DOCUMENT RESUME

ED 164 497 95 SP 013 510

AUTHOR Frederick, A. B.
TITLE Relaxation: Education's Fourth "R."
INSTITUTION ERIC Clearinghouse on Teacher Education, Washington, D.C.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE Jan 79
NOTE 32p.

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS Behavior Patterns; *Coping; *Human Body; *Hypertension; Motor Reactions; Neurology; Physiology; *Stress Variables; *Teacher Role
IDENTIFIERS *Relaxation; Tension Control

ABSTRACT

Strategies for coping with stress and tension that may be used by a teacher in a classroom setting are presented. The development of tension control as an area of study is traced, noting the role total relaxation plays in various religious and philosophical movements. Stages of teaching students how to relax through a technique known as progressive relaxation are described. A glossary of selected terms frequently used in tension control literature is included, and references for further reading are provided. (JD)

SPECIAL
CURRENT
ISSUES
PUBLICATION

No. 10

Relaxation: Education's Fourth "R"

Clearinghouse on Teacher Education

RELAXATION: EDUCATION'S FOURTH "R"

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Published by:

ERIC Clearinghouse on Teacher Education
One Dupont Circle, Suite 616
Washington, D.C. 20036

January 1979

SP 013 510

The ERIC Clearinghouse on Teacher Education is funded by the National Institute of Education, in cooperation with the following associations:

American Alliance for Health, Physical Education, and Recreation
American Association of Colleges for Teacher Education
Association of Teacher Educators
National Education Association

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FOREWORD

This tenth in the series, Special Current Issues Publications (SCIPs), takes a look at a subject long neglected in the curriculum of most schools: instruction in strategies for coping with the stresses and tensions of our modern society. Unlike the popular "Peanuts" comic strip character Lucy, who counsels, "Snap out of it! (Five cents, please)," most of us are unable to turn off the cares of our surroundings at will, to disassociate ourselves from the minor but cumulatively burdensome hassles of daily living.

The tightening of muscles, the wrinkling of brows, the clenching of teeth are manifest signs that tension is more than a mental condition. After we have accepted the nature of the physical reactions it triggers within our bodies, the first step in reducing tension's debilitating effects is to recognize that tension control is a skill to be learned like any other--and that relaxation, like any other skill, is perfected through practice.

This document briefly traces the development of tension control as an area of study; takes note of the essential role total relaxation plays in various religious and philosophical movements; and describes stages of teaching students how to relax through a technique known as progressive relaxation. The author emphasizes the need for teachers to receive inservice training before attempting to implement tension control in their classrooms. The second part of the publication provides a glossary of selected terms frequently used in tension control literature, with helpful references for those interested in further reading on any of the topics mentioned.

A. B. Frederick, Associate Professor of Physical Education at the State University of New York--College at Brockport, is well qualified to write about tension control, relaxation, and stress management. He has taught courses in relaxation and tension control at both the public elementary school and the college levels, and has organized classes for other community groups as well. During the past 20 years, he has regularly contributed articles on the subject to a number of publications. Dr. Frederick is at present coordinating the efforts of the American Association for the Advancement of Tension Control (AAATC) to establish a certification plan for educators, in order to promote the skills of tension control through a standardized method of instruction to a wide population of learners.

The Clearinghouse is grateful to the author for sharing his professional experience in this publication. Comments or suggestions from readers are encouraged; and information about how others can add their knowledge on this subject to the ERIC data bases appears at the end of this document.

Karl Massanari
Director, ERIC Clearinghouse
on Teacher Education

RELAXATION: EDUCATION'S FOURTH "R"

In recent years, problems related to tension and stress have been publicized with increasing frequency in the press and scientific journals. Tension disorders are identified as a major health threat in modern America and elsewhere. A partial list of leading tension disorders would certainly include hypertension, heart disease, gastrointestinal ulcer, and anxiety syndrome. Paralleling the interest in tension states is the idea that individuals should become more independent with respect to health care. Physicians and laymen are concerned about the promiscuous use of prescribed tranquilizers as the most prominent treatment for a host of tension-related disorders. The use of nonprescriptive drugs, especially for the relief of pain and insomnia, has also escalated to amazing levels.

Good evidence is available that the artificial tranquility of a pill-dependent society might be at least partially abandoned by those investing some time in learning relaxation procedures. Once educators are convinced of the value of such training, a school-based program in tension control is the most efficient way to reach a majority of the population. Both elementary and secondary school students would benefit, and instruction could also be available for adults through the community-school program of continuing education.

Where pilot programs have been conducted in the schools, results have been encouraging, although not enough longitudinal data have been gathered to know the effect of early training on the habit patterns of selected populations. This monograph is therefore written to stimulate interest among educators. The information presented comes from the experiences of public school and college teachers, most of whom have received the kind of training necessary to establish sound programs of tension control in public education. Relaxation is really a basic educational ingredient and as such qualifies as education's fourth "R".

What Is Tension Control?

Tension control, as it relates to education, is very much like any other neuromuscular skill one may teach or learn. Almost everyone can learn to swim or play tennis satisfactorily. Experience with relaxation training similarly shows that most students can master the skills required. Like any other neuromuscular skill, there are variations in performance attributable to practice variables and the normal distribution of inherited traits.

The goals of tension control training are twofold:

1. General relaxation for the purpose of cultivated rest and preventative medicine

2. Selective or differential relaxation for the purpose of efficient movement.

In the sense employed here, relaxation training and/or tension control training has a very simple definition, based on the physiological state of striated or voluntary muscle tissue. In the sense of

the physiologist, muscle tissue either contracts or it does nothing (relaxes). During the relaxed state, electrical activity emanating from the muscles and associated nervous tissue approaches zero. This was confirmed by Edmund Jacobson as early as 1930, shortly after the first extremely sensitive apparatus (electromyogram) had been developed. Jacobson actually collaborated with technicians at the Bell Telephone Laboratories to develop an instrument capable of detecting muscle voltage in fractions of a microvolt. A microvolt is 1/1,000,000 of a volt.

For nearly half a century, Jacobson had shown repeatedly that very small amounts of persistent muscular contraction or "bracing" could be held accountable for an array of tension disorders ranging from stuttering and teeth clenching (bruxism) to essential hypertension (high blood pressure with no known cause). Tension disorders often develop simply because the individual victim is unaware of habitual, residual tension. For example, many victims of high blood pressure feel healthy and have few complaints. They are surprised when their physicians apprise them of such a condition. In our normal, daily activities, there is little need actually to feel the function of our muscles in a multitude of learned habit patterns. The problem is that nature conceals the bad with the good. It is primarily for this reason that training in muscle tension recognition is required for a majority of individuals, so that they become aware of unnecessary or wasteful efforts. For example, one often observes a driver gripping the steering wheel of an automobile with excessive pressure. Other individuals have a constantly furrowed brow. The latter may often complain of headaches, while the former may tire easily at the wheel. Insomnia, test anxiety, and headaches may be due in large part to a simple lack of recognition of wasted muscular efforts.

Teachers with even brief experience recognize a great amount of variability in their students. Just as some are short and others are tall, there is also a normal student variability in tension levels. Some students are characterized as "nervous" while others seem to be "relaxed," in the layman's sense. Such variability is usually magnified when a teacher has studied tension control because the training highlights the process of observation. Those who have taught others to relax realize that without training the variability of wasted efforts observed in any population is likely to remain the same, whereas trained individuals seem to make appropriate adjustments in their behavior patterns.

The need for trained instructors seems to be crucial. Jacobson has often stated that he knows very few individuals who were able to train themselves even when exposed to appropriate materials including printed instructions and tape recordings. Those who have taken a course in progressive relaxation are given the tools that enhance their potential for better self-programming. This is not to say that behavioral changes are observed in all trainees, but positive reports commonly accompany training in tension control.

Tension Control in Education: A Brief History

For nearly two decades, educators have had the opportunity to participate in tension control programs. The first major effort to teach tension control techniques to large groups was developed as an

experimental program for the U.S. Navy near the end of World War II. Neufield (1951) employed Jacobson's progressive relaxation, a method of tension control with a proven record of results in medicine, to train more than 15,000 Naval cadets.

Tension control methods and techniques designed for use in the public schools were developed somewhat later and were given momentum in teacher preparation programs by the strong leadership of Arthur Steinhaus of the George Williams College in Chicago. Steinhaus began to certify teachers in the techniques of progressive relaxation in Chicago and elsewhere. These teachers then established their own programs in many parts of the country.

Steinhaus had himself been trained in progressive relaxation at the University of Chicago in 1925 by Jacobson, who was at that time conducting sophisticated physiological research in low voltage measurement in muscle. Steinhaus thus became the first of many educators trained by Jacobson. In 1974 Jacobson was honored for his many contributions to education, as the recipient of the Anderson Award from the American Alliance for Health, Physical Education, and Recreation (AAHPER).

Jacobson's initial research in relaxation appeared in scientific journals as early as 1910. He reported the results of his experiments at Harvard and Cornell. His most important work, the measurement of muscular tension, was conducted at the University of Chicago; and in 1929 that institution's press published his classic work, Progressive Relaxation, as well as a revision a decade later (Jacobson, 1938). To the present day, this text remains one of the best resources for methods of teaching relaxation in a clinical setting. Adaptations for the classroom and the gymnasium have been derived primarily from this resource.

In the early sixties, the Foundation for Scientific Relaxation founded by Jacobson and others began to offer instructional materials in order to educate the physician about the clinical use of relaxation techniques as well as to sponsor pilot programs in relaxation training in public schools and colleges. It was thought that early training in relaxation would be a valuable contribution to preventative medicine. In 1974, at the first annual meeting of the American Association for the Advancement of Tension Control (AAATC), Marshall and Beach (1975) reported on the education of teachers in the field of tension control and the cooperative project of the East Lansing Public Schools and Michigan State University to teach relaxation techniques to elementary school-aged children. The initiation of this program was due to the enthusiasm of Steinhaus.

The first notable public school program in relaxation training was organized in 1961 under the auspices of the Foundation for Scientific Relaxation. Children in selected elementary schools and their teachers participated in the program under the leadership of Cosmo Cosentino and Bernardine Lufkin. The interest and experience of the Chicago teachers prompted others to investigate the methods employed. Frederick (1967) reported on a program for elementary school children in Delaware; it elaborated on the special adaptations of Jacobson's progressive relaxation. Claypool and Claypool (1974), both of whom were certified by Steinhaus, developed programs and materials for school programs in relaxation in the State of Washington.

A research project funded by the U.S. Office of Education of the Department of Health, Education, and Welfare was coauthored by Steinhaus

and Norris (1964). Their research in teaching neuromuscular relaxation provided conclusive data that the methods employed in the classroom did in fact result in skilled relaxation behavior patterns measured against a no-treatment control group, thus supporting subjective reports of teachers in the field who were employing similar methods. A number of psychological studies (for example, Paul, 1969) have shown that even abbreviated training in progressive relaxation results in effects rated somewhat superior to other methods of relaxation.

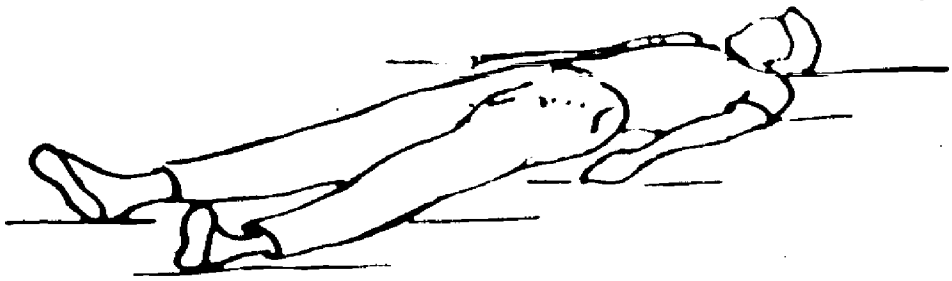
How Students Learn To Relax

The key to nurturing an active awareness of tension rests on the teacher's ability to have students recognize the "tension signal." In other words, the teacher attempts to have the students become aware of the feeling accompanying contracting muscles. This "signal," first brought to the attention of physiologists by Sir Charles Bell, is often referred to as the "Bell sense" or "muscle sense." Steinhaus liked to use the term "proprioception"--the general sense of knowing one's position in space.

Teachers of progressive relaxation rely on techniques that tend to bring the signal to some threshold of recognition. For example, the teacher might ask members of a class to bend the hand back at the wrist, creating a slight muscular contraction as illustrated in Figure 1. During early lessons, this instruction is ordinarily given while students are lying down (Figure 2). After the hand has been held in that position perhaps a minute or so, the student then is asked to report any perceived differences between the active and passive arms. It is very important, during these initial evoking sessions which feature the "Bell sense," that the teacher remain neutral. That is, no hint about the exact locus of the signal is given. (Note that in Figure 1 the shaded area is the approximate locus of correct reports.) It has been my experience that very few individuals report correctly after a single trial. First reports often indicate some "strange feeling" at the wrist or tightness at the elbow. Some reports are seemingly unrelated, and at times the report procedure is misunderstood. After a few lessons, however, students get the idea and learn more rapidly.

Figure 1

Figure 2



During this process of discovery, the teacher must be patient and skillfully eliminate all incorrect responses. The goal is to have the students make an independent discovery. Eventually, perhaps after five trials, the students seem to be reporting more accurately. There are always those students who imitate the reports of others, however, and only the most experienced teachers may be able to detect such inaccuracies. Some students will become aware of the sensation almost immediately, while others will need additional attention. Only one muscle group is engaged in the first few classes, and some instructors favor working with muscle groups found in the leg and/or abdomen for first attempts at evoking the signal.

The discovery methodvis almost universally employed by experienced teachers of tension control, since they realize that once they reveal the correct locus of the signal, their suggestion will carry more weight than the actual signal itself and students will report "correctly" without really learning anything. To illustrate a point, I have even suggested, when working with students who are bending the hand, that the feeling should come from the general area of the face--perhaps prefacing the suggestion with some false rationale. A good observer would immediately recognize that something was wrong, but the novice will seldom question the suggestion. Suggestion is a very powerful influence, especially in the hands of a skilled teacher, and it should be avoided in relaxation training. This is true even when the correct locus of the "signal" is given.

When learners do not seem to be responding normally, the teacher might then resort to other techniques that will enhance the signal of tension. In recent years, psychologists have employed biofeedback apparatus in a clinical setting for such purposes. Few, if any, schools have this sort of apparatus available, however. There are two other, less desirable, ways an individual might discover the locus of tension in the contracting muscles, but they are indirect. If the students look at the approximate site of contraction, they will note a discernible bulge as the muscles shorten. Children often palpate themselves in an attempt to discover [illegible] part of their body "gets hard" when they use one muscle group or another--discovery by the sense of touch. Neither of these techniques guarantees immediate success in evoking the "Bell sense," however, and they are ordinarily employed only in extreme cases.

Another technique that might be used is to have a student contract with more force, or perhaps contract while being actively resisted by the teacher's hand. Such forceful contractions often result in muscle pain, and the locus of contraction is discovered. The progression in training continues until each student reports the "signal" with only very slight contraction, and training is well along the road to success when the signal is perceived with so small a contraction that actual movement is not detected by a neutral observer.

In the early sessions, every second or third lesson is reserved for total rest. During these sessions, the teacher observes, quietly noting such things as restlessness, eye movements, rapid breathing, and other small movements. It is very difficult for untrained individuals to remain absolutely quiet even for short periods of time. I have made it a practice to relax totally for a class during my first session, asking them to try to distract me or to lift my limbs, thereby having them observe skilled relaxation. Often, class members report that my arms feel heavy and limp. When asked to lift me from the floor, they find that they have great difficulty. This procedure seems to provide some initial motivation to learn relaxation because individual students shortly discover that they are unable to duplicate such a skilled performance.

A Further Word on Suggestion

Learning tension control techniques is a neuromuscular experience that often results in measurable behavioral changes when accompanied by sufficient practice. Discovery learning is a key component in the technical skill of relaxation. Therefore the student plays a major role in the learning process under the patient guidance of an experienced teacher.

Methods of instruction that depend primarily on suggestive techniques place less significance on discovery learning, however. The most powerful form of suggestion is hypnosis. Although hypnotherapy has become a more acceptable treatment form in psychiatry, and although some valuable research has been conducted in the psychology laboratory using subjects carefully screened and tested for their reaction to hypnotic suggestibility, hypnosis is not generally recommended for school use because of problems associated with subject dependence.

Autosuggestion or so-called "self-hypnosis," at the other end of the continuum of suggestion, similarly has not resulted in any well-established program for general education. There is nothing particularly objectionable about Coué's suggestion that "every day in every way I'm getting better and better"; such a theme has permeated a host of popular self-help programs since the early twenties. The power of positive thinking and other autosuggestive procedures offer little in terms of skill learning, although they may result in attitudinal or personality changes when accompanied by faith or the belief that some real change is actually taking place. The Chinese belief or faith in acupuncture methods accounts in part for the higher rate of success for this method of treatment in China as compared with results obtained elsewhere. Individuals who have undergone some meaningful religious experience will often exhibit desirable traits as a result. Others claim that soft music is relaxing.

But none of these procedures results in a particularly good strategy for coping with the primary source of tension problems that develop from an inefficient use of the striate musculature. Students who have learned progressive relaxation are better equipped to recognize the role of muscular contraction in tension. This is not to say that such individuals are anti-religious or cannot enjoy music. Like the sugar pill often given by a physician to patients with imagined health problems, autosuggestion serves as a placebo for the mind.

Furthermore, the effects of autosuggestive methods as related to relaxation have never been properly evaluated for general education. A leading authority in the psychiatric application of hypnotherapy indicated that children below nine years of age have difficulty maintaining concentration, while teenagers tend to regard the repetitive phrases of autogenic training as somewhat ridiculous (Luthe, 1963). On the other hand, children seem to enjoy learning the techniques of progressive relaxation since these deal directly with self-knowledge (for example: "What makes my arm go up?"). Teachers in the field of tension control have also found that children learn to relax much faster than adults, whereas adults are more receptive to suggestion of all kinds.

Although autosuggestive techniques do not produce skilled relaxers as a rule, certain autogenic phrases have often been used by the practitioners of muscle biofeedback. Biofeedback procedures include electronic amplification of a number of internal, physiological functions in a variety of display modalities in order that the subject may monitor signals from the interior of the body that are ordinarily not perceived. For example, we cannot know the status of our blood pressure from moment to moment without some assistive device such as a blood pressure cuff and a stethoscope. During muscle biofeedback, with the subject monitoring the voltage produced by contracting muscles, the phrases "My arm (hand/forehead) is warm" or "My arm is heavy" are employed as strategies to reduce contraction. Although some people will quickly be able to produce desired changes in the direction of relaxation, they often become "married" to the biofeedback machine and have to undergo a weaning period in the process of recognizing signals independently. Much the same process is often observed in the learning of complicated gymnastic skills. The gymnast who, for one reason or another, depends heavily on the protective maneuvers of the coach may have difficulty in performing independently. Progressive relaxation techniques rely much more on the independence of the learner and have the potential for more permanent learning. Dependent methods such as drug therapy, suggestion, and biofeedback may produce results that are short-lived.

The Inhibition of Sensation

It is perhaps noteworthy that Jacobson's 1910 doctoral dissertation, presented to the psychology faculty at Harvard, was on the subject of inhibition. Relaxation techniques that are associated with yoga and autosuggestion often rely on the inhibition of sensations to produce an effect. The methods employed in such techniques often require the student to do something totally unrelated to the desired outcome. This process tends to mask sensation rather than to enhance it.

In transcendental meditation and a spinoff procedure known as the "relaxation response" (Benson, 1974), students are asked to repeat a

sound in covert speech; that is, they are asked to utter such phrases silently "to themselves." In transcendental meditation, a secret mantra is given to the initiate in an early session; while Benson employs the word "one." Students engaged in these techniques are asked to repeat the mantra or phrase at those times when other thoughts occur to them. This has the effect of masking other stimuli such as the "Bell sense."

Jacobson's early research at Harvard and Cornell led him to the discovery that when one's attention is diverted in any one activity such as reading, the response to a sudden loud noise is markedly greater than when the same subject is engaged in quiet rest. Jacobson became curious about the extent to which one might rest quietly and was motivated to develop a sophisticated and measurable relaxation technology. By the mid-thirties, Jacobson had shown in experiments that the knee jerk and other autonomic responses virtually disappeared when his subjects were taught to relax in the technical sense. He showed that even the act of thinking, which many people still believe is a function of the brain, is intimately associated with contractions of the muscles. His approach with progressive relaxation was not the inhibition of sensation but rather the development of an awareness of what to avoid. Later, his techniques were modified for use in behavior therapy (Wolpe, 1958), whose practitioners subscribed to Jacobson's claim that emotional responsivity is incompatible with relaxation.

Instruction in yoga has been found useful in the development of flexibility leading to a greater range of movement at the joints. As a religious practice, yoga may also have a beneficial effect on mental health much as Christianity, Judaism, and a host of other religious theologies tend to have a beneficial effect on persons who faithfully follow the precepts these represent. One who is inspired with a religious belief has a means of coping with rather mundane problems that are stressful for others. But such persons may also benefit from training in technical relaxation procedures, which are not learned automatically through faith.

Religious procedures such as those taught in transcendental meditation recommend several periods of practice each day. Recent analyses have shown that two 20-minute periods of transcendental meditation per day are no better physiologically than two periods of simple rest. Few physicians would argue against such a daily plan. In fact, both rest and exercise should be planned as a part of one's daily routine, and skillful relaxation enhances their effect. The practice of daily prayer or the recitation of a mantra in inner speech is a means for the inhibition of sensation and may be no better than autosuggestive methods.

What About Stress?

Stress is a popular term that has been adopted by laymen and indeed many persons within the scientific community. The term was popularized by Dr. Hans Selye, a Canadian endocrinologist who conducted some of the first modern studies of the endocrine (ductless gland) system. He concluded that stress is the nonspecific response of the body to any demand made upon it. His studies led him to believe that human beings cannot avoid stress, and therefore must learn to live with it (Selye, 1974). Selye pointed out that extremely good feelings result in a positive "eustress"; while those who cannot cope with daily stress

develop stereotypic disease symptoms he referred to collectively as "distress." Although he has not recommended a specific therapy for stress, he has often supported popular techniques such as meditation and self-assertion as means for coping with stress.

Since Selye's definition of stress would include a host of "stressors," tension in man might well be considered a source of stress with a potential for the development of stress disease. Another stress theory is supported by those who believe that glandular responses to stress are specific rather than nonspecific in nature; and Jacobson himself has stated that stress and tension should not be employed as synonomous terms. Tension refers specifically to muscular activity whereas stress, in the sense of Selye, includes much more. The teacher should know about the various meanings that surround "stress" and "tension" but should not be concerned about the popular substitution of the one term for the other.

Stress terminology should not be confused with cardiological stress testing which has become popular in medicine in recent years, nor should it be equated with another evaluative system known as "life stress." The latter attempts to show the extent to which events such as death, divorce, discovery of cancer, and other common events contribute to disease states. A life stress rating scale was worked out by Holmes and Rahe (1967), who have employed the list of events to note the correlation of specific occurrences with the onset of medical problems. Such a list provides the therapist with a valuable tool for the evaluation of patients.

Relaxation and Skilled Movement

In addition to the potential health benefits that result from learning the skill of relaxation, the teacher might also expect to see the beneficial effect of tension control in skilled movements of all kinds. The idea of selective or differential relaxation suggests movement efficiency or the precise expenditure of energy to accomplish a given task. A skilled performer with additional training in relaxation techniques is better able to recognize inefficient efforts of all kinds and, as a result, is better able to disperse them quickly. It is well known that one of the key differences between a skilled performer and a novice is the former's ability to move rhythmically and "effortlessly." The novice often "chokes" or braces during the acquisition of new skills. For example, a tennis stroke may not be fully extended due to the overcontraction of the arm muscles. Distance runners may clench their fists unnecessarily, while golfers are prone to a variety of inefficient movements due to the precision necessary in their swings. A program known as "psycho-aquanetics" (Forbes and Lifrak, 1976) combines relaxation training with swimming instruction, with a reported increase in efficiency. Tension control techniques are valuable in reducing the effect of fear that may be associated with first experiences in swimming and gymnastics. Gymnastic instructors have provided good models for the development of skill progressions paralleling those of Wolpe (1958), in that each segment of the progression is performed so far as possible in a tension-free environment.

In a speech before the Eastern District Association of the AAHPER, Jacobson (1966) stated his belief that "efficiency education is the most

important basis for education that man has ever known." He was referring to the school program in physical education which he viewed at the time as the most important location for the proliferation of tension control techniques. Although this view is still prominent in the minds of educators, particularly those who have followed AAATC activities, very few new programs have been developed for the public schools.

In a related area, people who have begun programs in jogging, swimming, and other rhythmic forms of exercise often claim to be beneficiaries of a so-called "athletic high." Rehabilitation programs for victims of heart disease have also included carefully supervised exercise programs. DeVries (1975) attempted to answer the question, "Does physical activity promote relaxation?" He concluded that mild, rhythmic exercise such as walking, jogging, and cycling might have some tranquilizing effect on the body which the individual might well regard as "relaxing."

The history of human tension would also suggest that regular exercise is interpreted by the limbic system as an appropriate response to the inborn reflex of man (and all animals) to engage in patterns of fight or flight when confronted with danger. In modern times, the dangers our primitive ancestors encountered in the primordial environment have given way to imagined dangers, fears, and anxiety states; but the limbic system interprets such threats as if they were actually real and becomes confused when the victim fails to respond physically. Daily exercise tends to have a dampening effect on the "fight or flight" reflex and thus the individual "feels better." An excellent description of this problem is given by Simeons (1962), whose theories have been confirmed in part experimentally and clinically in the seventies.

Recalling our definition of relaxation as near electrical silence in muscle tissue, it would be inaccurate to equate relaxation with exercise. Selective relaxation ("differential relaxation" in Jacobson's terms) is most appropriate in movement education, however, since it promotes movement efficiency; while mild, regular exercise helps to counter the effect of covert fears and anxiety that have become the hallmark of modern tension disorders.

The Role of the Teacher in Tension Control

It has been my experience that teachers who have taken the time to read about tension control and have later enrolled in inservice courses to learn the special methods associated with teaching relaxation techniques to their students have become very excited about the potential benefits to society at large. I know of many teachers who have begun programs, and few have abandoned them. I hope that this brief introduction to tension control in education will have the effect of stimulating many more educators to take positive action.

The initiation of a tension control program has three important steps:

1. Become familiar with the literature of tension control. Relaxation cannot be taught without a proper background including a knowledge of the issues, terminology, and characteristics of successful ongoing programs. You should examine the references introduced in this monograph with an open yet skeptical mind

and probe for answers to special problems you encounter or questions you would like to have answered. The Education Division of the AAATC* is willing to help you in this endeavor.

2. Enroll in a tension control course with an experienced instructor. Teacher training in tension control has been slow in developing. The George Williams College program in Chicago was the first to certify teachers in tension control. Training is important because if the teacher has actually participated in skill learning under the direction of an experienced instructor, it will be much easier to observe and understand the problems in learning encountered by students later on. The AAATC* can provide a current list of programs in tension control, many of which can be taken for graduate credit.

3. Develop a program appropriate to the school level of the students. Having completed steps 1 and 2, the teacher may then proceed to develop independent programs at a variety of levels. In the past, programs have been initiated at the elementary school level (Frederick, 1967) and the college level (Steinhaus and Norris, 1964).

It is important to reiterate that school programs in tension control since World War II have emphasized the techniques of progressive relaxation developed and validated by Edmund Jacobson. The AAATC has often recommended this method to those who have inquired about the initiation of tension control in the public schools, but the Association is always open to new and successful options that can be validated and tested for their effect on human tension.

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REFERENCES

Benson, Herbert. "The Relaxation Response." Psychiatry 37: 37-46; February 1974.

Claypool, Jean, and Jack Claypool. Learning To Live Relaxed. 1974. Available from the authors, 707 Grandview, Wenatchee, Wash. 98801.

DeVries, Herbert. "Physical Education, Adult Fitness Programs: Does Physical Activity Promote Relaxation?" Journal of Physical Education and Recreation 46 (7): 53-54; September 1975. EJ 135 301

Forbes, Dennis, and Stephen Lifrak. "Psycho-Aquanetics." Journal of Physical Education and Recreation 47 (6): 52-53; June 1976.

Frederick, A. B. "Tension Control in the Physical Education Classroom." Journal of Health, Physical Education, and Recreation, September 1967. pp. 42-44+.

Holmes, Thomas, and Richard Rahe. "Stress Rating Scale." Journal of Psychosomatic Research 11: 213-18; 1967.

Jacobson, Edmund. "Efficiency Education." Speech sponsored by the Basic Body Mechanics Section of the Eastern District Association of AAHPER, April 1966. (Tape available from A. B. Frederick, State University College at Brockport, N.Y. 14420.)

Jacobson, Edmund. Progressive Relaxation. Chicago, Ill.: University of Chicago Press, 1938. Second Ed. (Now available from the Laboratory for Clinical Physiology, 55 E. Washington St., Chicago, Ill. 60602.)

Luthe, W. "Autogenic Training: Method, Research, and Application in Medicine." American Journal of Psychotherapy 17: 174-95; 1963.

Marshall, Mike, and Charles Beach. "Tension Control at Michigan State University." Proceedings of the First Meeting of the American Association for the Advancement of Tension Control (AAATC), October 12-13, 1974. (Available from AAATC, P.O. Box 8005, Louisville, Ky. 40208.)

Neufield, William. "Relaxation Methods in U.S. Navy Air Schools." American Journal of Psychiatry 108: 132-37; August 1951.

Paul, Gordon L. "Physiological Effects of Relaxation Training and Hypnotic Suggestion." Journal of Abnormal Psychology 74: 425-37; 1969.

Selye, Hans. Stress Without Distress. Philadelphia, Pa.: J. B. Lippincott, 1974.

Simeons, A. T. Man's Presumptuous Brain. New York: E. P. Dutton, 1962.

Steinhaus, Arthur, and Jeanne Norris. Teaching Neuromuscular Relaxation. Chicago: George Williams College, 1964. (Now available from Dr. Norris c/o George Williams College, 555 31st St., Downers Grove, Ill. 60515.)

Wolpe, Joseph. Psychotherapy by Reciprocal Inhibition. Stanford, Calif.: Stanford University Press, 1958.

The language of tension includes a wide variety of words with both a technical and a popular meaning. Often we employ the popular usage without knowing a technical definition. Scientists are just as guilty of using popular terms as laymen are, so it is important for the educator to distinguish between, for example, "I bowl to relax" and "I'm having difficulty relaxing my eyes." The former declaration conveys the popular sense of relaxation, while the latter implies a technical awareness of the skill of relaxation.

The glossary which follows isolates some of the most frequently used and misused tension terms. Each word is defined so as to clarify its technical meaning in terms that would be appropriate for classroom purposes. References following the definitions are considered prime sources for additional information.

ALPHA - The most prominent of four identifiable brain wave patterns measured with EEG apparatus. The alpha wave is characterized by its rhythmic and cyclic appearance of 8-10 cycles per second. Although the alpha rhythm is easily generated by most subjects who are resting comfortably with their eyes closed, the presence of alpha is not synonymous with relaxation. The alpha rhythm tends to disappear the moment one begins to concentrate the attention on some subject or object, giving way to a rather faster, low amplitude brain wave known as Beta activity (13-28 cycles per second). Less is known about two other identifiable brain waves: Theta (4-7 cycles per second) and Delta (1-3 cycles per second) waves are sometimes associated with sleep and creativity. [See also: EEG, biofeedback, sleep.]

Brown, Barbara B. New Mind, New Body. New York: Harper and Row, 1974. Nontechnical discussions of biofeedback topics.

Budzynski, Thomas. "Tuning in on the Twilight Zone." Psychology Today 11: 38-44; August 1977. Training people to generate theta brain waves in an examination of creativity.

ANXIETY - A form of fear response; but since anxiety is imagined fear, the individual experiencing it finds it difficult to eliminate. Our instinctive reaction to fear culminates in a "fight or flight" response. But how does one escape from, or attack, imagined fear? Even though our instinctive response is of little use in combatting anxiety, we automatically respond not by running away or fighting but by "bracing." The bracing response is often cultivated as a new habit pattern, leading to serious tension disorders. Since the whole body is affected by a state of anxiety, it is improper to characterize such a problem as "all in your head." [See also: fight or flight response, desensitization.]

Cannon, Walter. The Wisdom of the Body. New York: Norton Library, 1963. Reprint of Cannon's classic work, originally published in 1932, combining lectures on the way the body balances its functions.

AUTOGENIC TRAINING - A system of autosuggestive training developed in Germany by Vogt and Schultz. The method employs a series of phrases (such as "My right arm is heavy.") that patients repeat to themselves.

The method is suggestive of a number of meditative techniques that employ repetition of words to reduce stimulation or redirect the attention of the patient. Certain phrases taken from autogenic therapy have been adapted for use in biofeedback research. [See also: hypnosis, biofeedback.]

Luthe, W. "Autogenic Training: Method, Research, and Application in Medicine." American Journal of Psychotherapy 17: 174-95; 1963. Very little has been published in English about this method of therapy and its potential for school applications.

BIOFEEDBACK - A special kind of information one obtains when the body is connected with highly specialized apparatus which can magnify signals that are generated internally and seldom perceived. For example, the heartbeat might be displayed as a curve on the oscilloscope (similar to a television picture tube). When you weigh yourself you get direct feedback about the relationship of your body's mass to the pull of gravity. Abbreviations are often used for biofeedback apparatus:

EEG - Electroencephalograph (measures low voltages produced by the brain in rhythmic patterns)
EMG - Electromyograph (measures low voltage from contracting muscles--Muscle Action Potentials or MAPs)
EOG - Electrooculograph (measures eye movements)
EKG - Electrocardiograph (measures heartbeat)
GSR - Galvanic Skin Response, now generally referred to as the Palmar Skin Resistance (measures electrical resistance in the skin of the hand--often the fingertips--and as sweating occurs, the resistance is lower since salt water is a good conductor of electricity. This is a rough measure of emotionality.)

[See also: EEG, EMG.]

Brown, B. B. "New Mind, New Body." Psychology Today, August 1974. Almost the entire edition is devoted to Brown's book by the same name. It has a number of good illustrations not found in the book and covers the entire field of biofeedback.

Melzack, Ronald. "Promise of Biofeedback: Don't Hold the Party Yet." Psychology Today 9: 18-22+; July 1975. Cautions against overenthusiasm about biofeedback methods.

CONSCIOUSNESS - This term has a host of meanings depending upon its use by social scientists, religious groups, or philosophers. "Consciousness raising," also used frequently by those espousing one cause or another (the women's movement, the human potential movement, self-assertion), means more than simply knowing about facts. To raise one's consciousness implies immersion into all facets of a particular point of view.

In the parlance of science, three states of consciousness are generally recognized: (a) the waking state, (b) the sleeping state, and (c) the dream state. Each has a specifiable pattern of brain electrical activity or eye activity that can be measured. The yogan, however, describes as many as seven states of consciousness, the last of which is "union with God." [See also: EEG, sleep, yoga.]

Ornstein, Robert, ed. The Nature of Human Consciousness: A Book of Readings. New York: Viking Press, 1974. Expresses both Eastern and Western points of view.

DESENSITIZATION - A technique employed by behavior therapists to reduce anxiety-producing stimuli and to counter phobic (irrational fear) responses. Systematic desensitization is attributed to Joseph Wolpe, who initiates the therapy by instructing patients in what he terms "deep muscle relaxation." Wolpian relaxation is simply a brief form of Jacobson's progressive relaxation. The method of desensitization stems from Jacobson's assertion that anxiety responses are incompatible with relaxation. Patients are taught to relax in the presence of a series of mild to powerful anxiety-producing stimuli. [See also: anxiety, phobia, progressive relaxation.]

Wolpe, Joseph. The Practice of Behavior Therapy. Elmsford, N.Y.: Maxwell House, 1974. 2nd Ed. A good reference for the technique of systematic desensitization.

DYSPONESIS - Probably the rarest word found in the tension literature; it is not found in any dictionary. The word derives from two Greek words meaning "misdirected efforts" (dys + ponos = wrong work). The term is attributed to George Whatmore, who has specified a treatment for those who have acquired a habit of persistent "bracing"--or the nonproductive generation of nerve impulses throughout the nervous system--that gives rise to muscular tension. The treatment consists of effort management, with patients guided to discovery of the specific sites of wasted energy production. Biofeedback techniques are ordinarily combined in treatment. Since patients learn to be good observers of their own misdirected efforts, thus forming the foundation for their release, this treatment is similar to the progressive relaxation techniques of Jacobson, from which it is derived. [See also: biofeedback, progressive relaxation.]

Whatmore, George B., and Daniel Kohli. "Dysponesis: A Neurophysiological Factor in Functional Disorders." Behavioral Science 13: 102-24; 1968.

EEG (ELECTROENCEPHALOGRAPH) - An apparatus capable of amplifying low voltage electrical activity originating in the brain. Electrodes (highly sensitive conductors adapted for attachment to the head) are placed in selected sites to monitor brain electrical activity. The EEG apparatus is often used in biofeedback research, and the voltage detected can be transduced to produce audible or visual signals enabling subjects to "observe" brain activity. [See also: EMG, biofeedback, alpha, references under "alpha."]

EMG (ELECTROMYOGRAPH) - A device employed to detect electrical activity (action potentials) in muscle and associated nerve tissue. An excellent EMG device can measure electrical activity in fractions of a microvolt (millionth of a volt). The apparatus was developed in the 1920s by Forbes and Thatcher; but the first modern device capable of extremely sophisticated measurement was developed by Edmund Jacobson, who worked in collaboration with Bell Telephone Laboratory scientists. Shortly after its development, Jacobson's experiments showed that the act of thinking is always marked by appearance of electrical activity in the eyes, tongue, and other portions of the voluntary musculature. [See also: EEG, biofeedback, muscle, progressive relaxation.]

Jacobson, Edmund. Progressive Relaxation. Chicago, Ill.: University of Chicago Press, 1938. 2nd Ed. Provides a complete

history of the development of EMG apparatus. (Available in paperback from the Laboratory for Clinical Physiology, 55 E. Washington St., Chicago, Ill. 60602.)

EMOTION - A total response of the body to real or imagined circumstances. Patterns of expressive activity or behavior are often described as anger, fear, love, and hate, for example. Physiologist Walter Cannon found that he could stimulate the brains of animals with thin wire electrodes to produce a "mock rage." Although emotion-like behavior can result from this sort of stimulation, it is incorrect to conclude that the so-called "seat of emotion" is in the brain. No animal, including man, receives such artificial stimulation in the natural environment. Emotional expression is manifested in all parts of the body. For example, emotional responses diminish when the voluntary muscles relax in the technical sense. Brain stimulation in animals and man has been useful in mapping out brain functions; such studies are still far from being complete. [See also: anxiety, desensitization, muscle.]

Jacobson, Edmund. Biology of Emotions. Springfield, Ill.: Charles C. Thomas, 1967. Presents a new view of emotions based on experimental and clinical work, and includes discussions of the James-Lange and Cannon theories of emotion.

Arnold, Magda B., Ed. The Nature of Emotion. Baltimore, Md.: Penguin Books, 1968. An excellent collection of readings on the subject.

Olds, James. "Ten Milliseconds into the Brain." Psychology Today 8: 45-48; May 1975.

FIGHT OR FLIGHT RESPONSE - Said to be a primitive reflex of all animals (including man) which is associated with survival. In man, the reflex often takes the form of habitual "bracing" or a constant low level of tension in the voluntary muscles, leading to dysponesis. People described as "being up tight" may be exhibiting the "bracing" reaction, which is a learned habit pattern that can be reversed with appropriate training in tension control. Some investigators believe the locus of the "fight or flight response" is in the brain stem's division known as the hypothalamus; and the term itself was coined by Walter Cannon, a prominent Harvard physiologist whose most productive years were in the first half of the present century. [See also: relaxation response, muscle, proprioception.]

Cannon, Walter. See reference under "anxiety."

Gellhorn, Ernst. "The Influence of Hypothalamic Stimulation on Evoked Cortical Potentials." Journal of Psychology 39: 77-88; 1955. University of Minnesota experiments.

Gellhorn, Ernst. "Motion and Emotion: The Role of Proprioception in the Physiology and Pathology of the Emotions." Psychology Review 71: 457-72; 1964. Good summary of experiments.

HABIT - Refers to some learned behavior which has been elicited with such regular frequency that one is not likely to notice its presence (for example, lighting a cigarette while another, unfinished, burns in an ash tray). Continuous muscular tension or "bracing" can be thought of as a habitual, learned response requiring some alternative habit patterns such as those taught in tension control training including

relaxation techniques. [See also: dysponesis, relaxation, progressive relaxation.]

HYPERTENSION - A medical term denoting elevated blood pressure. The term has lost its literal meaning of "too much tension"; although a more specific use of the term, often designated "neuromuscular hypertension," refers to "bracing" by some individuals. Essential hypertension refers to the condition of high blood pressure with an unknown origin. This condition is the most prevalent type of high blood pressure and is complicated by the fact that very often the victim has no overt symptoms or complaints. Students should understand the need for frequent blood pressure checks by competent clinicians. Elevated blood pressure associated with essential hypertension is commonly controlled by physicians who recommend a carefully prescribed dosage of anti-hypertensive drugs. The medical profession has become alarmed about the excessive use of such drugs in our society, however. Patients who have learned the techniques of tension control under a physician's care have often been able to reduce their dosage of anti-hypertensive medicine and in some instances have normalized their blood pressure as a result of such training. It is significant to note that anti-hypertensive medication commonly contains drugs that reduce muscle tension (relaxants). [See also: tension, relaxation.]

"Conquering the Quiet Killer." (Cover story.) Time *105: 60-64; January 13, 1975.*

Hillman, Ernest C. "The Effect of Tension Control on Blood Pressure." Proceedings *of the Second Meeting of AAATC. (Available from AAATC, P.O. Box 8005, Louisville, Ky. 40208.)*

HYPNOSIS - The practice of conditioning by suggestion. Although valuable in laboratory and clinical settings, the general practice of hypnotic techniques by the layman should be avoided due to their potential for unexpected complications. [See also: autogenic training.]

INHIBITION - When one source of stimulation has the effect of diverting attention from another source, the former is said to interfere with (or inhibit) the latter temporarily. A common example is our frequent attempt to listen to two speakers simultaneously. Listening to one tends to interfere with our comprehending what is said by the other. Some "relaxation" techniques rely on inhibition for effect. For example, during meditation the individual concentrates on some object of meditation such as a sound (uttered silently) or some object which is kept in view, such as a candle. The concentration tends to inhibit sensation from other sources. In progressive relaxation, however, the learner is taught to recognize or observe signals coming from the muscles so as to learn what to avoid. This indulgence in sensation rather than its avoidance permits the individual to confront tension in a direct manner rather than masking it. Later, when the signals of tension are thoroughly learned, the trained individual will be able to recognize their appearance and reduce them efficiently. Methods of relaxation employing techniques related to the inhibition of sensation are often quickly learned but are not conducive to the establishment of new habit patterns. [See also: relaxation, meditation,

transcendental meditation, relaxation response, autogenic training, hypnosis.]

LIMBIC SYSTEM ("OLD BRAIN") - Located at the upper end of the brain stem (so called because it resembles the stem of a large fruit--the "fruit" in this instance being made up mainly by the cerebrum and thalamus). Included in this so-called "system" is the hypothalamus (Greek: "beneath the thalamus") which has become the target of a number of theories related to "activation" and "quiescence." For example, Benson's "relaxation response" technique of quiescence supposedly stimulates the parasympathetic division of the hypothalamus, which in turn "soothes" the alerting system of the body. The limbic system has also been called the "seat of emotion." None of these theories have been absolutely confirmed, however. In general, one might say that the limbic system has a primary role in the "housekeeping" functions of the body such as heartbeat rate, contractions of smooth muscles surrounding such organs as the stomach, and the regulation of blood pressure--all of which are controlled involuntarily. Biofeedback researchers have claimed some limited breakthroughs in the direct control of autonomic processes such as blood pressure conditioning, but the results of such experiments are not clinically significant at this time. [See also: biofeedback, emotion.]

"Exploring the Frontiers of the Mind." (Cover story.) Time *103: 50-59; January 14, 1974.*

Cooley, Donald G. "Cells That Communicate." Part 1: "The Brain and Its Pathways." Today's Health *41: 21-25+; May 1963. Part 2: "How Nerve Cells Work."* Today's Health *41: 39-41+; June 1963. Contains excellent diagrams and descriptions.*

Asimov, Isaac. The Human Brain. *New York: Signet Science Library Books, 1963. A very readable book on the capacities and functions of the brain.*

MEDITATION - Any of a number of practices during which an individual attempts to "clear the mind" while attending to or concentrating on some sound or object. Religious meditation and concentration are frequently associated with yoga and zen. Although there are many ways and systems of meditation, transcendental meditation (TM) has proven particularly attractive to a large number of Americans. The meditation object of TM is a secret sound its followers call a "mantra." [See also: inhibition, transcendental meditation.]

Naranjo, C., and R. E. Ornstein. On the Psychology of Meditation. *New York: Viking Press, 1971. All aspects of meditation are examined.*

MUSCLE - Three varieties of muscle tissue are found in the body. Smooth muscles surround certain organs of the body and are controlled automatically by the lower brain centers. Cardiac muscle is exclusively found in the heart. Finally there is striated or voluntary muscle tissue. This latter type is also known as skeletal muscle since a majority of them are attached to bones. These muscles comprise approximately 40 percent of the body's weight. A skeletal muscle cell is found in groups; when stimulated, the cells contract or "shorten." When not in a state of contraction, muscles relax. The contraction

of muscle is always accompanied by the presence of an electrical discharge which can be measured by a special voltmeter known as an EMG (electromyograph). More sophisticated EMG apparatus can detect microvoltage as small as 1/1,000,000 of a volt. Tension control techniques are therefore directed toward the efficient contraction of muscle tissue for purposes of complete rest or movement economy. [See also: biofeedback, EMG, relaxation, tension.]

Steinhaus, Arthur. "Your Muscles See More Than Your Eyes." Journal of Health, Physical Education, and Recreation, September 1966. pp. 38-40.

Huxley, H. E. "The Mechanism of Muscular Contraction." Scientific American 21: 18+; 1965.

Jacobson, Edmund. Direct Electrical Measurement of Mental Activities in Action-Potentials. Chicago, Ill.: Laboratory for Clinical Physiology. (Available from the Laboratory, 55 E. Washington St., Chicago, Ill. 60602; $1.50.) A collection of classic articles reprinted from the American Journal of Physiology and other sources.

Basmajian, John. "Electromyography Comes of Age." Science 176: 603-609; May 12, 1972.

PHOBIA - Any one of a number of irrational fears resulting in a "bracing" response when affected individuals are exposed to them. Phobic responses are often treated by systematic desensitization, which incorporates relaxation training with a planned progression of exposure to stimuli that evoke the response. [See also: anxiety, desensitization, progressive relaxation, relaxation.]

PROGRESSIVE RELAXATION - A therapeutic form of training devised by Edmund Jacobson, M.D. Such training has also been taught to healthy individuals as a means of preventative medicine. Teaching methods have been devised for children in the public schools, as well as college students.

Jacobson described the method as follows:

> One learns to identify and discriminate the tension states of the trigger mechanisms of eyes and speech apparatus and also of the trunk regions, including respiratory and visceral tension. The student is drilled in relaxing the chief striated muscle groups singly and jointly. The smooth and cardiac neuromusculature cannot be relaxed directly, but responds reflexively with diminished tension upon progressive relaxation of the striated type.

"Progressive relaxation" of the Wolpian type is employed in a therapeutic program known as systematic desensitization. The relaxation training in this therapy--although similar to the methods of Jacobson--is very brief, with the primary goal of the patient being the mastery of particular phobic responses rather than the technical skills of relaxation. Progressive relaxation of the Jacobsonian type is always taught as a skill and like other psychomotor skills cannot be learned thoroughly in a few sessions.

"Differential relaxation," the second goal of the Jacobson program in tension control, is viewed as movement efficiency or human energy conservation. That is, one should learn to use only those muscles

necessary in accomplishing any task. Skilled performers in sports of all kinds often exhibit good models of differential relaxation, but relaxation might also be cultivated in the less glamorous activities of life such as walking, cleaning the house, or driving a car. [See also: dysponesis, EMG, habit, muscle, relaxation, tension.]

Jacobson, Edmund. See reference under "EMG."

Bernstein, Douglas, and Thomas D. Borkovec. Progressive Relaxation Training--A Manual for the Helping Professions. Champaign, Ill.: Research Press, 1973. A good source of information contrasting Wolpian with Jacobsonian methods but concentrating on the former.

PROPRIOCEPTION - This term generally includes two classes of receptors in the human body: those responding to kinesthetic sensations, and those responding to sensations of the body's orientation in space. The latter type includes mechanisms in the vestibular system, inclusive of the inner ear and the semicircular canals of the inner ear. Motion sickness is often associated with a disturbance or disorientation of this latter type. One of the key proprioceptive elements in learning relaxation is the so-called "Bell sense." Sir Charles Bell has been credited with the discovery that sensations of contraction may be detected by human subjects directly and are not simply movements of the skin that are felt when muscles contract. Learning the technical skill of relaxation depends primarily on the student's ability to detect the "Bell signal." [See also: EMG, muscle (especially the Steinhaus reference).]

Hopkins, B. "Proprioception and/or Kinesthesis." Perceptual and Motor Skills 34: 431-35; 1972.

Kerr, Beth, and Ray Klein. "Vision, Kinesthesis, Consciousness, and Skills." Journal of Physical Education and Recreation 47: 46-49; November-December 1976. EJ 161 272

RELAXATION - The absence of tension in muscle as measured by EMG techniques. This is the state of "not doing," the absence of muscular contraction. This definition is more objective than the popular idea of relaxation, which is the sense of "taking it easy" or "recreation." [See also: biofeedback, EMG, muscle, tension.]

Jacobson, Edmund. You Must Relax. New York: McGraw-Hill Book Co., 1976. 5th Ed. First published in 1934, this book continues to be the best source of basic information for the general public and has often been used as a textbook for relaxation courses.

RELAXATION RESPONSE - A technique devised by Herbert Benson based on his experience with research in transcendental meditation. According to Benson, the response or state of quiescence is elicited in the presence of four elements:

1. A mental device such as a "mantra" is used. Benson has adopted the word "one" for this purpose. The subject repeats the word silently at those times when thoughts enter the imagination. The word is uttered as the subject breathes out.

2. A quiet environment with few distractions is selected for practice.

3. A passive attitude ("let it happen") is taken and relaxation is assumed. No specific direction for relaxation is given, other than the suggestion that one "deeply relax all the muscles."

4. A comfortable position is suggested. Ordinarily, sitting comfortably in a well-padded chair is recommended.

Recent data indicate that such techniques may be equated with simple, daily rest periods that require no specific instruction but merely the acquisition of a new daily habit pattern. New habit patterns are often difficult to cultivate. [See also: fight or flight response, habit, meditation, transcendental meditation.]

Benson, Herbert. "Your Innate Asset for Combatting Stress." Harvard Business Review 52: 49-60; July-August 1974.

SLEEP - One of the three so-called states of consciousness, the other two being the wakeful state and the dream state. In general, characteristic brain wave activity measurable with EEG apparatus is associated with each of these states. Using EEG data, Dement and Kleitman have classified sleep stages into:

Sleep Stage 1 - Alpha trains appear, giving way to low voltage changes. The alpha activity is noncontinuous.
Sleep Stage 2 - Spindle stage; bursts of fast activity lasting up to one second.
Sleep Stage 3 - Delta waves appear (10-50 percent).
Sleep Stage 4 - More than 50 percent delta wave activity. (Deep sleep.)

Jacobson has also described the onset of sleep (that moment when sleep first occurs) as the relative electrical silence of the speech and eye musculature for 30 seconds or more. REM (rapid eye movements) sleep is associated with the dream state and is measured with the electrooculograph (EOG). Jacobson was one of the first to measure eye movements with EOG apparatus. [See also: alpha, consciousness, EEG.]

Monroe, L. J. "Psychological and Physiological Differences Between Good and Poor Sleepers." Journal of Abnormal Psychology 72: 255-64; 1967.

Mitler, M. M., et al. "Sleeplessness, Sleep Attacks, and Things That Go Wrong in the Night." Psychology Today 9: 45-50; December 1975. Describes the work of Dement's team at the Stanford University Sleep Disorder Clinic.

STRESS - Like "relaxation," the term "stress" has a multitude of meanings. In the popular sense, stress is the rough equivalent of tension; but scientifically, stress should be employed in the sense of the endocrinologist since the term was first used to describe the actions of corticoids, substances secreted by the cortex of the adrenal glands. The pioneer in this kind of research is the famous Canadian endocrinologist, Hans Selye. Selye defined stress as "the non-specific response of the body to any demand made upon it." Since 1970, he has supplemented this rather general idea with the notions of "distress," which is associated with stress disease; and "eustress," which is the stress of joy, a positive kind of stress that is good for you (such as a vigorous game of tennis). In his endocrine research,

first reported in 1936, he put forward the idea of the "general adaptation syndrome" (GAS), with three stages:

1. The alarm reaction--the body's primitive "fight or flight" response, a term introduced by physiologist Walter Cannon.

2. The resistance stage--the body attempts to establish some balance or "homeostasis" (a term also introduced by Cannon) by adapting to the stressor. With a continuous imbalance the individual proceeds to the third stage.

3. Exhaustion--ultimately results in serious disease or death.

Selye's "local adaption syndrome" (LAS) indicates particular changes in specific organs of animals that have been subjected to a broad spectrum of stressors. In such animals, the adrenal cortex enlarges, lymphatic structures show shrinkage, and bleeding ulcers develop.

Although there are those who would disagree, a great similarity exists between the onset of dysponesis and the general results demonstrated in stages 2 and 3 of the GAS. Selye advocated a thorough assessment of life style in coping with stress although he has not recommended any one program for this purpose. The observation of life events has resulted in another stress term call "life stress," first introduced by Holmes and Rahe (see reference below). Life stress checklists based on population statistics result in a stress "score," weighting certain life events such as a death in the family or a "run-in" with the boss. Some physicians are also using a computerized version of the life stress checklist along with other factors such as weight and family histories to calculate a rough estimation of life span, to help patients convince themselves that certain life style changes or new habits would be potentially beneficial in extending their predicted life span.

Finally, psychological stress refers more to environmental factors such as those associated with the life stress lists than to the specific meanings of physiologists. [See also: anxiety, dysponesis, fight or flight response, habit.]

Selye, Hans. Stress Without Distress. Philadelphia, Pa.: J. B. Lippincott, 1974. (Also available in paperback from New American Library.)

Cherry, Laurence (interviewer). "On the Real Benefits of Eustress." Psychology Today 11: 60-70; March 1978. Interview with Hans Selye.

Holmes, T. H., and R. H. Rahe. "The Social Readjustment Rating Scale." Journal of Psychosomatic Research 11: 213-18; 1967. The so-called "life stress" rating scale.

Mason, John. "The Integrative Approach in Medicine--Neuroendocrine Mechanisms." Perspectives in Biology and Medicine, Spring 1974. pp. 333-47.

TENSION - This term, like "relaxation" and "stress," is also subject to a wide variety of popular definitions. Beyond such usage, tension should convey the idea of muscular contraction. The popular expression "uptight" is therefore not far from the meaning of the physiologist. Tension, in the sense of muscular contraction, is frequently

interpreted as "too much muscular contraction" or "hypertension." Unfortunately, the latter term has been used by physicians to mean high blood pressure and the term "neuromuscular hypertension," although specific, is not commonly used. Levels of tension (muscular contraction) are measured with EMG apparatus. Programs in tension control are therefore directed toward the efficient use of muscular energy (actually human energy conservation) and often include specific instruction in relaxation. Tension conveys the sense of "doing," while relaxation conveys the sense of "not doing." [See also: dysponesis, EMG, hypertension, muscle, progressive relaxation, relaxation, stress, tonus.]

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TONUS - Most people understand the expression "good tone" in reference to the muscles, but there is some controversy among physiologists about the meaning of the term. Some simply equate tonus with muscular tension (muscular contraction), but to others tonus means something more. The semantics of tonus may be of some interest to the teacher; and since this glossary adopts the tonus-contraction view, the other side of the argument may be read in:

Basmajian, John. Muscles Alive: Their Function Revealed by Electromyography. Baltimore, Md.: Williams and Wilkins, 1967.

TRANSCENDENTAL MEDITATION (TM) - A method of meditation popularized by Maharishi Mahesh Yogi. The meditation object is a so-called "meaningless sound" or mantra assigned to initiates in private according to some sort of mysterious personality test. The method of mantra assignment has never been divulged in either popular magazines or scientific journals. Those who are active meditators meditate twice daily for 20 minutes. The meditator is seated comfortably with eyes either open or closed.

TM instruction in the public schools has been disallowed by the court in the State of New Jersey, since its proponents could not convince the court that it is disassociated from religion. The mantra assignment ritual is at least a quasi-religious ceremony involving candles, fruit, and a clean white cloth. During the ceremony, held to be simply a traditional recognition of Mahesh's teacher, Guru Dev, the initiator offers thanks.

Recent research (see references) has shown that TM is about as effective as taking a rest period twice daily, and that the earlier claims of Wallace and others about the physiological benefits of TM are not supported. Those who come to "believe" in the practice of TM might benefit from some placebo effect as a result of practice. (Although there are hundreds of references for TM, the following references will lead interested teachers to a full survey of the literature.) [See also: consciousness, fight or flight response, meditation, relaxation response, yoga.]

Wallace, R. K. "Physiological Effects of Transcendental Meditation." Science 167: 1751-54; March 27, 1970.

Bloomfield, H. H., et al. TM--Discovering Inner Energy and Overcoming Stress. New York: Delacorte Press, 1975.

Kanellakos, D. P., and J. S. Lucas. The Psychobiology of Transcendental Meditation. Menlo Park, Calif.: W. A. Benjamin, 1974.

Michaels, R. R., et al. "Evaluation of Transcendental Meditation as a Method of Reducing Stress." Science 192: 1242-44; June 18, 1976.

YOGA - Yoga means "yoke" or "union." It is the path whereby one might seek and finally join God in a perpetual union. There are many paths to union, involving a variety of practices. Hatha yoga or physical yoga has been taught in schools and colleges, where the religious or philosophical elements are omitted in favor of posturing, breathing exercises, and relaxation techniques. Transcendental meditation is actually a form of yoga and advanced students often have further training, including methods leading to levitation in opposition to gravity. No demonstrations of the latter have yet been verified, however. [See also: hypnosis, inhibition, meditation, relaxation, relaxation response, transcendental meditation.]

Ryan, Allan J. "Yoga and Fitness." Journal of Health, Physical Education, and Recreation 42: 26-27; February 1971. EJ 033 972

AFTERWORD

Through public education and greater efforts by professionals to understand the terminology of tension, valuable programs may be developed in schools and colleges that could have a lasting effect on the population at large. The American Association for the Advancement of Tension Control at present is active in preparing clinics; advising professional personnel about the potential of tension control programs in medicine, psychiatry, education, and psychology; and planning for certification in tension control. (For further information, you may contact the author.)

READER RESPONSE

The Educational Resources Information Center (ERIC) is a nationwide information system of the National Institute of Education, whose basic objective is to provide ideas and information on significant current documents in education, and to publicize the availability of such documents. Through a network of specialized clearinghouses, ERIC gathers, evaluates, abstracts, and indexes these materials, and processes them into a central computerized data system. The scope of the ERIC Clearinghouse on Teacher Education is the preparation and continuing development of education personnel, as well as selected aspects of health education, physical education, and recreation education.

We are convinced that the knowledge base on relaxation and tension control is in need of expansion and that practitioners possess considerable expertise to contribute. We encourage you, therefore, to submit to us any manuscript you have developed on this topic and to encourage your colleagues to do the same.

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