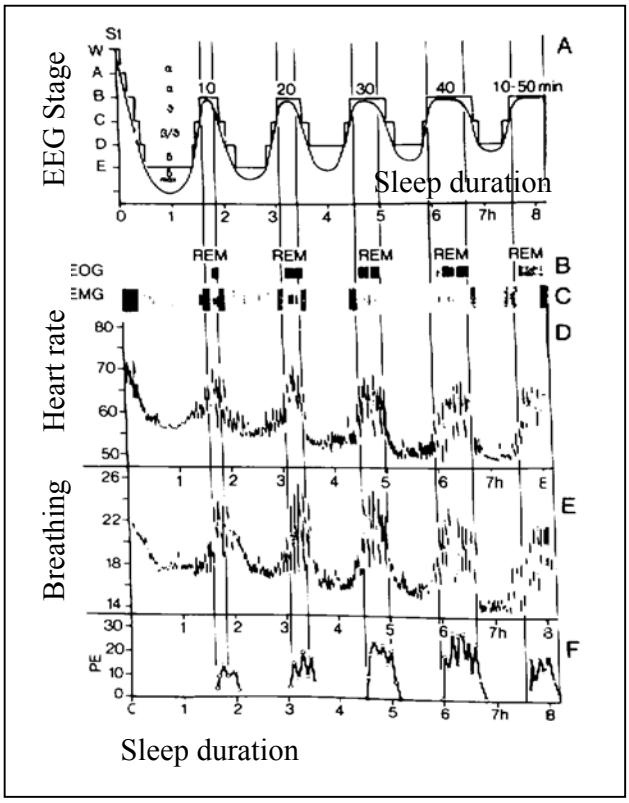


Figure 30:

It is astonishing that the duration of REM sleep during a life-time becomes shorter and shorter with advancing age. There is no binding explanation for this. However, hypothe-tically speaking, the long period of REM sleep during infancy and early childhood may be important in the development of the central nervous system, and the increased REM activity may also serve as a substitute for the low level of environmental stimulation in the child's formative years. Furthermore, neurological research has shown that the tissue hormone, serotonine, initiates NREM sleep, whereas the circulatory hormone, nor-adrenaline is responsible for REM sleep. An explanation for the phenomenon of rapid eye movement has not yet been found. As assumed by serveral researchers in this field, this may be a relic from a period of human development in the past, when mankind was forced to periodically interrupt his nocturnal rest to deal with any impending dangers. Today, this may be considered as a type of control alarm in the hypnogenic center.

Even in a state of deep sleep, one can suddenly be awakened by so-called key stimuli. The best example of this, recorded in literary works, is the so-called nursing sleep. The wet nurse

can suddenly be torn from sleep by the soft crying of a child - the key stimulation - although the sound may be so low - almost imperceptible - that it cannot be registered.

The depth and duration of sleep as well as the rhythm of sleep are affected by dangerous diseases, injuries or feverish infections. Very practical! In this manner, the phase of inactive sleep, during which the circulation and metabolism are both reduced to a "minimum", is shortened.

Uneasy sleep

The biological clock responsible for the sleeping-waking cycle can function improperly such as not tiring until the wee hours of the morning or waking up at the crack of dawn. As long as the person in question acquires sufficient sleep - be it a shorter period of 5 to 6 hours or a longer period of 6 to 9 hours - there is no reason to worry. Fig. 31.

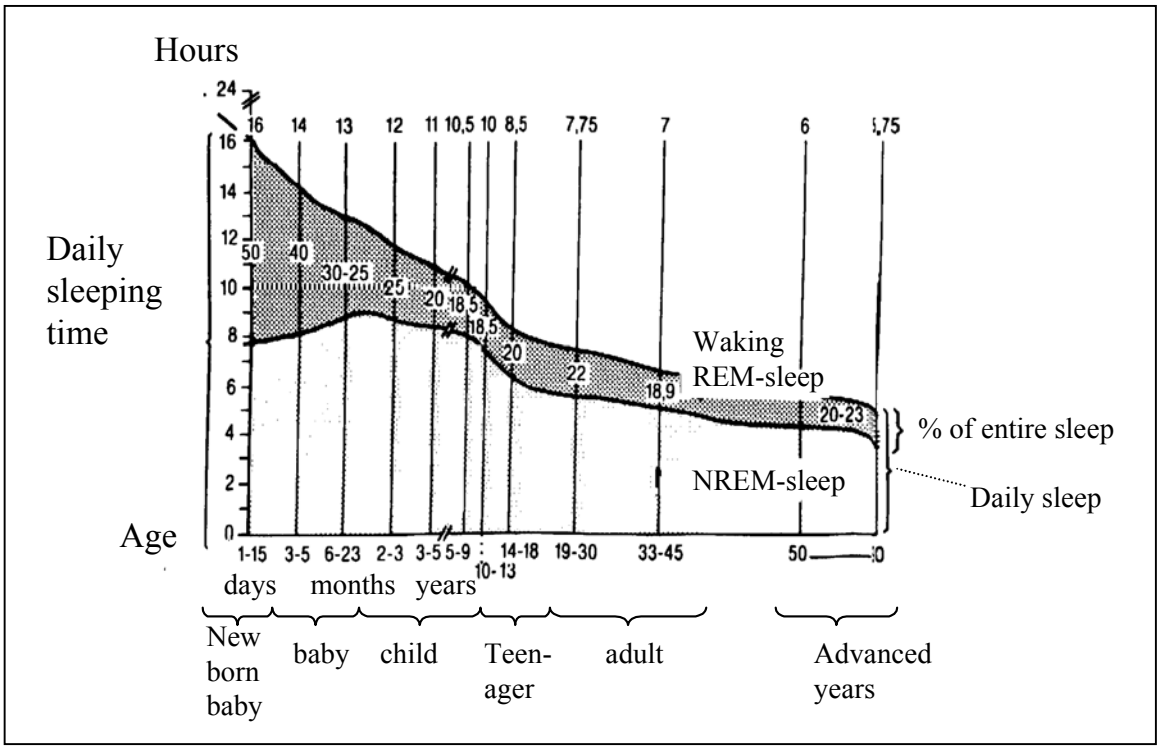


Figure 31:

The most common cause of troubled sleeping is the keen attention paid to certain thoughts and ideas, especially if they are of an emotional nature. Also during great physical, emotional or mental stress, the "mental preparation" needed for sleep is slowed down.

Helpful tips for falling asleep

A sumptuous dinner late at night or stimulants such as alcohol, coffee, tea or soft drinks are just as disturbing to the waking-sleeping cycle as emotional conversations or activities.
The room used for sleeping should be dark, agreeable in temperature, and quiet. The windows should be open to provide necessary air circulation. A warm bath before going to bed can promote relaxation. An arm bath can be helpful as well, placing the forearms in a basin filled with moderately tempered water of about 36° C and gradually increasing the temperature to 43° C within a period of 15 minutes. The same results have been achieved by washing with vinegar-water, using rubbing alcohol, or wrapping wet compresses around the lower legs.

Electro-therapeutic sleep was introduced in the USSR for the first time about 35 years ago for the treatment of vegetative disorders. During this procedure, the central nervous system was exposed to low frequency eletromagnetic oscillations which are supposed to have a soothing effect on the hypnogenic center. To what extent the use of this so-called "Russian sleeping machine" is able to actually induce sleep or have a suggestive effect is still largely unclarified.

The use of sleeping-pills also involves certain risks. All sleeping medication, which is taken for a long time, leads to a psychological and physical dependeny - addiction. Due to their influence on the individual sleeping phases, the natural course of sleep is mani-pulated, and the general ability to perform on the following day is impaired.

Psychological methods

Counting sheep ... no.

The greatest hindrance of sleep is the unconscious will to fall asleep ... because ...sleep is necessary. According to the law "contradiction is the fruit of hard labor" (Baudouin), this is a guaranteed method of staying awake. A sleeping aid, which is supposed to work by means of mental exhaustion is unsuitable. Counting sheep, solving math problems, or mentally rehearsing poems once learned are only hindrances to falling asleep, and the same holds true for concentrating on problems and ideas.

Relaxing exercises ... yes.

The greatest success is achieved with the help of physical and mental relaxation which can be accomplished through autogenous training (J.H. Schultz) or the active control of tension (E. Stokvis). Contrary to preparation for a competition, the method of progressive muscular relaxation explained by E. Jacobson is not well suited for falling asleep since it increases the circulation in peripheral areas of the body and thus activates the metabolic and circulatory organs. Techniques of the aforementioned methods of relaxation were thoroughly described in a series of articles I wrote entitled, "I Suffer from Anxiety" - methods of psychological stabilization in sport shooting - appearing in issues 6 though 10 of the "Deutsche Schützenzeitung" in 1983.

A state of restricted consciousness, during which pictures originate and then flow - one scene at a time - before the "mind's eye", is called film-strip thinking. Film-strip thinking is an intermediate stage between the conscious state of mind and sleep. In a relaxed position with closed eyes imagine being seated in a cinema and waiting for a film to start flowing across the screen. After a period of time, differences in brightness start to appear in the "mind's visual field", and then pictures resembling still or moving figures appear in black-and-white or colored tones. Although the flow of pictures is meaningless and unsystematic at first, one should remain fully passive and not try to interfere in the order of things. The pictures gradually take on meaning, and the film strip ends in a dream.

Music can cause drowsiness but only if the music selected for sleeping suits the individual and is chosen according to his taste. Slow rhythmic pieces with many low frequencies and monotonous tones are better suited for this purpose than emotionally-packed pieces.

Lack of sleep the night before the competition

During the period of preparation for a competition, the psychological state of an athlete becomes increasingly tense. Before falling asleep, he usually rehearses in his mind all the steps planned for the forthcoming competition and develops the necessary behavioral strategies. The time used for this robs him of valuable sleep at night. Furthermore, if a shooter also has to rise early in the morning because his accommodations are far away from the competition site, he will be forced to perform without adequate sleep on the day of competition. However, it would be wrong to try to compensate for this lack of sleep during travel time, since many of the body's organic functions are - as always during sleep - minimized during such a "cat nap". After waking up, a fairly long period of time goes by before the finely coordinated sensorimotor skills are able to function with the appropriate precision. At the shooting range, no time is left to tune these skills.

A further disadvantage of a "cat nap" is the danger that the relaxed musculature while sleeping will not be able to cushion a sudden shift in the head's position caused by abrupt changes in the vehicle's velocity.

Abnormal stress or too much strain placed on the small vertebral joints; decreased arterial circulation in the cervical vertebra; and inadequate function of the central nervous system can result from this.

Quintessence:

A cat nap during the trip only has disadvantages!

Summary:

Sleeping should be regarded as an active process of recuperation involving cerebral metabolism. The physical and psychological well-being of a person is largely dependent on the quality of sleep he gets. In sport shooting, where psychic and vegetative processes, awareness, reaction ability, and the interaction of the sense organs all play major roles in shaping the shooter's capabilities, too little or very light sleep is a factor which restricts the shooter's performance.

Falling asleep can be learned and conditioned just like any other form of behavior. Autogenous training and film-strip thinking can be used as aids, whereby the latter helps to

facilitate the transition from conscious awareness to sleep. A few other "natural" methods or background music have also proven effective in relieving anxiety, improving relaxation, and thus promoting sleep.

Cigarette Smoking

A Factor which Impairs the Ability to Perform in Sport Shooting

Nicotine is a highly active poison

If the nicotine contents of only 3 to 5 cigarettes are administered at the same time, the effect can be deadly for an adult. Cigarette smoking, however, also promotes the develop-ment and progress of certain inflammatory or degenerative cardiovascular diseases. Statistics compiled from epidemiological tests have shown that smokers suffer from cardiac infarction or die of acute heart failure 2.5 times more often than non-smokers and that heavy smokers run this risk three times more often. Furthermore, if cigarette smoke is inhaled over a period of many years, it will favor the development of vascular constriction and vascular collapse of the lower extremities - the so-called smoker's leg. It is also the cause of some types of malignant tumors on the mucous membranes of the mouth and respiratory organs.

However, the performance ability of a fully healthy athlete is also impaired to a great extent by cigarette smoking. A good example of this is the increased airway resistance when smoking.

Shortly after smoking only one cigarette, the airway resistance increases with the con-striction of the bronchi and the small bronchi to the point that the air volume is signifi-cantly reduced while inhaling and exhaling. Under physical stress, this becomes more apparent with the drop in performance level which occurs when the airway becomes smaller. The air passage continues to narrow while smoking as a result of the increased mucous secreted by the bronchi (fig.32a + b).

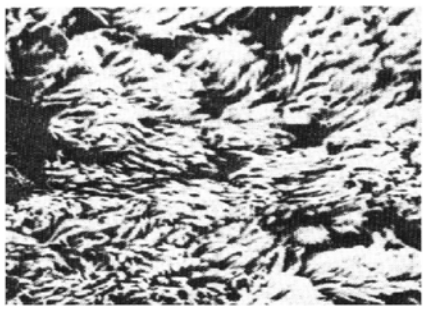


Figure 32a:
(x 20 000, Cambridge Stereoscan Electron Microscope, Documentation Zyma)
Epithelial cilila of the bronchial mucous membrane of a healthy person.

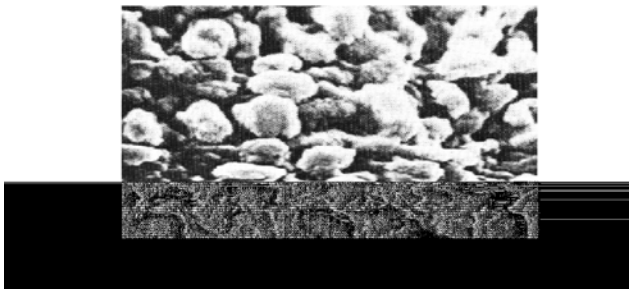


Figure 32b:
(x 50 000 Cambridge Stereoscan Electron Microscope, Bayer AG, Leverkusen)
A diseased epithelium which is often found by chronic smokers. The cilia are covered and enveloped by viscous phlegm and bacteria, so that normal functioning is not possible.

The pharmacological effect of tabacco is largely unknown. Apart from its central stimu-lating effect, tabacco smoking has also been determined as the cause of vascular con-striction in the terminal vascular bed (capillary system).

Smoking increases the level of carbon monoxide in the blood

The oxygen, which has reached the blood stream by way of the lungs' alveoli, must be carried to the user - the body's cells. The transport of oxygen (O_2) primarily takes place through the chemical bonding of hemoglobin with red blood corpuscles.

Under atmospheric conditions, 1 gram of hemoglobin can bond 1.34 ml of oxygen which means that a hemoglobin content of 15% can transport 20 ml of oxygen in 100 ml of blood. The amount of oxygen bonded with hemoglobin - oxygen saturation - fluctuates between 92% and 98% under normal conditions.

When the bonding curve of exogenous carbon monoxide (CO) with hemoglobin becomes steeper than the bonding curve of oxygen with hemoglobin, oxygen is released from the blood pigment for breathing, even if only a small percentage of carbon monoxide is available.

Smokers, therefore, have a considerably higher level of CO_2 in their blood than non-smokers. By smoking 20 cigarettes each day, about 3.5% of the red blood pigment (hemoglobin) is transformed into carbon monoxide hemoglobin - also called carboxyhemoglobin (fig. 33a + 33b).

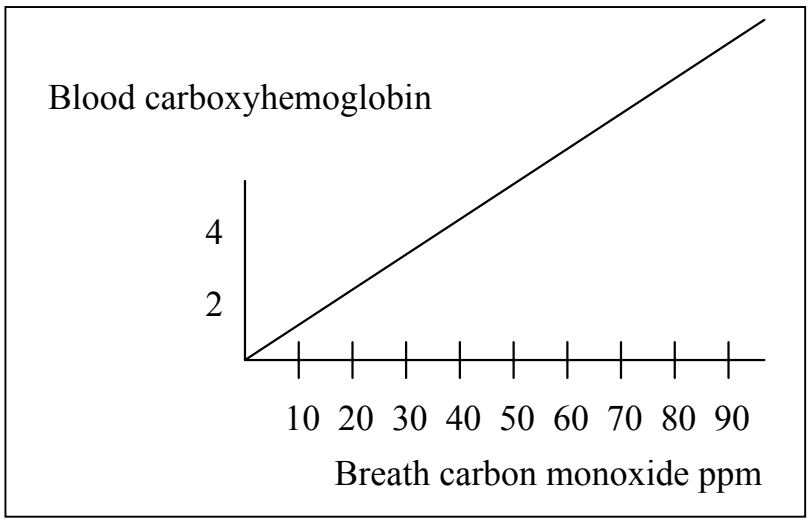


Figure 33a:

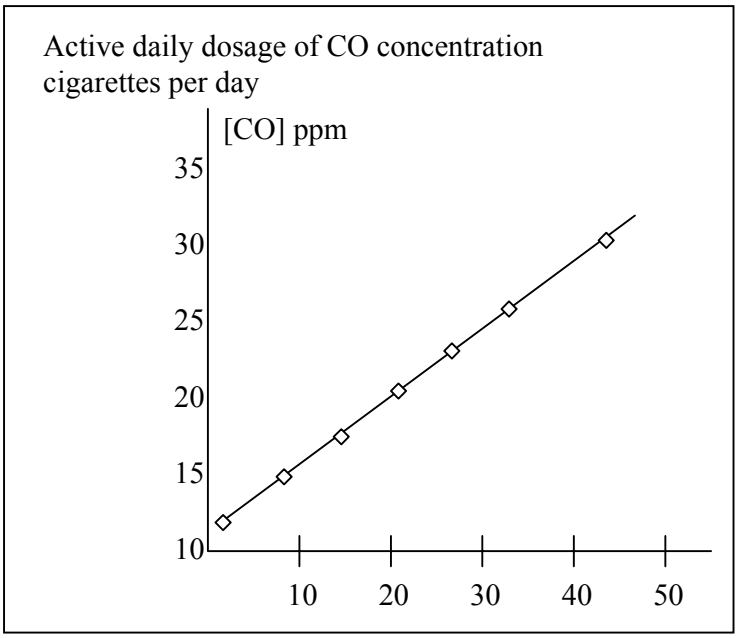


Figure 33b:

With 50 cigarettes a day, this increases to 6%. With a carboxyhemoglobin concentration of more than 10%, the regulatory mechanisms of the central and peripheral nervous systems are impaired; alertness dwindles; attentiveness and reactivity slow down. Athletes in such disciplines as shooting, which demands finely coordinated movements over an extended period of time, suffer the consequences.

We shall use the vital graph EC 50 to determine the level of carbon monoxide in the blood. With this graph, the concentration of CO in expired air can be determined (fig. 34).

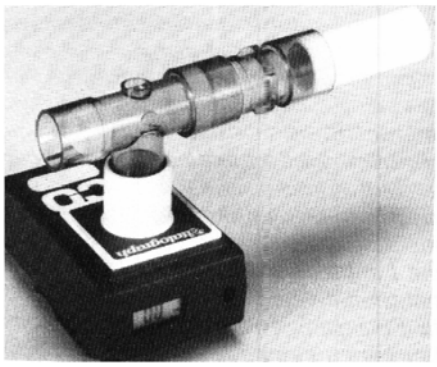


Figure 34:

The following example shows us that the content of carbon monoxide in expired air increases by 5 points after only smoking a single cigarette, and the forced volume expired in the first second - value indicating the permeability of the air passage - drops by about 8%.

Example:

Test person: a 40-year-old female, 163 centimeters in height, moderate smoker (3 to 5 cigarettes per day). After smoking one cigarette in the morning, a test is made on the carbon monoxide content of expired air, and a spirometric examination is conducted before noon.

Both tests are repeated 5 minutes after smoking a cigarette.

The concentration of carbon monoxide in the examination room (measured with a vital graph EC 50): 1 ppm = 1 x $10^{(-6)}$.

The carbon monoxide content in the expired air of the test person (before smoking): 11 ppm

VC	target: 3.36	measurement: 3.31
FEV_1	target: 2.84	measurement: 3.09
FEV_1/VC	target: 82	measurement: 93

Carbon monoxide concentration in the examination room: 1 ppm

Carbon monoxide content in the expired air of a test person (5 minutes after smoking a cigarette): 16 ppm

VC	target: 3.36	measurement: 3.65
FEV_1	target: 2.84	measurement: 2.85
FEV_1/VC	target: 82	measurement: 78

VC	= vital capacity
FEV_1	= forced volume expired in the first second
FEV_1/VC in %	= relative value of a second ppm = parts per million

Non-Smoker through "Meditation"

Many methods of breaking the habit have been recommended according to the psychic make-up of the smoker - occasional smoker, pleasure smoker, compelled smoker, or chain smoker. Whereas medical treatment, including the recent use of nicotine chewing gum, etc. has not proven very successful, astounding results have been achieved among occasional and pleasure smokers and, to a lesser extent, among habitual smokers through the use of psychology and behavioral therapy. I would like to introduce a method, which I have drawn up, for the individual smoker to break the habit through "meditation".

A poster with the letter "N" written in red on a yellow background is needed for this. The "N" stands for "non-smoker" (fig. 35).

Figure 35:

The letter "N" - 8 cm in height, bright red in color and 1 cm thick
is glued in the center of a yellow piece of paper with a border edge of 12 cm x 12 cm.

Before starting this therapy, a list should be drawn up noting the negative factors of smoking on one side and the positive factors to be gained by not smoking on the other side (fig. 36).

Negative Factors: Smoker	Positive Factors: Non-Smoker
Nicotine causes: addictiveness Vegetative disturbances: rapid heart rate, reduced circulation Lung and respiratory diseases; increased mucous secretion, constriction of bronchi, destruction of pulmonary air cells (aveoli), reduced saturation of oxygen in the blood, lung cancer.	By giving up nicotine, the following can be expected: Improved heart and circulatory function with regard to: blood pressure, heart rate, central and peripheral circulation, economizing of breathing and transport of oxygen in the blood, reduced danger of cancer.
The athlete should modify the list of negative factors for smokers and positive factors for non-smokers according to his own personal points of view.	

Before every experiment, the advantage of breaking the habit should be carefully considered from the list of factors drawn up, and a set resolution should be formulated: "since smoking is a risk ... I shall become a non-smoker ... non-smokers are generally healthier."

Afterwards, one should concentrate on the brightly illuminated poster of the letter "N" for about 2 minutes at a distance of about 30 cm and softly but sternly repeat the word "non-smoker... non-smoker...". Upon completion of this, the eyes should be closed. A "mental picture" of a green "N" on a blue background now appears as a so-called negative after-image, which can be retained for a shorter or longer period of time depending on concentration and practice. The mental image of "non-smoker" should retain its intensity until the picture has faded.

The evening meditation should be done shortly before falling asleep. The mental aim is then not disrupted as much through external stimulus and can be continued in the un--conscious mind. After "meditating" in this fashion two times a day, the desired effect can be achieved in only a few days or sometimes in one or two weeks - similar to breaking the smoking habit through hypnosis.