HARVARD BOSINESS REVIEW - ON HUMAN RELATIONS
HARVER + KOW NEW YARK 1979. C 2

10. Your Innate Asset for Combating Stress

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As much as any group in history, modern administrators are overworked, pressured, and squeezed, often to the point of physical illness or emotional misery. Their characteristic ambitions constantly lead them into struggles that stretch their capacities. Many cannot stand up to it; their reactions range from subtle malaise to heart attacks. Fortunately, there is an extremely simple technique by which the executive can alter his physiology from the stressful mode toward calm—even decreasing his blood pressure. It can be practiced easily and with immense rewards in physical and emotional well-being. This article has been written expressly to provide the harried manager with the medical rationales for using the technique and to persuade him to practice it for the sake of his own health. In his conclusion the author even suggests that every company do ALL its employees a good turn by offering an alternative to the coffee break—the relaxation response break. Once an executive has tried it out, he may agree with this suggestion.

Emotional stress is a well-known aspect of the modern Western world and is especially prevalent in the business community. Our society has experienced rapid technological progress; the business community has been an integral part of this progress and, like the rest of the society, has experienced both beneficial and deleterious effects. Members of the business community have been forced to make certain behavioral adjustments—notably, a faster pace and a more pressured life—and behavioral adjustments of this sort induce stress. Although some individuals are aware of the physiologically harmful effects of stress, few know how to prevent or alleviate them. Victimized by the stressful world they have helped to create, many executives have accepted stress as a necessary component of their existence.

AUTHOR'S NOTE: The work on which this article is based has been supported by funds from the U.S. Public Health Service and the General Service Foundation. The editorial assistance of Helen P. Klemchuk and Martha M. Greenwood and the secretarial help of Nancy E. MacKinnon in the preparation of this article are gratefully acknowledged.

However, there is a simple way for the individual to alleviate stress and thus moderate or control many of its undesirable effects—effects that may range from simple anxiety to heart disease. The "relaxation response," an integrated physiologic response, appears to counteract the harmful physiologic effects of stress. It can be elicited by a simple mental technique.

The essential elements of the technique have long been familiar to man, and although they have usually been framed in the vocabularies of religions and cults where the elicitation of the relaxation response has played an important role, the response and the technique can be described in ordinary language. Moreover, the technique and the response can be beneficially applied by all the individuals of the community, including the executive.

The Concept of Stress

The concept of stress has been difficult to define and difficult to quantify. Stress can be usefully defined through its physiologic correlates, particularly elevations in blood pressure. Elevated blood pressure is consistently related to environmental situations that require behavioral adjustment by the individual and thus may be described as stressful. The behavioral adjustments associated with socioeconomic mobility, cultural change, urbanization, and migration are examples of such environmental situations.

Relevant findings were obtained in a comparison of high school and college graduates in managerial positions within the same corporation. The high school graduates experienced more general illness during the one-year period of observation and displayed more signs of cardiovascular disease and high blood pressure (hypertension). The investigators in this study postulated that the high school graduates perceived more threats and challenges in their life situations than the college graduates because of the greater discrepancy between their lives and their childhood experiences: the relative ill health of the high school graduates is regarded as part of the price they pay for "getting ahead in the world."

In other investigations, undertaken in several Pacific islands, higher blood pressure was found to be associated with the degree of Westernization. Migration from rural to urban areas in these same islands was also correlated with a rise in the prevalence of elevated blood pressure. Adrian M. Ostfeld and Richard B. Shekelle of the University of Illinois clearly summarized why these situations apparently require behavioral adjustment:

^{1.} Mary C. Gutmann and Herbert Benson, "Interaction of Environmental Factors and Systemic Arterial Blood Pressure: A Review," Medicine, November 1971, p. 543.

There has been an appreciable increase in uncertainty of human relations as man has gone from the relatively primitive and more rural to the urban and industrial. Contemporary man in much of the world is faced every day with people and with situations about which there is uncertainty of outcome, wherein appropriate behavior is not prescribed and validated by tradition, where the possibility of bodily or psychological harm exists, where running or fighting is inappropriate, and where mental vigilance is called for.²

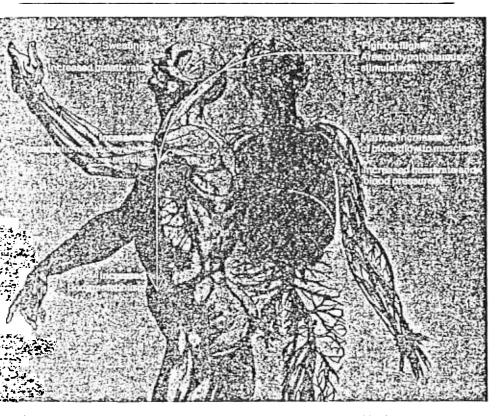
THE FIGHT-OR-FLIGHT RESPONSE

Stressful situations that require behavioral adjustment appear to elevate blood pressure by means of a physiologic response popularly referred to as the "fight-or-flight response," first described by Dr. Walter B. Cannon of the Harvard Medical School. When an animal perceives a threatening situation, its reflexive response is an integrated physiologic response that prepares it for running or fighting. This response is characterized by coordinated increases in metabolism (oxygen consumption), blood pressure, heart rate, rate of breathing, amount of blood pumped by the heart, and amount of blood pumped to the skeletal muscles.

The existence of this integrated response in lower animals was substantiated by the Swiss Nobel laureate Dr. Walter R. Hess. By stimulating the brain of the cat, he demonstrated that the controlling center for the fight-or-flight response is located within a specific area of the brain called the hypothalamus. When this area is electrically stimulated, the brain and other portions of the nervous system respond by controlled outpouring of epinephrine and norepinephrine (also called adrenalin and noradrenalin), which leads to the physiologic changes noted in the fight-or-flight response. These two compounds are the major chemical mediating substances of the sympathetic nervous system. Significantly, the overactivity of this functional division of the nervous system has been implicated in the development of many serious diseases. Thus the fight-or-flight response is an integrated physiologic mechanism leading to coordinated activation of the sympathetic nervous system.

A Czech scientist, Dr. Jan Brod, and his associates have demonstrated the physiologic characteristics of the fight-or-flight response in man in the laboratory setting. First, control measurements were made in a group of healthy young adults in a resting position. These subjects were then given a mental-arithmetic problem to solve: from a four-digit number like 1,194, subtract consecutive serial 17s. A metronome was set clicking in the background, and others around

^{2. &}quot;Psychological Variables and Blood Pressure," in *The Epidemiology of Hypertension*, edited by J. Stamler, R. Stamler, and T. N. Pullman (New York, Grune and Stratton, 1967), p. 321.



the subjects made statements such as: "I did better than that. You're not doing very well." Then new measurements were taken of blood pressure, blood pumped by the heart, and blood pumped to the skeletal muscles. All had increased. Exhibit I is an illustration of the physiologic characteristics associated with the fight-or-flight response.

Other situations requiring behavioral adjustment also lead to the fight-orflight response. All human beings use the same basic physiologic mechanisms to respond to individually meaningful, stressful events.

Although the fight-or-flight response is still a necessary and useful physiologic feature for survival, the stresses of today's society have led to its excessive elicitation; at the same time, its behavioral features, such as running or fighting, are usually socially inappropriate or unacceptable. These circumstances may lead to persistent hypertension. Those who experience greater environmental stress and, therefore, more frequent elicitation of the fight-or-flight response have a greater chance of developing chronic hypertension (that is, chronic high blood pressure).

The importance of hypertension

High blood pressure, or hypertension, is of far greater significance to man than as just an index of stressful circumstances. It is one of the important factors—if not the most important—predisposing man to heart attack and stroke. These diseases of the heart and brain account for more than 50% of the deaths each year within the United States. Therefore, it is not surprising that various degrees of hypertension are present in 15% to 33% of the adult population of the United States, affecting between 23 million and 44 million individuals.

Heart attacks and strokes have always been diseases leading to death, predominantly in the elderly. However, it is highly disturbing that these diseases are now affecting a younger population. The late American cardiologist Dr. Samuel Levine pointed out that in families he followed for decades in which both fathers and sons experienced heart attacks, the average age at the time of the first attack was 13 years earlier for the sons than for their fathers. Many cardiologists feel that we are in the midst of an epidemic of these diseases. If hypertension could be prevented, this epidemic might be alleviated. Consequently, situations requiring behavioral adjustment, which may lead to hypertension, are of considerable concern.

THE RELAXATION RESPONSE

What can be done about everyday situations that lead to stress and its consequences? It is unlikely that the rapid pace of Western life will slow down significantly; and as far as our present standard of living depends on that pace, it is unlikely that most executives would want it to slow down. The need for behavioral adjustment will probably continue, and therefore individuals should learn to counteract the harmful effects of the physiologic response to stress. One possibility is the regular elicitation of the relaxation response.²

The relaxation response is an innate, integrated set of physiologic changes opposite to those of the fight-or-flight response. It can be elicited by psychologic means. Hess first described this response in the cat. He electrically stimulated another specific area of the hypothalamus and elicited what he called "a protective mechanism against overstress [which promotes] restorative processes."

4. Walter R. Hess, Functional Organization of the Diencephalon (New York, Grune and Stratton, 1957), p. 40.

^{3.} See Herbert Benson, John F. Beary, and Mark P. Carol, "The Relaxation Response," Psychiatry, February 1974, p. 37.

Like the fight-or-flight response, the relaxation response is also present in nan. Until recently, the relaxation response has been elicited primarily by neditational techniques—the reader will find information about the effects of one of these techniques in Exhibit II. The practice of one well-investigated echnique, transcendental meditation (TM), results in physiologic changes that are consistent with generalized decreased sympathetic nervous system activity and are thus opposite to the fight-or-flight response. There is a simultaneous lecrease in the body's metabolism, in heart rate, and in rate of breathing. These hanges are distinctly different from the physiologic changes noted during quiet itting or sleep. Blood pressure remains unchanged during the practice of ranscendental meditation; however, pressures appear lower in general among neditators than among individuals who do not practice meditation. Exhibit III s an illustration of the physiologic characteristics associated with the relaxation esponse.

A Very Simple Technique

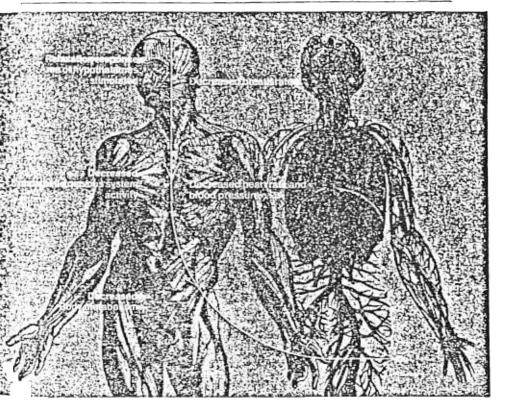
The basic technique for the elicitation of the relaxation response is extremely simple. Its elements have been known and used for centuries in many cultures throughout the world. Historically, the relaxation response has usually been elicited in a religious context. The reader who is interested in the historical background of the response and its universality may enjoy the appendix to this article.

Four basic elements are common to all these practices: a quiet environment, a mental device, a passive attitude, and a comfortable position. A simple, mental, noncultic technique based on these four elements has recently been used in my laboratory. Subjects are given the following description of the four elements in the technique:

- A quiet environment. One should choose a quiet, calm environment with as few distractions as possible. Sound, even background noise, may prevent the elicitation of the response. Choose a convenient, suitable place—for example, at an office desk in a quiet room.
- A mental device. The meditator employs the constant stimulus of a singlesyllable sound or word. The syllable is repeated silently or in a low, gentle tone.
 The purpose of the repetition is to free oneself from logical, externally oriented

See R. Keith Wallace, Herbert Benson, and Archie F. Wilson, "A Wakeful Hypometabolic Physiologic State," American Journal of Physiology, September 1971, p. 795, see also R. Keith Wallace and Herbert Benson, "The Physiology of Meditation," Scientific American, February 1972, p. 84.

Technique	Physiologic measurement					
	Oxygen consumption	Respiratory rate	Heart rate	Alpha waves	Blood pressure	Muscle tension
Transcendental meditation	Decreases	Decreases	Decreases	Increases	Decreases	Not measured
Zen and yoga	Decreases	Decreases	Decreases	Increases	No change	Not measured
Autogenic training	Not measured	Decreases	Decreases	Increases	Inconclusive results	Decreases
Progressive relaxation	Not measured	Not measured	Not measured	Not measured		Decreases
Hypnosis with suggested deep relaxation	Decreases	Decreases	Decreases	Not measured		Decreases
Sentic cycles	Decreases	Decreases	Decreases	Not measured		Not measured



thought by focusing solely on the stimulus. Many different words and sounds have been used in traditional practices. Because of its simplicity and neutrality, the use of the syllable one is suggested.

- 3. A passive attitude. The purpose of the response is to help one rest and relax, and this requires a completely passive attitude. One should not scrutinize his performance or try to force the response, because this may well prevent the response from occurring. When distracting thoughts enter the mind, they should simply be disregarded.
- 4. A comfortable position. The meditator should sit in a comfortable chair in as restful a position as possible. The purpose is to reduce muscular effort to a minimum. The head may be supported; the arms should be balanced or supported as well. The shoes may be removed and the feet propped up several inches, if desired. Loosen all tight-fitting clothing.

ELICITING THE RELAXATION RESPONSE

Using these four basic elements, one can evoke the response by following the simple, mental, noncultic procedure that subjects have used in my laboratory:

☐ In a quiet environment, sit in a comfortable position.
☐ Close your eyes.
Deeply relax all your muscles, beginning at your feet and progressing up
to your face-feet, calves, thighs, lower torso, chest, shoulders, neck, head.
Allow them to remain deeply relaxed.

☐ Breathe through your nose. Become aware of your breathing. As you breathe out, say the word one silently to yourself. Thus: breathe in . . . breathe out, with one. In . . . out, with one. . . .

Continue this practice for 20 minutes. You may open your eyes to check the time, but do not use an alarm. When you finish, sit quietly for several minutes, at first with your eyes closed and later with your eyes open.

Remember not to worry about whether you are successful in achieving a deep level of relaxation—maintain a passive attitude and permit relaxation to occur at its own pace. When distracting thoughts occur, ignore them and continue to repeat one as you breathe. The technique should be practiced once or twice daily, and not within two hours after any meal, since the digestive processes seem to interfere with the elicitation of the expected changes.

With practice, the response should come with little effort. Investigations have shown that only a small percentage of people do not experience the expected physiologic changes. (However, it has been noted that people who are undergoing psychoanalysis for at least two sessions a week experience difficulty in eliciting the response.)

A person cannot be certain that the technique is eliciting these physiologic changes unless actual measurements are being made. However, the great majority of people report feelings of relaxation and freedom from anxiety during the elicitation of the relaxation response and during the rest of the day as well. These feelings of well-being are akin to those often noted after physical exercise, but without the attendant physical fatigue.

The practice of this technique evokes some of the same physiologic changes noted during the practice of other techniques, such as those listed in Exhibit II. These physiologic changes are significant decreases in body metabolism—oxygen consumption and carbon dioxide elimination—and rate of breathing. Decreased oxygen consumption is the most sensitive index of the elicitation of the relaxation response.

Techniques that elicit the relaxation response should not be confused with biofeedback. Through biofeedback training, a subject can be made aware of an otherwise unconscious physiologic function, such as his heart rate, and learn to

^{6.} See Wallace, Benson, and Wilson, op. cit.; see also John F. Beary and Herbert Benson, "A Simple Psychophysiologic Technique Which Elicits the Hypometabolic Changes of the Relaxation Response," Psychosomatic Medicine, March-April 1974, p. 115.

alter it voluntarily. He uses a device that measures the function—heart rate, for example—and "feeds back" to him information corresponding to each beat of his heart. He can then be rewarded (or reward himself) for increases or decreases in his heart rate and thus learn partial heart rate control. Other physiologic functions that have been shown partially controllable through biofeedback are blood pressure, skin temperature, muscle tension, and certain patterns of brain waves, such as alpha waves.

But whereas biofeedback requires physiologic monitoring equipment and can usually be focused on only one physiologic function at a time, elicitation of the relaxation response requires no equipment and affects several physiologic functions simultaneously.

THERAPEUTIC POSSIBILITIES FOR HYPERTENSION

I suggest that voluntary, regular elicitation of the relaxation response can counterbalance and alleviate the effects of the environmentally induced, but often inappropriate, fight-or-flight response.

For example, the regular elicitation of the relaxation response is useful in lowering the blood pressure of hypertensive subjects. Individuals atending an introductory transcendental meditation lecture were asked whether they had high blood pressure and, if so, whether they would be willing to participate in a study of the effects of meditation on high blood pressure. Over 80 subjects with high blood pressure volunteered for the study. They agreed to postpone learning meditation for six weeks while their blood pressures were periodically measured and recorded to establish their premeditation blood pressures. At the end of the six-week period, the subjects were trained to elicit the relaxation response through transcendental meditation.

After at least two weeks of twice-daily meditation, the subjects' blood pressures were measured approximately every two weeks for at least nine weeks. Measurements were made at random times of the day but never during meditation. Throughout this entire period, the subjects were instructed to remain under the care of their physicians and to make only those changes in their medications that were prescribed by their physicians.

Of the original group, about 50 individuals altered the type or dosage of their

^{7.} See Herbert Benson, Barbara R. Marzetta, and Bernard A. Rosner, "Decreased Blood Pressure Associated with the Regular Elicitation of the Relaxation Response: A Study of Hypertensive Subjects," in Contemporary Problems in Cardiology, Vol. 1: Stress and the Heart, edited by R. S. Eliot (Mt. Kisco, New York, Futura, 1974), p. 293; see also Herbert Benson, Bernard A. Rosner, Barbara R. Marzetta, and Helen Klemchuk, "Decreased Blood-Pressure in Pharmacologically Treated Hypertensive Patients Who Regularly Elicited the Relaxation Response," The Lancet, February 23, 1974, p. 289.

antihypertensive medications during the course of the experiment. The data on these individuals were excluded from the study to avoid possible inaccurate interpretations caused by the altered regimens. There remained over 30 subjects who either did not alter their medications or took no antihypertensive medications. Comparisons were then made between these subjects' blood pressures before and after learning meditation.

During the premeditation (control) period, the subjects' systolic blood pressures averaged 140 to 150 millimeters of mercury. (Systolic pressure is the measure of the highest component of blood pressure.) After nine weeks of regular elicitation of the relaxation response, this average dropped into the range of 130 to 140 millimeters. Their diastolic pressures (the lowest component of blood pressure) averaged 90 to 95 millimeters during the control period and dropped into the range of 85 to 90 millimeters by the ninth week of meditation. These decreases reflect a statistically significant change in blood pressure, from what is considered the borderline hypertensive range to the normal range of blood pressure.

An equally important result of the experiment was the change in blood pressure in the subjects who chose to stop meditation. Within four weeks both their systolic and their diastolic pressures had returned to their initial hypertensive levels.

Work remains to be done in this area, but these studies suggest that the regular elicitation of the relaxation response may be another means of lowering blood pressure. At the present time, standard medical therapy for hypertension involves the use of antihypertensive drugs. This pharmacologic method of lowering blood pressure is very effective, but it is sometimes accompanied by unpleasant side effects, and it is expensive. Indications are that the relaxation response affects the same mechanisms and lowers blood pressure by the same means as some antihypertensive drugs. Both act on the sympathetic nervous system.

Although it is unlikely that the regular elicitation of the relaxation response will be adequate therapy by itself for severe or moderate hypertension, it might act synergistically, along with antihypertensive drugs, to lower blood pressure, and may lead to the use of fewer drugs or decreased dosages. In borderline hypertension, the regular elicitation of the relaxation response may be of great value, since it has no pharmacologic side effects and might possibly supplant the use of drugs.

However, no matter how encouraging these initial results appear to be, no person should treat himself for high blood pressure by regularly eliciting the

Auxiliar response. He should use the technique only under the supervision of this sician, who will routinely monitor his blood pressure to make sure it is acquately controlled.

THER THERAPEUTIC POSSIBILITIES

Individuals choose various means to alleviate their subjective feelings of stress, and heavy alcohol intake, drug abuse, and cigarette smoking are serious problems in our society. In a recent investigation, 1,862 individuals completed a juestionnaire in which they reported a marked decrease in hard-liquor intake, drug abuse, and cigarette smoking after they had begun the elicitation of the relaxation response through the practice of transcendental meditation.

Details on decreased alcohol intake are as follows. Hard liquor was defined as any beverage of alcoholic content other than wine or beer, and its usage was divided into four categories:

- 1. Total nonusage of alcohol.
- 2. Light usage—up to three times per month.
- 3. Medium usage—one to six times per week.
- 4. Heavy usage—at least once per day.

Prior to the regular practice of meditation, 2.7% were heavy users of hard liquor. This percentage decreased to 0.4% after 21 months of the twice-daily practice of meditation. Medium users comprised 15.8% prior to meditation; after 21 months they were only 2.6%. Light usage of hard liquor decreased from 41.4% to 21.9%. Further, heavy and medium users tended to become light users or nonusers as they continued to meditate; and, whereas 40.1% were nonusers of alcohol prior to learning meditation, this percentage had increased to 75.1% after 21 or more months of meditation.

This questionnaire also surveyed the drug-abuse patterns of the group—that is, the usage of marijuana, amphetamines, barbiturates, narcotics, LSD and other hallucinogens. Following the start of the regular practice of meditation, there was a marked decrease in the number of drug abusers in all categories; and, as the practice was continued, there was a progressive decrease in drug abuse. After 21 months, most subjects were using no drugs at all.

For example, in the 6-month period before starting the practice of meditation, about 80% of this sample used marijuana, and of those about 28% were heavy users. After regularly eliciting the relaxation response for approximately 6 months, 37% used marijuana, and of those only 6% were heavy users. After 21

^{9.} Herbert Benson and R. Keith Wallace, "Decreased Drug Abuse With Transcendental Meditation—A Study of 1,862 Subjects." in *Drug Abuse—Proceedings of the International Conterence*, edited by C. J. D. Zarasonetis (Philadelphia, Lea and Febiger, 1972), p. 369.

months of the practice, 12% continued to use marijuana, and of those almost all were light users; only one individual was a heavy user.

There was an even greater decrease in the abuse of LSD. Before starting the practice of meditation, 48% of the subjects had used LSD, and of these about 14% were heavy users (at least once per week). After 3 months of meditation, 12% of the subjects still took LSD, but after 21 months only 3% still took it.

For other drugs there were similar increases in numbers of nonusers after starting the practice of meditation. After 21 months, nonusers of the other hallucinogens rose from 61% to 96%; for the narcotics, from 83% to 99%; for the amphetamines, from 68% to 99%; and for the barbiturates, from 83% to 99%.

The smoking habits of the subjects also changed. Approximately 48% smoked cigarettes before starting meditation, and 27% of the sample were heavy users (at least one pack per day). After 21 months of meditation, only 16% still smoked cigarettes, and only 5.8% were heavy smokers.

This particular investigation was biased in several ways. The data were retrospective and subject to the limitation of personal recall. The group was not a random sample, nor was it chosen to be representative of the general population. Further, there was no control population; there are no data concerning the patterns of alcohol intake, drug abuse, and cigarette smoking of a matched sample of nonmeditators. Only a prospective investigation can eliminate these biases. However, these data, as well as data from the other studies cited, suggest strongly that a beneficial effect may be derived from elicitation of the relaxation response.

I must emphasize again, however, that the relaxation response should not be viewed as a potential panacea for medical problems. An investigation of the response in the therapy of severe migraine and certain other kinds of headache, for example, has demonstrated the response to be of limited usefulness in these illnesses; it is recommended that this particular therapy be tried when other therapies of headache have proved unsuccessful. Thus, the relaxation response should not be practiced for preventive or therapeutic medical benefits unless done so with the approval of a physician.

A note on side effects

The side effects of the extensive practice of the relaxation response are worth brief discussion, although they have not been well documented.

When the response is elicited for two limited daily periods of 20 to 30 minutes, no adverse side effects have been observed. When the response is elicited more frequently—for example, for many hours daily over a period of

^{10.} Herbert Benson, Helen Klemchuk, and John R. Graham. "The Usefulness of the Relaxation Response in the Therapy of Headache," Headache, Vol. 14, pp. 49-52, 1974.

several days—some individuals have experienced a withdrawal from life and have developed symptoms that range from insomnia to hallucinatory behavior. These side effects of the excessive elicitation of the relaxation response are difficult to evaluate on a retrospective basis, since many people with preexisting psychiatric problems might be drawn to any technique that evangelistically promises relief from tension and stress.

However, it is unlikely that the twice daily elicitation of the response would do any more harm than would regular prayer.

Benefits for the Business Community

As noted above, well over 50% of our present U.S. population will die of heart disease and related conditions, and these diseases appear to be attacking Americans at younger and younger ages. The frequent elicitation of the fightor-flight response has been strongly implicated in the development of these diseases. The regular use of the relaxation response in our daily lives may counteract the harmful effects of the fight-or-flight response and thereby mitigate these extremely prevalent and dire diseases.

However, modern Western society has turned away from many of the traditional techniques that elicit the relaxation response, such as prayer. Our society has thus lost an important means of alleviating stress and maintaining equilibrium in a changing world. We can probably greatly benefit by the reintroduction of the relaxation response into our society.

Because of its far-reaching influence in our society, the business sector could take the lead in this reintroduction. For example, programs could be established in which time is made available for employees to practice the relaxation response. Voluntary participants could choose whatever mode they wish: a familiar mode, like certain types of prayer, or the simple, noncultic, mental technique previously described. A quiet environment is desirable, but a person can elicit the response at his or her desk or at any comfortable seat. A "relaxation response break" might be substituted for the coffee break. This may improve employees' ability to deal with stress and increase their sense of well-being. Not only may such an application prove beneficial to the individual—it may have further, broader benefits and ramifications for industry as a whole.

For centuries, people have used various techniques to elicit the relaxation response, but it is only now that we are recognizing its potential physiologic benefits. The relaxation response is innate. Members of industry need only take the time to bring it forth. Finally, in our society, the executive certainly has the power to effectively champion the use of this simple but remarkably salutary response, by making time available to bring it forth.