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FEEDBACK FACILITATED RELAXATION TRAINING IN SCHOOL COUNSELING

ABSTRACT: In a broad sense, tension involves anxiety and insecurity while relaxation refers to self-comfort and confidence. Research has indicated that tension can facilitate or inhibit learning. Although optimal levels are poorly understood, there appears to be an inverse relationship between relaxation and debilitating tension. Biofeedback training has made it possible to investigate the process of physiological arousal and voluntary control more clearly.

The knowledge of tension unlearning and relaxation teaching can be used by the counselor in his work with both average and hyperkinetic students in the areas of attention and concentration, for example. Training in such skills can be lifelong assets in coping with interpersonal and educational situations in daily life.

The purpose of this paper is to provide a rationale for involving school counselors in the provision of feedback facilitated relaxation training. Focus will be on the nature and use of electromyographic feedback to teach muscle relaxation and the potential application of this training in educational settings. The role of the school counselor in this enterprise will be depicted as a resource person, a professional trained to help others act on their own behalf, to act as agents by acting on themselves and their environments. This is in sharp contrast to the role of the therapist who is part of an environment that treats and acts

on the helpee who is in the position of patient. Self control of debilitating tensions through relaxation will be pictured as an exemplary instance of man's potential for agency.

School counseling is often characterized by its problem solving approach. Essentially this approach involves recognition of the benefit to be derived from collaborative efforts in adaptation and coping with life's problems. Adaptation refers to an individual's application of available resources to shape experience in accord with environmental demands. Coping involves adaptation under relatively difficult conditions. Fostering effectiveness in adaptation is a legitimate aim for school counselors and education in general.

Relaxation is only minimally part of school experience. Traditionally many elementary school teachers have employed brief rest periods or quiet times to introduce a special event or story. The wisdom of this practice has not, unfortunately, been extended to the secondary school. For most people relaxation implies "taking time out" or "resting one's muscles." The place of relaxation in everyday activities, especially those involving learning, has gone unrecognized by all but a few (Jacobson, 1973, Brown, 1974). This is a serious oversight of educators in view of the apparent inhibitory effects of tension on learning. (Mandler & Sarason, 1952; Sarason, Davidson, Lighthall, Waite & Ruebush, 1960; Ausubel, 1968; Sarason, 1972.)

A SOCIOPHYSIOLOGICAL VIEW OF TENSION AND LEARNING

In Interpersonal Theory a simple but straightforward attempt has been made to relate the physiological and social psychological facets of life. Consciousness is seen as the experience of interactions with one's social and physical environment (Sullivan, 1953). From conception, humanness evolves through a complex person-environment interplay. This process is continuous and a state of balance in this field is only hypothetically possible.

Experience is essentially comprised of tensions and action. Tension arises from organic needs that must be satisfied or feelings of anxiety that must be dealt with. Needs arise from biologic processes like sleep and hunger. Anxiety cames from insecurity or disjunctions in relations with significant others. Sullivan's (1953) ideal typical portrayal of tension involves picturing extreme tension or terror, a state of disatisfaction and insecurity, at one end of a continuum. On the other end is euphoria, a state of blissful satisfaction and security. Important to note is that tensions arising out of interpersonal relations often collide and take precedence over those arising from physical needs. This observation is illustrated in the worries of chronic insomniacs, which interfere with the necessary satisfactions of sleep.

According to Interpersonal Theory life is a series of interwoven tensions. The task of living is the effective management of tensions in dynamic equilibrium (Cannon, 1939). Man is born into a state of

tension and must adapt and cope with experience to survive. A parallel may be drawn between personality as a tension system and the twelve-story edifice constructed by Moshe Safdie for "Expo 67" in Montreal, called Habitat. Eight-ton concrete blocks are bound together by interlocking tension cables. Like man, this structure faces both its inner and outer worlds by distributing these forces among its parts. The force that comes to bear on one part of the structure can be moved, changed, and shaped by a variety of forces that play on it. This open systems view of man involves a homeostatic model where there is a constant interplay of internal and external forces seeking a steady state. Adaptation involves ever improving forms of homeostasis (Freeman, 1948).

This concept of tension management does not imply a simple one to one relation of psychological states to physiological events. Rather, cognitive, interpersonal, motor, and physiological events interact through interoceptive and exteroceptive channels (Lang, 1971). In responses like anxiety physiological events are more than a vehicle of action, they form an essential expressive part of the response. Feeling states such as anxiety, or its opposite, efficancy, are determined jointly by physiological activation and cognitive set (Schacter, 1964). Nearly all physiological responses can be generated by a great variety of internal and external stimuli. Thus, it is unlikely that any physiological event could be used as a direct index of psychological state. Physiological data must be interpreted in a transactional context and explained on a relatively abstract level in order to acquire the scope necessary to encompass complex inter and intra personal interactions (Lacey, 1959).

This explanatory requirement can be met by considering tension as the potential for action, a necessary impetus for action, a necessary impetus for being and behaving. White (1959, 1960) employs the notion of effectance to describe the energies behind adaptative activities that are involved in the satisfaction of needs and the pursuit of security. Effectance is the tendency to put forth effort to influence the environment. Feelings of efficancy refer to the feeling or satisfaction and security that comes from producing effects (White, 1963). Self esteem is related to the success of one's activities directed toward adaptation. Knowledge about the environment and oneself is knowledge about the probable consequences of one's adaptative efforts. Self knowledge, thus, involves awareness of patterns of tension in the neuromuscular system that offer one potential for coping and adaptation.

As noted previously, however, tension may be characterized by its extreme presence or absence. Experience of either typified state would be immobilizing. Tension is, however, educative to a point beyond which it becomes paralytic. Less severe forms of anxiety are informative and provide an educative influence in living. Tension mobilizes, arouses, and provides both the basis and impetus for action. Tension is, thus, both facilitative and inhibitory. In large doses tension is debilitating and reduces the efficiency of the individual in satisfying

his needs, disturbs interpersonal relations, and produces confusion in thinking (Sullivan, 1953). The experience of anxiety can greatly handicap and complicate the learning process. An extensive literature exists demonstrating the devastating impact of anxiety on performance (Speilberger, 1972). The consequence of learning in the presence of anxiety is that certain experiences are never thoroughly mastered. Substitutions are made for them such as selective inattention, regression, rote memorization, neurotic preoccupation, and avoidance (Sullivan, 1953). To the extent that an individual employs these substitutions he must improvise, distort, and reduce experience to a level he has the capacity to deal with. Thus, no positive training or enduring changes in the organism that result from profiting by experience occur.

FEEDBACK FACILITATED RELAXATION AND EDUCATION

Although optimum levels for learning are poorly understood, there appears to be an inverse relation between muscle relaxation and debilitating tension (J. Wolpe, 1973). This is not surprising insofar as muscles are the vehicle of expression for almost every aspect of our physical and mental life. In spite of certain ambiguities in the relation of relaxation and anxiety, a number of researchers have advocated the retraining of the physiological system as a way of altering unwanted feeling states (Jacobson, 1939; J. Wolpe, 1958; Schultz & Luthe, 1959). The assumption is made that feedback from physiological events is such an integral part of feeling states that they can modify motor and cognitive responses (Lang, 1971). Further, muscle relaxation has been found to be a favorable vehicle for producing the desired changes.

The use of muscle relaxation has an extensive history in medicine, clinical psychology, and psychiatry. The pioneering work in relaxation training was done by physician physiologist Edmund Jacobson. Early in his career he observed that many of the physical disorders he encountered in private practice were tension related. Thereafter, he concentrated on exploring the nature of muscle tension and its management. The training system he founded, known as Progressive Relaxation, involves learning to control fine and gross groups throughout the body. Beginning in 1908 Jacobson has evolved a detailed training program based on the practice of tensing and relaxing muscle groups throughout the body (Jacobson, 1939, 1964, 1967, 1970). After awareness of the internal signs of tension are learned, an appreciation of the capacity for voluntary achievement of relaxed states is gained by experiencing the difference between felt and unfelt or forgotten residual tension. The first goal is getting generally relaxed and the next is to perfect it so that it can be easily done differentially, while doing something like listening to a lecture, taking an exam, driving a car, or shooting a basket. The graduated practice series covering muscle groups from head to toe extend from

general to deep and differential relaxation. Progressive Relaxation training involves an hour a day of practice over a number of months.

A number of alternative relaxation training programs have been produced in recent years. Most notable is Autogenic Training developed by German psychiatrist Johannes Schultz. Essentially this self induced method of achieving inner calm employs aspects of hypnosis, psychoanalysis, and yoga (Schultz & Luthe, 1959; Lindeman, 1971). Behavior therapists have developed similar techniques in the form of emotive imagery, rehearsal, cognizing and actually picturing stimuli that suggest relaxation (Lazarus & Abromovitz, 1962). These techniques, while reflecting many of the principles of Progressive Relaxation, may be characterized by their passive and ideational method in contrast to Jacobson's active and sensate approach. Although both forms of training have been successful, they involve relatively long and time-consuming programs.

In recent years the technological revolution brought by modern electronics and the insights provided by information theory have made it possible to shorten the time required for relaxation training and to extend its scope.

Biofeedback employs the finding that a variable cannot be controlled unless information about the variable is made available by electronically creating a feedback loop where information about one or more normally unconscious physiologic processes is made available to a person as a visual, auditory, or tactile signal. Moreover, the person's progress in controlling the process (e.g. muscle tension) can be electronically monitored.

The technology employed in biofeedback is based on the fact that underlying all action is the bioelectric energy generated by the body's organs. The cell is the major part of this phenomenon. Where stimulated, the walls of neural and muscle cells alter their permeability. The resulting rearrangement of ions on either side constitutes the firing of the cell and is sensed electrically as a change in voltage polarity (Lang, 1971). This depolarization may be transmitted from cell to cell within the active organ. Evidence for this occurrence is manifest in a sequence of bioelectric events radiating through the relatively high conducting medium of body tissue (Brown, 1974.) Bioelectric assessment of an organ's functioning can be accomplished by placing electrodes on the body surface and amplifying the sensed voltage changes. The equipment necessary to monitor bioelectric activity includes three basic components, sensing electrodes, an amplifier, and a recorder. By listening to the signal produced by biofeedback equipment it is possible to discriminate internal states and discover which manipulation produces the desired changes. After control is learned by following the signal, the feedback apparatus should no longer be necessary since the desired state is potentially reproducible at will.

Research based on this technological advance has dramatically upset traditional views and revolutionized modern psychophysiology (Jonas, 1973). Traditionally, the nervous system was divided into two distinct

subsystems: the central nervous system, which includes the brain and the spinal cord that directs skeletal muscle activity and the autonomic system, which was thought to automatically maintain the internal milieu, control the heart, stomach, and glands (Guyton, 1971). The claim of certain yogas and mystics that they could control cardiac functions such as heart rate and blood pressure has been substantiated (Brown, 1974). As a result of biofeedback research, these divisions have been found to be arbitrary in that the conception of the automatic system as truly automatic, beyond voluntary control, has been shown invalid (Ornstein, 1972).

Although feedback of brain wave patterns, cardiac function, electrodermal activity and skin temperature have been used to facilitate relaxation, the monitoring of the electrical output of muscles seems to offer the greatest potential in tension control training (Budzynski, in press). Moreover, feedback assisted relaxation training appears to be more effective than either biofeedback or relaxation practice used alone (Lang, 1971).

Electromyographic feedback, the translation of muscle tension into auditory and visual stimuli, has been extensively used to facilitate learning how to relax (Green, 1969; Budzynski, Stoyva, & Adler, 1970; Shipman, Oken, & Heath, 1970; Love, 1972, 1973). An electromyogram or EMG is a recording of changes in the electrical output or potential of muscles. Muscle contractions are the source of EMGs. A potential exists when the concentration of sodium and potassium ions are different on the semi permeable cell wall from those on the outside. When the ions move through the cell wall to seek a balance current flows and shifts from negative to positive. Motor nerves are cellular and attached to individual muscle fibers. When a signal from the brain causes these cells to depolarize, the muscle fiber shortens (tenses). Muscle tension is a shortening of these fibers, relaxation is their lengthening. When muscles contract they generate an electrical impulse along the muscle fibers. The electrical impulse spreads from the muscle to the skin. The total voltage at the skin varies with the number of fibers contracting simultaneously (Basmajian, 1967, 1972). An EMG is obtained by placing two electrodes and a ground over a muscle. The electrodes pick up the muscle potential in microvolts which can be filtered, amplified, and converted into a signal such as a tone, needle deflection on a meter, or numerical representation of integrated microvolt activity in single and repeated trials.

A person trying to control muscle tension uses the feedback provided by the electromyograph to close the feedback loop and obtain information about what causes the desired reaction. By seeing or hearing one's internal responses by means of this electronic recording device, one can learn to control them for reinforcement.

Although the outcome of this experience can be explained in terms of instrumental conditioning the notion of coping and adaptation outlined previously best accounts for the objective and subjective components of biofeedback, the confounding influences of suggestion and

placebo effect. Biofeedback, when employed in connection with relaxation practice can facilitate the development of a sense of efficancy in relation to one's self, as internal states never thought capable of self management are brought under control. The competence motivation perspective helps reconcile findings of several discrepant reports on the relation of anxiety and muscle tension. Davison (1966) demonstrated that muscle relaxation and anxiety are not mutually antagonistic by producing reports of the experience of anxiety by subjects in a state of chemically induced muscle relaxation. As Rachman (1968) argues, mental relaxation, not muscle relaxation, appears to be the essential element in anxiety reduction. Self control is, thus, interrelated with self-confidence and self-esteem. This securing of oneself in relation to the requirements of coping and adaptation may be said to diminish debilitating anxiety and result in a sense of competence and well being. Biofeedback provides an effective means of regulating the pace of daily life, thought patterns, bodily processes, habits, perceptual style, and activation levels. Relaxation extends one's repertoire of coping skills and strengthens available resources in meeting life's challenges.

The sort of muscle relaxation advocated in this paper does not involve the absence of all muscle tension. A population of placidly controlled people would probably be dull. As noted earlier the process of living is an enterprise in tension management. Even at rest the cells of muscles are working. The complex system of muscles throughout the body must exhibit a twenty-four hour tonus if only to respond to the push and pull of gravity. The body's orchestration of muscles in varying and often escalating degrees of tension are largely forgotten. Relaxation training can only act as a reminder and an opportunity to assess whether or not present levels of muscle tension are appropriate and effective.

Residual tension, the difference between felt and unfelt tension, involves an expectancy, a bracing against the world that becomes unconscious. This sort of tension is habitual and may become a life style. After a number of years its only manifestation may be chronic fatigue. As Brown (1974) points out, the body's adaptations are usually accepted by the mind. Biofeedback intervention early in life offers some hope of enabling the mind to check the body's adaptations and get them in line on the basis of foresight and reason.

The school counselor wishing to employ feedback facilitated relaxation in his or her school would do well to begin the training program by making it available to teachers and administrators. Following their familiarity with the program students may be referred or elect to begin training.

The most direct way the teacher or counselor can detect the overtense pupils is by observing them for signs of steady and intermittent muscle contraction, wrinkling of brow, frowning, blinking, eye focus, fidgeting, stuttering, rate of speech, voice level, and rate of food intake. Overactivity restlessness, rapid movements, and hyper-

distractability, coupled with academic underachievement, are obvious indicators that either the pupil is having trouble coping with tension or that the constraints of the school are oppressive and tyrannical. The latter should never be excluded in assessing the need for relaxation training. One good procedure for determining the needs of a large class is to ask the pupils to sit at their desks, lay their heads down with eyes closed, and relax. Soon ultra tense students can be contrasted to class members by their outstanding restlessness.

Students entering relaxation training are told of the nature of muscle tension and biofeedback. Most are intrigued by the concept and eager to give it a try. For younger students it has proven useful to use an analogy such as describing the body's use of energy as if it were an automobile and the EMG a speedometer. The first phase of practice involves a general introduction to relaxation using primarily suggestion. Next the student is introduced to the biofeedback equipment and the relaxation or, for young children, the astronaut's reclining control chair. Small surface electrodes are placed on the forearm for the first session and then on the forehead for the duration of the training program. The forearm is a good site for the learning of rapid tension control, the frontalis muscles are one of the best spots for monitoring residual tension and they produce adequate generalization of relaxation throughout the body.

The student is told that the electromyograph will emit a tone that will tell him how relaxed or tense he is. The higher the tone the more tension there is in the muscle group under observation. The student's task is to keep the pitch of the tone low. In addition to the tone, the machine's counter and integrated recording of muscle potential are also useful for feedback and research purposes. Vital to the success of biofeedback training is the maintenance of a relaxed atmosphere, the provision of clear instructions, and persuading the student to commit himself to learning tension control and then confirming success. The student moves through several levels of muscle-control practice. Likewise machine sensitivity is adjustable in relation to the student's progress. Training usually takes a month, with eight to ten half-hour feedback facilitated sessions, until satisfactory awareness of muscle tension is achieved and adequate tension control is exhibited.

Pretest trials at the Institute of Child Study, University of Toronto, indicate that children old enough to develop on awareness of a feeling between subjective reality and the external indicators of muscle activity, can successfully learn relaxation with the aid of an electromyograph. This would set the lower range of training possibilities at about six years of age or the beginning of the stage in cognitive development known as concrete operations.

The real issue in using biofeedback with young children is that they are likely not to appreciate adult reasoning for continuing practice and, thus, may not wish to endure the training program. Currently a preliminary study by the author is employing a young child's mother as trainer in an attempt to overcome this problem.

APPLICATIONS AND IMPLICATIONS

Reports of relaxation training techniques being used with school age children, particularly normal children, are relatively scarce. Behavior therapists have, however, used relaxation with children in clinical settings. Notable in these accounts is the early therapeutic use of relaxation training by Lazarus (1960) in the successful treatment of a nine-and-a-half-year-old girl displaying a wide range of psychophysiological ailments in response to separation from her mother. These maladies made it impossible for her to attend school. Relaxation training was used in association with a list of stimuli to which the child reacted with debilitating anxiety. The child, when relaxed, was asked to imagine each stimulus and apply relaxation techniques until she was systematically desensitized. Five sessions over a ten day period were required before she returned to school and the neurotic symptoms subsided. Similar uses of relaxation training in desensitization with children have been reported by a number of other therapists (Kushner, 1965; Patterson, 1965; Garvy & Hegreves, 1962).

Graziana & Kean (1971), using muscle relaxation as a muscle antagonist to anxiety, were able to teach tension control to autistic children between the ages of five and six in 105 training sessions. The children reported the achievement of deep relaxation and manifested a marked decrease in excitement responses before and after the training program. Jacobson (1973) has related his successful use of Progressive Relaxation training in the treatment of children's stuttering and stammering.

Relaxation training has also been found a useful technique for dealing with the academic underachievement of adolescents suffering from debilitating test anxiety (Laxer, Quarter, Kooman, & Walker, 1969; Donner & Guerney, 1969; Emery & Krumboltz, 1967; Garlington & Cotter, 1968; Allen, 1971; Cornish & Dilley, 1973).

If few studies have been reported using relaxation with children, even fewer have been reported using feedback facilitated relaxation. Simard (1969) successfully trained healthy children. between the ages of three and twelve in fine motor control. The children demonstrated the same motor ability as adults. The only variations found between age groups were the usual differences in attention span between age groups. Brown (1974) reported the successful use of feedback in the control of muscles suffering from both minor and major neural damage. She indicated that children six to twelve with cerebral palsy were taught fine motor control.

Recently, Connoly and his associates (1974) placed six hyperkinetic children on EMG feedback training to reduce overall levels of hyperactivity. All children showed significantly lower levels of hyperactivity on standard rating scales after eight training sessions. Moreover, they exhibited significant improvement on tasks requiring speed and fine motor coordination.

School counselors and other educators who are in the business of promoting self-awareness and control might offer feedback assisted relaxation training as a method for accentuating processes conducive to learning, strengthening specific skills, and reducing impediments to learning.

Educational technology has gone far in enabling individual needs, rates, and styles of learning to be taken into account. As yet, however, the state of the learner has not been given adequate consideration. Students could conceivably be taught to maintain states conducive to learning, remembering, and retrieval (Mulholland, 1973). Moreover, education should involve training for life. More specifically, it should enable individuals to learn, to profit by their experience to an extent that desired changes in behavior result.

Distraction disturbs the learning process. Attention is necessary for accuracy, memorization, and comprehension. The most disturbing distraction results from anxiety. The anxious learner is usually the poor learner. Attention and concentration problems are associated with most of what is called academic underachievement (Heinicke, 1972). If levels of arousal of attentional processes could be better understood and made amenable to self control through relaxation training, skills in numerous areas such as reading and listening may be enhanced.

The Lozanov Teaching Method, developed and used primarily in Bulgaria, is a technique for speeding up learning and increasing retention using relaxation. Essentially, this approach involves having pupils relax while the teacher lectures or reads. The student is reported to gain on intuitive perception of the material presented (Ostrander & Schroeder, 1970).

Connoly and associates (1974) report an estimate that between 150,000 to 200,000 North American children are given tranquilizers for various reasons. Since the consequences of stimulant and psychoactive drugs on social psychological development are unknown, alternative methods for reducing hyperactivity are needed. In special education, hyperactivity and distractability could be made more manageable through feedback facilitated relaxation training. As self-control skills are fostered, interpersonal performance stress may be reduced. This sort of training could provide an alternative to the chemical tranquilization of the hyperkinetic child.

Some of the boredom and dissatisfaction of alienated youth may be lessened if the school becomes a place to raise levels of personal awareness and expand consciousness. Moreover, heightened awareness of internal processes that affect health and a sense of well being could lessen the risks of serious drug abuse. Relaxation is a mind trip, a potential source of inner peace through expanded awareness of self (Dohner, 1972; Kurtz, 1973).

"Knowledge about" is usually not as appealing to an adolescent as "acquaintance with." Our society expects adolescents to have achieved a degree of autonomy and self reliance from childhood experiences, and provides them with little opportunity for personal expression of agency

and assertiveness. When concerns with self-identity are most salient, the concrete experience of learning about oneself may be of more lasting consequence than much of the traditional curriculum. Self-exploration through biofeedback and relaxation could be employed as an avenue to much of the information considered important to the potentially productive citizen.

Finally, in the area of educational implications, the frequently neglected area of teacher training and ongoing education need mention. Awareness of relaxation techniques could personally assist teachers and administrators in their jobs and provide a foundation to similarly help others. Teachers could profitably become more sensitive to the human needs implied in efforts to control internal states and more able to assist students to became more self-reliant and responsible for their own learning.

The school counselor is in a unique position of being an educator and a mental health agent. His role necessitates influencing the school to serve human needs, foster the well being of children and their families, manifest community responsibility, and act as a center for constructive social change. Feedback-facilitated relaxation offers one way of helping the school counselor achieve some of these aims in terms of realistic classroom practices and within the school's available resources.

In conclusion a cautionary note must be entered. Feedback facilitated relaxation training is no panacea. The North American penchant for gadgetry has seen many who jumped on the biofeedback band wagon jump off it. The enthusiasm surrounding early claims regarding alpha training and cardiac control has waned (Budzynski & Stoyva, 1970; Blanchard & Young, 1973). Likewise aspects of electromyography such as the generalizability of site relaxation throughout the body appear more problematic than previously suspected (Jessup, 1974).

Moreover, the assumed golden mean between over tension and over relaxation is elusive. Each person has individual and differential levels of arousal and efficiency. The importance of recognizing the rewards of tension such as excitement and anticipation can easily be minimized. Berlyne (1960) has observed that increases in tension will be sought by subjects for the mere sake of experiencing the succeeding drop in arousal. Risk taking, uncertainties, and novel, complex, changing and surprising stimuli serve as "arousal jags" and are often welcomed because their alleviation provides satisfaction.

What is left after close scrutiny of biofeedback applications are complex issues and, in the context of this paper, implications for feedback-assisted relaxation training that are mere hypotheses awaiting investigation.

While feedback facilitated relaxation training is not all things it does offer the potential for contributing to competencies in dealing with problems in living and learning that could prove a valuable resource in a person's repertoire of coping skills throughout the life span.

RESUME: Généralement parlant, toute tension suppose de l'anxiété et de l'insécurité tandis que la relaxation implique un bien-être et de la confiance. La recherche a montré que la tension peut faciliter ou inhiber l'apprentissage. Bien qu'on en sache peu sur les niveaux optimaux, il semble y avoir une relation inverse entre la relaxation et la tension débilitante. L'apprentissage par rétroaction a rendu possible l'étude du processus d'excitation physiologique et du contrôle volontaire.

Le conseiller peut utiliser à bon escient les techniques de relaxation et de réduction de tension dans son travail avec les étudiants normaux et hyperkinétiques, par exemple, dans les domaines de l'attention et de la concentration. La formation à l'usage de ces techniques peut constituer un atout acquis pour la vie dans la résolution des situations interpersonnelles et éducatives de tous les jours.

REFERENCES

Allen, G. J. Effectiveness of study counselling and desensitization in alleviating test anxiety in college students. *Journal of Abnormal Psychology*, 1971, 77, 282-289.

Alpert, R. & Haber, R. W. Anxiety in academic achievement situations. *Journal of Abnormal and Social Psychology*, 1961, **61**, 207-215.

Ashby, W. R. *Introduction to cybernetics.* New York: Wiley, 1963.

Ausubel, D. P. *Educational psychology: A cognitive view.* New York: Holt, Rinehart, Winston, 1968.

Basmajian, J. W. *Muscles alive, their function revealed by electromyography.* Baltimore: Williams and Wilkins, 1967.

Basmajian, J. W. Electromyography comes of age. *Science*, 1972, 603-609.

Berlyne, E. E. *Conflict, arousal, and curiosity.* New York: McGraw Hill, 1960.

Blanchard, E. & Young L., Self-control of cardiac functioning: A promise as yet unfulfilled. *Psychological Bulletin*, 1973, March, 145-163.

Brown, B. *New mind, new body — bio-feedback: New directions for the mind.* New York: Harper & Row, 1974.

Budzynski, T., Stoyva, J. & Adler, C. Feedback-induced relaxation. Application to tension headache. *Journal of Behaviour Therapy and Experimental Psychiatry*, 1970, 1, 205-211.

Budzynski, T., & Stoyva, J. Biofeedback techniques in behaviour therapy. In N. Birbaumer (Ed.) *The mystery of anxiety: Contributions of neuropsychology to anxiety research.* In press.

Cannon, W. B. *The wisdom of the body.* New York: Norton, 1939.

Connoly, D., Desserman, R., & Kisschvink, J., Electromyography (E.M.G.) Biofeedback on hyperkinetic children. *Journal of Biofeedback*, 1974, 2, 24-30.

Cornish, R. D. & Dilley, J. Comparison of three methods of reducing test anxiety: Systematic desensitization, impulsive therapy and study counselling. *Journal of Counseling Psychology*, 1973, **20**, 499-503.

Davison, G. G., Anxiety under total curarization: Implications for the role of muscular relaxation in the desensitization of neurotic fears. *Journal of Nervous and Mental Disease*, 1966, **143**, 443-448.

Dohner, V. A. Alternatives to drugs. *Journal of Drug Education*, 1972, 2, 3-22.

Donner, L. & Guerney, G. Automated group desensitization for test anxiety. *Behaviour research and therapy*, 1969, 7, 1-13.

Emery, J. R., & Krumboltz, J. R. Standard versus individual hierarchies in desensitization to reduce test anxiety. *Journal of Counseling Psychology*, 1967, **14**, 204-209.

Freeman, G. L. *The energetics of human behaviour.* Ithaca: Cornell University, 1948.
Garlington, W. K. & Cotter, S. B., Systematic desensitization of test anxiety. *Behaviour Research & Therapy,* 1968, **6,** 247-256.
Garvey, W. P. & Hegreves, J. R. Desensitization techniques in the treatment of school phobia. *American Journal of Orthopsychiatry,* 1962, **32,** 89-98.
Graziano, A. M. & Kean, J. E. Programmed relaxation and reciprocal inhibition with psychotic children. In Graziano, A. M., (Ed) *Behaviour Therapy with Children.* Chicago: Aldine-Atherton, 1971.
Green, E. Feedback technique for deep relaxation. *Psychophysiology,* 1969, 6, 371-377.
Guyton, A. *Basic human physiology: Normal functions and mechanisms of disease.* Philadelphia: W. B. Saunders, 1971.
Heinicke, C. M. Learning disturbance in childhood. In Wolman, B. (Ed.), *Handbook of Child Psychopathology.* New York: McGraw Hill, 1972.
Jacobson, E. *Progressive relaxation.* Chicago: Chicago, 1939.
Jacobson, E. *You must relax.* New York: McGraw Hill, 1962.
Jacobson, E. *Anxiety and tension control.* Philadelphia: Lippincott, 1964.
Jacobson, E. *Teaching and learning: New methods for old arts.* Washington, D.C.: National Foundation for Progressive Relaxation, 1973.
Jacobson, E. *Tension in medicine.* Springfield: C. C. Thomas, 1967.
Jacobson, E. *Modern treatment of tense patients.* Springfield: C. C. Thomas, 1970.
Jessup, B. A. An E.M.G. study of biofeedback relaxation training with generalization of response and relation to subject depression rating. Paper presented at the annual meetings of the Canadian Psychological Association, Windsor, Ontario, 1974.
Jonas, G. *Visceral learning.* New York: Viking, 1973.
Kurtz, P. Turning on without chemicals. *Journal of Biofeedback,* 1973, 2, 88-102.
Kushner, M. Desensitization of a post traumatic phobia. In Eysenck H., (Ed.) *Behaviour Therapy and the Neuroses.* Oxford: Pergamon, 1960.
Lacey, J. I. Psychophysiological approaches to the evaluation of psychotherapeutic process and outcome. In E. A. Rubinstein and M. B. Parloff (Eds.) *Research in Psychotherapy.* Washington: APA, 1959.
Lang, P. The application of psychophysiological methods in the study of psychotherapy and behaviour modification. In A. Bergin and S. Garfield (Eds). *Handbook of psychotherapy and behaviour change: An empirical analysis.* New York: Wiley, 1971.
Laxer, R. M., Quarter, J., Kooman, A., & Walker, K. Systematic desensitization and relaxation of high-test anxious secondary school students. *Journal of Counseling Psychology.* 1969, **16,** 446-451.
Lazarus, A. A. The elimination of children's phobias by deconditioning. In H. Eysenck (Ed.) *Behaviour therapy and the neuroses.* Oxford: Pergamon, 1960.
Lazarus, A. A. *Behavior and beyond.* New York: McGraw-Hill, 1971.
Lazarus, A. A. Coping with tensions in daily living tapes. Chicago: *Human Development,* 1971.
Lazarus, A. A., & Abromovitz, L. The use of emotive imagery in the treatment of children's phobias. *Journal of Mental Science,* 1962, **108,** 191-195.
Lindeman, H. *Relieve tension the antogenic way.* New York: Wyden, 1971.
Long, A. Muscle relaxation with male adolescents using E.M.G. feedback training vs. tape recorder relaxation training. Unpublished paper presented to the Midwest Regional Conference of the Association for Humanistic Psychology, May, 1974.
Love, W. A., Montgomery, D., & Moeller, T. Working paper number 1. Unpublished paper, Nova University, Fort Lauderdale, Florida, 1971.
Love, W. A. The use of biofeedback E.M.G. training with a clinical case. Unpublished paper, Nova University, Fort Lauderdale, Florida, 1972.
Love, W. A. Problems in therapeutic application of E.M.G. feedback. Unpublished paper, Nova University, Fort Lauderdale, Florida, 1973.

Malmo, R. Emotion and muscle tension — story of Anne. *Psychology Today*, 1970, March, 64-67.
Mandler, G., & Sarason, S. A study of anxiety and learning. *Journal of Abnormal and Social Psychology*, 1952, **47**, 166-173.
Mulholland, T. It's time to try hardware in the classroom. *Psychology Today*, 1973, Dec., 103-104.
Ornstein, R. *The psychology of consciousness.* San Francisco: Freeman, 1972.
Ostrander, S., & Schroeder, L. *Psychic discoveries behind the iron curtain.* New York: Basic, 1970.
Osterhouse, R. A. Desensitization and study skills training as treatment of two types of test anxious students. *Journal of Counseling Psychology*, 1972, **19**, 301-307.
Patterson, G. R. A learning theory approach to the treatment of a school phobic child. In L. P. Ullman and L. Krasner (Eds). *Case studies in behaviour modification.* New York: Holt, Rinehart and Winston, 1965.
Rachman, S. The role of muscular relaxation in desensitization therapy. *Behaviour research and therapy*, 1968, **6**, 159-166.
Sarason, S. B., Davidson, K. S., Lighthall, F. T., Waite, R. R., & Ruebush, B. K. *Anxiety in the elementary school child.* New York: Wiley, 1960.
Sarason, I. Experimental approaches to test anxiety: Attention and the use of information. In C. Speilberger (Ed.), *Anxiety: Current trends in theory and research*, Vol. I and II, New York: Academic Press, 1972.
Schachter, S. The interaction of cognitive and physiological determinants of emotional state. In L. Berkowitz (Ed.), *Advances in experimental social psychology.* New York: Academic Press, 1964.
Schultz, J. H., & Luthe. W. *Autogenic training: A psychophysiological approach in psychotherapy.* New York: Grave and Stratten, 1959.
Schwartz, G. E. TM relaxes some people and makes them feel better. *Psychology Today*, 1974, April, 39-46.
Shipman, W., Oken, D., & Heath, E. Muscle tension and effort at self-control during anxiety. *Archives of General Psychiatry*, 1970, **23**, 359-368.
Simard, T. Fine motor control in healthy children. *Pediatrics*, 1969, **43**, 1035-1041.
Simons, R., & Bibb, J. Achievement motivation, test anxiety, and under-achievement in the elementary school. *Journal of Education Research*, 1974, **67**, 366-369.
Speilberger, C. (Ed.) *Anxiety: Current trends in theory and research.* Vol. I and II, New York: Academic Press, 1972.
Strobel, C. Biofeedback treatment in medicine and psychiatry: An ultimate placebo. In L. Birk and B. Lueck, (Eds.) *Biofeedback: Behavioral medicine.* New York: Grune and Stratton, 1973.
Sullivan, H. S. *Clinical studies in psychiatry.* New York: H. W. Norton, 1956.
Sullivan, H. S. *The interpersonal theory of psychiatry.* New York: Norton, 1953.
White R. Motivation reconsidered: The concept of competence. *Psychological Review*, 1959, **66**, 297-333.
White, R. Competence and the psychosexual stages of development. In M. Jones (Ed.) *Nebraska symposium on motivation.* Lincoln: University of Nebraska, 1960.
White, R. Ego and reality in psychoanalytic theory. *Psychological Issues*, Monograph 1. 1963, III, 208.
White, R. *The enterprise of living*, New York: Holt, Rinehart, and Winston, 1972.
Wolpe, J. *The practice of behaviour therapy.* New York: Pergamon, 1973.
Wolpe, J. *Psychotherapy by reciprocal inhibition.* California: Stanford University Press, 1958.