CLINICAL BEHAVIORAL MEDICINE
AND ITS CUTTING EDGES
Biofeedback, Behavior Therapy, and Hypnosis

Inevitably, the doctor's work in the future will be more and more educational and less and less curative. More and more will he deal with the physiology and psychology of his patient, less and less with his pathology. He will spend his time keeping the fit fit, rather than trying to make the unfit fit.

—Thomas Lord Horder
in Familiar Medical Quotations

Nowhere are the needs and opportunities for progress in the biobehavioral sciences clearer than in problems of health and behavior. Behavioral factors contribute to much of our burden of illness. Half of the mortality from the ten leading causes of death in the United States is strongly influenced by life-style.

—David A. Hamburg, M.D.
President, Institute of Medicine
National Academy of Science
Science, 1982

Profound changes have been occurring in health care, particularly in terms of the types of diseases presented to physicians today, and the recognition of the inadequacies of conventional medical treatments for these disorders. Acute infectious diseases, like pneumonia and tuberculosis, no longer kill or cripple citizens of the United States so frequently as they did in 1900. Instead, chronic stress-related multifactorial conditions, like cardiovascular disease, cancer, and auto accidents, are today's major killers and cripplers. These diseases cannot be traced to a
single pathogen, but behavioral and environmental factors can increase vulnerability to the disease (Califano, 1979). Eighty percent of the problems presented to physicians today are chronic diseases, such as colitis, arthritis, asthma, diabetes, and cardiovascular disease. These are diseases of choice, not chance, because life-style and behavioral factors, such as diet, smoking, and exercise, are major risk factors for the prevention of these disorders. With the chronicity of disease, behavioral factors become even more crucial to prognosis and to effective therapy (compliance with medication, depression, etc.). In 1979 the Surgeon General’s Report attributed 50% of all deaths to unhealthy behaviors. The profile of illness today is marked by chronic-stress-related multifactorial diseases in which behavioral and psychological variables and issues of choice are crucial to prevention, therapy, and prognosis. It is worth noting that even for a new infectious disease, AIDS, behavior is a major risk factor and in fact a specific type of behavior, sexual behavior. (See Figure 5.)

The joint impact of the previously cited changes may lead to a revolution in health care. This revolution, which can be labeled behav-

![Diagram](image-url)  
*Figure 5. Deaths for selected causes as a percentage of all deaths: United States, selected years, 1900-1980. Source: National Center for Health Statistics, Division of Vital Statistics.*
ioral medicine, is based on the growing recognition that behavioral and cognitive factors may be crucial to the etiology, prevention, and therapy of physical diseases like lung cancer and heart disease. Cigarette smoking, diet, exercise, Type A behavior, and obesity are risk factors for lung cancer and heart disease. The behavioral medicine revolution is also based on the recognition that there are now promising behavioral treatments for physical disorders such as muscular and vascular headaches (Budzynski, Stoyva, & Ader, 1970; Sargent, Green, & Walters, 1973; Wickramasekera, 1972), primary Raynauds disease (Surwit, 1973), and primary hypertension (Patel, 1977). The behavioral medicine revolution may approach the importance of the antibiotic revolution that occurred approximately 50 years ago because it signals the demise of the mind–body dichotomy in practical matters like therapy and preventative health care. Behaviors, and, as I will later show, beliefs that select and mobilize behavior can have biological consequences (Wickramasekera, 1979a). If psychological techniques can reliably and effectively alter some biological functions, should health psychologists then be defined as physicians (Wickramasekera, 1984b)? Does the legal definition of physician require revision now that therapies other than drugs and surgery can heal physical dysfunctions?

There have been several efforts to define behavioral medicine (Matarazzo, 1979; Pomerleau & Brady, 1979; Schwartz & Weiss, 1977), and it seems that these definitions have been either too narrow or too broad. In an elementary sense, behavioral medicine can be defined as the interfacing of behavioral and biomedical sciences in the areas of research, diagnosis, prevention, and therapy of physical diseases and dysfunctions. This integration started much earlier in the research domain, and is now extending into the clinical arena, primarily because of recent advances in three psychological technologies of stress management: biofeedback, behavior therapy, and hypnosis. These behavioral and psychological technologies have two important features. First, they enable a substitution of skills for pills, and second, they make the patient an active participant in identifying, treating, and preventing the patient’s own disease process. In the biomedical model the patient is a passive recipient of services and interventions. In contrast, replicated experimental research in hypnosis, for example, has shown during the last 30 years that hypnotic behavior depends primarily on the subject’s ability or talent and only to a small extent on the hypnotist’s skill (Fromm & Shor, 1979; Hilgard, 1965). Proficiency in biofeedback and behavior therapy skills seem to depend on the degree of patient participation with homework practice. Biofeedback, behavior therapy, and hypnosis (Wickramasekera, 1976) follow an educational model, teaching the pa-
tient to identify stressors and to practice skills that can be used to cope with stress.

I believe the idea of a "right" to health should be replaced by that of a moral obligation to preserve one's own health. The individual then has the "right" to expect help with information, accessible services of good quality, and minimum financial barriers. Meanwhile the people have been led to believe that national health insurance, more doctors, and greater use of high-cost, hospital-based technologies will improve health. Unfortunately, none of them will. (Knowles, 1977)

As the quotations from the eminent medical philosophers Horder and Knowles indicate, the educational model is still relevant to health care. The word doctor originally meant teacher, and the best patient is an actively learning and participating student, not a passive decorticate animal preparation in a bed. The business of health care today is too heavy and complex a burden to be borne by medical doctors alone. As Franz J. Ingelfinger, M.D., editor emeritus of the New England Journal of Medicine stated, preventive health measures are much more influenced by occupations that can shape social attitudes rather than by individual doctors (Ingelfinger, 1978). Patients, health psychologists, environmen-

**Figure 6.** Average number of psychologists in American medical schools from 1953 to 1976. (Numbers in parentheses are the years for which the averages apply.) *Note:* These trends outstrip the growth rates of other factors, such as the numbers of medical schools and medical students (Lubin, Nathan, & Matarazzo, 1978).
talists, and medical doctors will all have to work together as a team to resolve the new health care problems. Behavioral medicine promises to improve the efficacy and quality of contemporary health care for chronic diseases, while significantly reducing its currently escalating cost by giving patients major responsibility for their own health care. In the clinical arena, behavioral medicine started with an uneasy flirtation between psychology and medicine, which is now growing into a marriage forced by therapeutic, economic, and political factors. This uneasy marriage has several important implications for scientific and professional psychology to which I will return later. One simple fact of employment data that demonstrates the recognition of the importance of behavioral and psychological factors in health care education, research, and therapy is illustrated by the following graph on the employment of psychologists in medical schools. (See Figure 6.)

The Origins of Behavioral Medicine

The behavioral medicine revolution stems from several specific and salient changes that have occurred in the profile of health care in the last 75 years. First, most death and disability in the United States today are not caused by acute infectious diseases (e.g., plague, smallpox, polio, etc.); the introduction of sterile procedures into surgery, the public health treatment of water and sewage, immunization measures, and the introduction of antibiotics have nearly eradicated these diseases. Today's death and disabilities are caused by chronic-stress-related conditions, such as heart attacks, strokes, cancer, pulmonary diseases, diabetes, automobile accidents, and alcoholism (Gori & Richter, 1978).

Stress refers to an abnormal neuroendocrine state associated with alterations in tissue functions that occur when people perceive threats to their physical or mental well-being (Mason, 1972). The choices people make about how to cope with threats to their well-being have consequences for physical health (e.g., smoking, alcoholism, Type A behavior, etc.). There is growing evidence that a patient's cognitive, emotional, and behavioral life-style responses can potentiate, maintain, or attenuate these chronic physical disorders (Engel, 1977; Glass, 1977; Jemmott & Locke, 1984; Weiner, 1977). The previous acute infectious diseases were mainly diseases of chance, because choice and volition were trivial factors in the prevention, diagnosis, and therapy of these diseases. Mechanisms relating behavior to physical disease today include (a) stress (Selye, 1976); (b) maladaptive methods of coping with stress (e.g., smoking, drug and alcohol abuse); (c) bad health habits (diet, lack of exercise);
and, (d) psychological reactions to illness, such as denial of symptoms, noncompliance, etc. (Lazarus & Folkman, 1984). For example, estimates of behavioral noncompliance with long-term medical regimens range from 25% to 80% for chronic disease (Haynes, Taylor, & Sackett, 1979). In fact, for chronic diseases the mean rate of noncompliance is over 50% (Epstein & Cluss, 1982; Sackett & Haynes, 1976). Efficacious medications are ineffective unless they are used. The best combination of standard risk factors accounts for only 50% of the incidence of coronary heart disease (Glass, 1977). Several of the standard risk factors for coronary disease are behaviors, or have large behavioral components (smoking, diet, alcohol consumption, physical inactivity, etc.). The medical philosopher, John H. Knowles (1977) recognized that, as never before, the prevention of disease and death involves forsaking bad habits that many people enjoy: “overeating, too much drinking, taking pills, staying up at night, engaging in promiscuous sex, driving too fast, and smoking cigarettes.” There is serious doubt today that a strictly unifactorial biomedical model (Engel, 1977; Lipowski, 1977) of diseases that ignores cognitive, emotional, and behavioral factors can adequately explain, predict, prevent, and lead to the control of the chronic-stress-related disorders that cripple and kill Americans today. Behavioral medicine proposes a multifactorial model of diseases for chronic-stress-related diseases of choice.

Second, chronic anxiety (Tallman, Paul, Skolnick, & Gallagher, 1980), chronic pain (Fordyce, 1976; Ng & Bonica, 1980), insomnia, and depression are probably the largest components in the profile of illness presented to physicians today. More recently, Inderal, Tagamet, and Valium are among the seven most frequently prescribed drugs in the United States (“Top 200 Drugs,” 1985). Pills alone cannot be the long-term solution to these chronic psychophysiological symptoms because of problems created by drug tolerance, physical and psychological dependency on drugs, and the negative physical and psychological side effects of long-term use of drugs (hyperalgesia, interference with normal physiological functions). It is becoming clear that psychophysiological skills (e.g., relaxation, coping, etc.) may have to replace pills as therapy for many of the chronic-stress-related diseases. Psychological stress (Lazarus, 1966; Mason, 1972) triggered by the perception of threat appears to be a large component in the etiology and maintenance of most chronic anxiety, pain, and insomnia complaints. There is growing evidence of a correlational and now an experimental nature (Ader, 1981) that cognitive expectancy and behavioral factors, such as depression and anxiety, can influence the immune system and physical disease susceptibility through neuroendocrine mechanisms (Ander, 1981; Jemmott &
Locke, 1984; Rasmussen, 1969; Rogers, Dubey, & Reich, 1979; Solomon, Amkraut, & Kasper, 1974) and that these effects may also be true for the geriatric population (Kielot-Glaser et al., 1985). The over 100-year-old dogma that the immune system is insulated from the brain (mind) is untenable today. This is a threat to the doctrine of mind–body dichotomy on which the biomedical model has rested. Beliefs and behaviors may have biological consequences (Wickramasekera, 1979a) for degrees of vulnerability even to acute infectious diseases (Canter, Imboden, & Cluff, 1966; Canter, Cluff, & Imboden, 1972).

Third, conventional unifactorial biomedical treatment models used by physicians to treat the previously cited conditions are of limited efficacy, and, in fact, create new behavioral and biological problems. The biomedical model ignores psychological stress, regards it as trivial and epiphenomenal, and depends exclusively on chemical and surgical solutions to complex, multifactorial human problems. It is clear that for many modern diseases and for some patients, psychological factors are neither trivial nor unreliable. The assessment and treatment of psychological stress (Lazarus, 1966; Lazarus & Folkman, 1984; Woolfolk & Lehrer, 1984) requires sophistication in psychology and behavioral science. Behavioral science training is the least popular, weakest, and smallest portion of a contemporary physician's education (Institute of Medicine–National Academy of Sciences, 1979a; Orleans, George, Houpt, & Brodie, 1985). Consequently, physicians rely primarily on drugs and surgery to treat the symptoms of psychological stress, such as anxiety, insomnia, and chronic pain (Orleans et al., 1985). Approximately 50% of the patients seated in a general practitioner's office present physical complaints without "physical findings" (Fink & Shapiro, 1966; Hilkevitch, 1965). Eighty percent of the visits to emergency rooms are not strictly medical emergencies (Gibson, Bugbee, & Anderson, 1970). These statistics are supported by the findings that at least 8,000 tons of benzodiazepines (Valium, Librium, and Dalmane, etc.) were prescribed by physicians and consumed by patients in the United States in 1977 (Tallman et al., 1980). Minor tranquilizers and sleep medications (Smith, 1979) are among the most frequently prescribed medications in the United States, and if the current rate of prescription writing for these drugs continues, by the year 2000 most of the nation will be on antianxiety agents (Blackwell, 1975).

According to HEW, "50 million Americans have trouble sleeping in a given year" (Institute of Medicine–National Academy of Sciences, 1979b), and 10 million people in the United States consult a physician about the problem. According to an Institute of Medicine–National Academy of Sciences (1979b) study, 25 million prescriptions are written
annually in the United States for sleep medication. The psychophysiological functions of sleep are exquisitely sensitive to psychological and environmental stress. Approximately 2 million people use these pills nightly for more than 2 months at a time. Clinical trials cited in the study show that the efficacy of most of the pills falls off after 4 weeks (Hauri, 1982). Prolonged use is even more likely among the elderly, particularly those in nursing homes, where prescriptions are made for reasons of behavioral control. The hazards of long-term use of sleep medication are just beginning to be recognized (Institute of Medicine–National Academy of Sciences, 1979b). Sleeping pills as a remedy for chronic-stress-related insomnia is even worse than the disease. Kales & Kales (1984) described three types of insomnia that are related to the withdrawal of hypnotic drugs: drug withdrawal insomnia, early morning insomnia, and rebound insomnia. Sleeping pills, one of the most prescribed medications in the world, are more dangerous and less useful than either physicians or patients realize, according to a recent report by the Institute of Medicine–National Academy of Sciences (Smith, 1979).

In 1978 alone, physicians prescribed Darvon 31 million times, making it the third most frequently prescribed drug in 1978 (Smith, 1979). Darvon was found in several double-blind studies not to be significantly more effective than the safer nonprescription medication, aspirin (Moertel, Ahman, Taylor, & Schwartau, 1972). However, patients may, on a placebo (psychological) basis alone, respond better to an analgesic like Darvon that is medically prescribed. Our growing reliance on strictly chemical solutions (Cummings, 1979) to common and chronic human problems is problematic.

A recent study cited by Benson (1979) from the Journal of the American Medical Association states that 6,000 to 12,000 deaths each year are related to prescription drugs. Pills can be a solution to short-term psychosocial stress but they only exacerbate chronic psychosocial stress-related physical symptoms. Chemicals alone cannot be long-term solutions to the complex chronic psychosocial problems presented by the bulk of patients with depression, anxiety, chronic pain, GI tract distress, essential hypertension, and sleep disturbances.

Fourth, alcohol, tobacco, food, and drug abuse (legal and illegal) are other mind- and mood-altering techniques patients themselves use to cope with psychological stress and behavioral inadequacies. But these short-sighted, nonprescription remedies for psychological stress increase the rate of disease and medical utilization, and cost employers major losses in terms of absenteeism and lost production (Jones & Vischi, 1979). It is estimated that one-fifth of the cost of medical care is due to tobacco and alcohol abuse (Ball, 1978). The combined economic cost of
drug abuse and alcoholism is estimated at $50 billion (Barchas, Akil, Elliott, Holman, & Watson, 1978).

Fifth, there has been a rapid increase in medical costs without a comparable improvement in health status, and it is likely we have reached the top of the cost-benefit curve with expensive biomedical technology (DeLeon & VandenBos, 1983). Frazier and Hiatt (1978) of Harvard Medical School say,

Fineberg has described the proliferating laboratory tests that in 1977 accounted for in excess of $1 billion of our health resource expenditures. He pointed out that there is evidence that much laboratory usage, which is increasing at a rate of 14 percent annually, has little or no beneficial effect on patient care. (p. 875)

Although definite evidence is not yet in, several studies cited by Tancerdi and Barondess (1978) point out that some of this increased utilization of tests is in response to the fear of malpractice lawsuits, and that these tests expose patients to significant "risks of harm from unnecessary procedures." Ingelfinger (1978), and Benson (1979) have also recently elaborated on the abuses of medical diagnostic test procedures. In spite of these massive expenditures and increasingly sophisticated medical instrumentation, there is little evidence that the United States public is any more healthy today (Knowles, 1977). Although patients demand and many physicians continue to provide expensive and strictly medical solutions to complex human problems, the cost of health care continues to rise in the United States. In 1950 health care was only 4.6% of the gross national product, and in 1983 it had escalated to 10.8% of the gross national product or $355.4 billion (Cohen, 1985). Hospital costs account for 40% of the health care bill and these costs have recently been inflating at an annual average of 17.3% (Culliton, 1978; Hamburg & Brown, 1978).

**Psychophysiological Stress Management Skills for Pain, Anxiety, and Sleep Disorders**

Pills cannot be a long-term solution to chronic pain, anxiety, and sleep disorders because of problems with tolerance, negative physical and psychological side effects, and dependency. Stress management techniques developed with biofeedback, behavior therapy and hypnosis technologies constitute the best available cost-effective (Blanchard, Jac- card, Andrsik, Guarnieri, & Jurish, 1985) alternatives to pills today (Wickramasekera, 1976; Woolfolk & Lehrer, 1984). Psychologists and psychiatrists have developed some behavioral techniques that are in fact
currently the most promising therapies for some physical presentations. Recent developments in the fields of biofeedback (Birk, 1973; Green & Green, 1977; Wickramasekera, 1976), behavior therapy (Wolpe, 1982), and hypnosis (Barber, 1969; Fromm & Shor, 1979) have provided psychologists with credible, safe, and promising alternative therapies to the standard medical treatments (drugs and surgery) for several chronic and unresponsive psychophysiological problems, such as chronic pain (Fordyce, 1976), functional vascular and muscular headache (Blanchard & Andresik, 1982; Budzynski et al., 1970; Cox, Freundlich, & Meyer, 1975; Wickramasekera, 1972), insomnia (Borkovec, 1982), primary Raynaud’s syndrome (Surwit, 1982), essential hypertension, (Patel, 1977; Shapiro & Goldstein, 1982) and coronary prone behavior (Sue, 1982). These stress-reduction therapies include EMG, biofeedback, systematic desensitization, autogenic therapy, meditation, and progressive muscular relaxation (Wickramasekera, 1977; Woolfolk & Lehrer, 1984). Numerous independent replications (Blanchard, 1982) with clinical samples have demonstrated that these technologies stemming from biofeedback, behavior therapy, and hypnosis can produce not merely statistically significant but also clinically significant treatment effects with some patients under some conditions with certain problems. The specific mechanisms through which these treatment effects are generated is unknown (Fuller, 1978; Roberts, 1985; Stroebele & Glueck, 1973; Wickramasekera, 1977a). It is my view that most of the variance will eventually be accounted for by recognizing that these technologies have contributed to specifying the nonspecific aspects of the placebo effect (Wickramasekera, 1977a, 1978, 1980, 1985). In other words, we are learning in clinical behavioral medicine how to arrange the psychological, behavioral, and situational conditions to produce more powerful, reliable, and durable psychophysiological effects. The implications of this statement will be elaborated on in Chapter 5, which deals with the placebo effect. These psychological and behavioral procedures have no serious side effects, seem cost-effective, are either curative or palliative, and can be adjunctive or primary interventions. Behavioral procedures have also been proposed to reduce obesity, smoking, and noncompliance with medication, but efficacy and reliability demonstrated in these areas have not yet reached satisfactory levels for routine clinical application.

Biofeedback, behavior therapy, and hypnosis (Wickramasekera, 1976) are empirically and procedurally oriented technologies; they tend to be symptomatic and short term in treatment focus. These four features make them acceptable to, and consistent with, the values of the pragmatically oriented physicians who dominate the health care system and with whom health psychologists have to work. Psychologists seem to be
developing effective, durable, safe, and cheap skill alternatives to pills such as minor tranquilizers, sleep, and pain medications. If these alternative psychophysiological skill therapies, which stem from biofeedback, behavior therapy, and hypnosis, become reimbursable by health insurance companies, the groundwork will be laid for profound long-term changes in the practice and role of primary care physicians. Currently, patients who present chronic-stress-related physical symptoms constitute a large component of patients who visit primary care physicians (Cummings, 1977; Houpt et al., 1980) and are treated with drugs and surgery. Health care psychologists can today treat or palliate many of these physical conditions with effective behavioral and psychological techniques (Blanchard, 1982). If psychologists can treat physical disorders with psychological techniques, are these health psychologists practices calling for a legal redefinition and expansion of the word physician (Wickramasekera, 1984)? This substitution of skills for pills is the first practical demonstration of the growing erosion of the mind–body dichotomy in health care and it has the most profound economic, political, and legal implications for psychology and medicine. How will these alternative skill therapies offered by clinical health psychologists impact the income and the demand for the services of primary care physicians (Wickramasekera, 1979b)? Will clinical health care psychologists and primary care physicians work next to each other in the same office complex, or will they work independently across town? These are all practical questions that will shortly have salient implications for the education, training, and practice of clinical health psychologists and physicians in the twenty-first century. There has been a tremendous increase in the use of psychologists in medical settings and schools (Lubin, Nathan, & Matarazzo, 1978; Matarazzo, 1980), demonstrating that organized medicine recognizes that psychologists have concepts and skills useful to physicians. How cost-effective is it to have expensive, highly trained specialists in medicine and surgery teaching patients with complex psychosocial problems equally complex psychosocial and psychophysiological skills? Does it not make more sense for medical doctors to limit their practice to diagnosing and treating acute, life-threatening diseases for which they are exceptionally well trained? Many problems have arisen because medical doctors have been pressured into treating complex chronic-stress-related disorders as if they were acute medical emergencies. A statement by Ingelfinger is pertinent to this point.

Nobody would argue that treatment of a disease is preferable to its prevention. Comprehensive prevention, however, entails skills and efforts that are beyond the capabilities of many a good doctor. Preventive health measures are much more influenced by occupations that can shape social attitudes
rather than by individual doctors who categorically instruct, “Smoke and drink less.” The doctor should not be expected to play a major role in changing whatever lifestyles may be seriously detrimental. He has enough to do if he takes care of the crisis illnesses that do occur, and if he keeps up to date with the various scientific facts known about their nature and management. Hence, I would not consider the failure of the doctor to practice holistic medicine as substantive evidence of inferior medical practice. (1978, p. 544)

Psychologists, like physicians, also have to recognize the present limitations of their education. Unfortunately, there are no indications that physicians are increasingly involved in the education of psychologists. Physician involvement in the education of clinical health care psychologists may improve the quality of training and reduce our vulnerability to future malpractice lawsuits (Wickramasekera, 1979b; 1984).

Common Features of Biofeedback, Behavior Therapy, and Hypnosis

Because it is likely that in the near future the most clinically important contributions to behavioral medicine will come from the technologies of biofeedback, behavior therapy, and hypnosis, it will be useful to look at the common features of these three domains. Wickramasekera (1976) previously identified and elaborated on several common features of these technologies that today provide the routine clinical tools in behavioral medicine.

Roots in the Experimental Laboratory. The clinical procedures in biofeedback, behavior therapy, and hypnosis can be related to an already large and growing body of experimentally established information. The experimental tradition in hypnosis, for example, ranges from Pavlov (1927) and Hull (1933) to Hilgard (1965) and Barber (1969), with a degree of emphasis on methodological rigor that may surprise most experimental psychologists and other scientists. All three technologies have roots in the experimental psychology laboratory, and have been pioneered by, or stem from, the concepts and procedures of experimental psychologists like Pavlov (conditioning and hypnosis), Skinner (behavior therapy), Mowrer (behavior therapy), Hilgard (hypnosis, conditioning), Barber (hypnosis), and N. E. Miller (behavior therapy and biofeedback). The experimental method tends to generate replicable knowledge. Knowledge based on the repeated confirmation of expectancies under specifiable conditions generates faith and confidence in the clinical investigator and patient.
Potentiating the Placebo Effect. Because the experimental method that marks scientific knowledge tends to generate replicable observations that repeatedly confirm expectancies under conditions confidently specifiable in advance, it is one of the most potent methods of creating belief and faith in the clinical investigator and patient. Faith and feelings of competence inhibit skeptical internal dialogue that can distract both the therapist and the patient from the optimal mobilization of their energy, creativity, and therapeutic skills. This faith and confidence can be the basis of powerful placebo effects (Wickramasekera, 1977a). In fact it is very likely that the general public has more faith in science today than in the God of traditional religions because it believes that science reliably delivers the goods. The fruits of scientific knowledge touch our lives daily and in reliably positive forms that range from electric light switches to our automobiles. In fact, each time we step into an elevator in our office building we are implicitly making an act of faith in science.

Biofeedback, behavior therapy, and hypnosis use the methods and technological hardware of science. All three technologies have potentiated the placebo effect or at least contributed to the investigation and specification of previously unspecified components of the placebo effect in healing (Stroebel & Glueck, 1973; Wickramasekera, 1976, 1977a, 1985). For example, the concept demand characteristics (Orne, 1962) came into the literature from hypnosis. The recognition of the importance of equating treatments for credibility (Borkovec & Nau, 1972; Kirsch & Henry, 1977) and the recognition that self-monitoring is a reactive process, came into the psychological literature through behavior therapy. The behavior therapy rituals of self-monitoring, counting, and graphing subjective events (fear, pain, anxiety, pleasure, images, etc.) are clearly empirically useful (Mahoney & Arnow, 1979) in generating a subjective sense of control. But graphing and quantifying rituals are also neutral conditioned stimuli (CS) associated with the faith and confidence that science and objectivity generate (Wickramasekera, 1977a, 1980). Biofeedback, which uses powerful faith generating biomedical instruments (Wickramasekera, 1977a, 1978, 1980) has itself been labeled an “ultimate placebo” (Stroebel & Glueck, 1973) because it appears to trigger the patient’s inherent self-regulatory ability (Green & Green, 1977).

Independent Variables. All three technologies specify their independent variables (treatment components) in ways that enable independent replication and evaluation of their alleged clinical efficacy. This is particularly true of the explicit component-analysis approach that Barber (1969) has taken to hypnosis, the component-analysis work on systematic desensitization (Lang, 1969), and the analytical approach to biofeed-
back (Taub, 1977). This component-analysis approach has led, for example, to the multiple channel (verbal-subjective, physiological, and motor) analysis of anxiety, fear, relaxation, acute pain, and other salient clinical phenomena. In fact, Hilgard’s hidden observer technique (1977) is an approach to carving the verbal-subjective channel into independent components that may have some non-overlapping parameters. The technique may illuminate some paradoxical clinical phenomena, such as dissociative states. All of this provides a differentiated and less simplistic approach to the investigation and observation of complex clinical phenomena and enables independent clinical investigators to take a treatment component approach to testing the efficacy of therapeutic packages.

Quantitative Dependent Variables. All three technologies specify their dependent variables (target symptoms, e.g., fear, pain, or warts) in circumscribed ways that permit objective and quantitative evaluation. This is in contrast to other psychotherapies that focus on target symptoms that are nebulous dependent variables, such as self-esteem, growth, or making the unconscious conscious. This circumscribed and objective approach encourages hypothesis testing, experimental manipulation of therapy components, and corrective empirical feedback that confirms or disconfirms treatment hypotheses. Because the target symptoms or dependent variables are observable and quantifiable (e.g., number of feet from phobic object or number of hours of “up” time for chronic pain patients), it is much harder to practice self-deception and convince oneself that the therapy is effective if the target symptoms do not reduce in frequency or intensity (Wickramasekera, 1981).

Psychophysiological Focus. All three technologies have had a psychophysiological focus. Hypnosis, for example, was one of the earliest psychological techniques used systematically to treat organic disorders (e.g., allergies, etc.) with careful scientific controls (Black, 1963a,b; Mason, 1952, 1955), and its psychophysiological correlates were studied quite early (Sarbin & Slagle, 1972). The psychophysiological emphasis in behavior therapy was pioneered by Wolpe (1958) and Paul (1966), and was explicit in the early laboratory study of phobias (Lang, 1969). Biofeedback, with its emphasis on the remission of physical symptoms, is, of course, the most explicitly psychophysiological of these three behavioral technologies.

Self-Regulation. All three technologies have contributed to expanding the boundaries of the self-regulation of clinically salient cognitive,
physiological, and motor behaviors. In biofeedback the patient is an active participant in learning complex psychophysiological skills to alter, for example, his or her EMG or skin temperature in therapy. In those clinically effective behavior therapy techniques, such as systematic desensitization, the patient learns complex cognitive and motor skills (e.g., graduated approach, muscular relaxation) that make them active participants in their own therapy. Recent efforts even moderately to increase baseline hypnotic ability have used an explicit skill training methodology (Diamond, 1977) or have made us aware of psychophysiological skills and methods (sensory deprivation, EMG, or theta biofeedback) that we can use even temporarily to increase hypnotic ability (Wickramasekera, 1977). These technologies place primary responsibility on the patient for changing his or her verbal and behavioral responses in ways that increase the probability of positive clinical outcomes. But for some patients, in the early stages of hypnotherapy, it is necessary to preserve the illusion of external or hypnotist control. The recent experimental investigations (Fromm et al., 1981; Johnson, 1979) of self-hypnosis are quite promising and may illuminate individual differences in clinical efficacy rates when other self-control procedures (meditation, relaxation training, etc.) not labeled self-hypnosis are used. The investigation of stable (Hilgard, 1965) and partly genetically based individual differences in hypnotizability (Morgan, 1973; Morgan, Hilgard, & Davert, 1970) is starting to permit a rational matching of patient types to types of treatments (Quals & Sheenan, 1979; Wickramasekera, 1979a, 1983, 1984a) and information about voluntary control of altered states of consciousness (Evans, 1977).

Wider Application. These three technologies apply to more types of patients than conventional psychotherapy or psychoanalysis. The treatment focus is short term and symptomatic. The first goal of these three technologies is to return the patient to his nonsymptomatic or at least premorbid functional status. Hypnosis, for example, is often the treatment of choice of the poor, the illiterate, and those patients who are functionally immobilized by their clinical symptoms (e.g., anxiety, pain) and who cannot afford long-term personality reconstruction or "psychoarcheology."

Procedural Handle on Cognition. All three technologies either explicitly or implicitly manipulate cognition by arranging (a) physical environments, (b) informational input, or (c) psychophysiological procedures. For example, the study by Orne and Scheibe (1976) on the contribution of nondeprivation factors to the production of sensory deprivation effects
illustrates how the design of physical environments and informational scripts can be covertly utilized to alter cognitions. Information about the alleged laws of learning and conditioning rationales for the efficacy of systematic desensitization are used in behavior therapy. The quest for quantifiable physiological correlates of imagery (Lang, 1979), and the systematic induction of low physiological arousal states to improve cognitive control of physiology demonstrate a psychophysiological approach to enhance the control of cognition (Wickramasekera, 1977). Others in hypnosis and behavior therapy have used sensory restriction (Suedfeld, 1980; Wickramasekera, 1969, 1970) procedures to alter cognitions and to enhance therapeutic messages. Impressive biomedical and electronic instruments (Wickramasekera, 1977) are used credibly to structure expectations in biofeedback and fixation objects in hypnosis. This systematic manipulation of information, environmental designs, and procedural variables can potentiate the manipulation of cognitive responses, fantasies, and belief systems in patients (Wickramasekera, 1970, 1977a,b). In summary then, these three technologies seek to put a procedural handle on cognition or, at least, to index its quantifiable correlates, and are more subtle and indirect techniques of altering beliefs than procedures as transparent as psychotherapy.

Biofeedback, behavior therapy, and hypnosis, because of their technological emphasis, circumscribed and quantifiable goals, and origins in the experimental laboratory, provide the primitive but promising cutting edge of useful tools for clinical behavioral medicine. These technologies provide the roots of a systematic approach to the behavioral investigation, assessment, and management of chronic-stress-related physical disorders that are replacing acute infectious diseases as the major cause of death and disability today.

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