

Meditation

Meditation is a ritualistic procedure intended to change one's state of consciousness by means of maintained, voluntary shifts in attention. There are dozens of meditation techniques, but they all employ some means of shifting attention away from habitual modes of perception and thinking to enable people to perceive themselves and the world in a different way.

Meditation has been developed and practiced most extensively in connection with religious traditions, but these days in the Western world it is often practiced secularly. Meditation is done to achieve some benefit for the individual. But while applied hypnosis (another nondrug, ritualistic procedure) involves relatively specific, short-term goals for changes in behavior, thinking, and memory, the goals of meditation are of a more general and long-term nature, such as increased self-understanding and spiritual growth.

In this chapter you will learn how to meditate. I will discuss the aims of meditation and claims about its benefits, and research on its short-term and long-term effects. I will also discuss mystical states of consciousness, which some people have reached through meditation. Finally, I will consider the question whether a meditation-like state (the "alpha" state) can be achieved through biofeedback procedures.

AIMS OF MEDITATION

Why do people meditate? The goals of meditation mostly fall into two categories: religious and secular. The religious meditation tradition is at least

2500 years old, and it has included most religions, including Hinduism, Buddhism, early Judaism and Christianity, and Islam, as well as many minor or more localized religions (Goleman 1977; Ornstein 1977; West 1987a). The goals of religious meditation are defined somewhat differently for different religions, but in each case they relate to a central feature of the religion. In Christianity, for example, the anonymous author of a fourteenth-century work titled *The Cloud of Unknowing* wrote that the way to attain union with God is to strike down everyday thoughts by continuously repeating a simple word such as "God" or "love" (West 1987a). Prayer, an attempt to talk to God, may or may not be similar to meditation, depending upon whether it involves a "meditative mood" or a mere mechanical repetition in order to fulfill religious obligations (Carrington 1986).

Meditation is a central practice in Buddhism, as important as prayer in Christianity (Claxton 1987). One of the fundamental Buddhist ideas is that the world as we know it is an illusion, created by our habitual ways of separating and classifying and labeling our perceptual experiences. In Buddhist belief, much human unhappiness (such as embarrassment, guilt, anxiety, depression, jealousy, and self-doubt) stems from our way of perceiving reality through the filter of language and habitual modes of thought. Thus, Buddhists recommend meditation as a way of learning to break through habitual ways of perceiving by suppressing the tendency to categorize and label our experiences in our inner speech or thinking.¹ Meditators may ultimately reach a mystical state of "oneness" or "unity," where their sense of self as a separate entity is overcome and they are absorbed into God. The Buddhist meditation tradition has been characterized as Buddhist psychology, with meditation being both a means of achieving inner peace and a means of discovering how the mind works (Claxton 1987; West 1987a).

The secular meditation tradition, which is relatively new, includes the use of meditation to improve one's sense of well-being, for example, by gaining personal insight, increasing creativity, or coping with the stress of life's daily hassles and major transitions. Secular meditation may be a form of self-therapy, or part of a directed psychotherapy program (Carrington 1987; Shapiro 1980). Noncultish varieties of meditation have been devised for psychotherapy use, for example Clinically Standardized Meditation (CSM) (Carrington 1987).

The most widely used form of meditation in the Western world is Transcendental Meditation (TM), which was derived from Hindu yoga practices and first introduced in the United States in the 1960s by Maharishi Mahesh Yogi (1966; Goleman 1977). TM is based on the Maharishi's theory called the Science of Creative Intelligence. It is taught by the Maharishi's disciples for a fee. TM teachers have made wide-ranging, and sometimes excessive, claims for the benefits of TM, ranging from relaxation to increased mental efficiency and creativity to the attainment of mystical states. TM is, in a sense, in between the religious and the secular traditions, in that, though rather cultish, it is not tied to any established religious tradition and it can be practiced with either secular or spiritual goals in mind.

Several writers have emphasized the point that meditation is a path to knowledge of a personal nature (Goleman 1977; Ornstein 1977).

It seems that at the heart of each tradition, underneath all the various, and even conflicting, formulations, there is a remarkable consensus. Behind the mundane benefits that meditation can bring lies, if a person is willing to undertake it, a deep and very personal journey of enquiry—a 'journey beyond belief' as one meditator (Walsh 1983) has called it—into such profound and perennial questions as 'What is life?', 'What does it mean to be happy?', and, right at the bottom, 'Who—or what—am I?' (Claxton 1987, p. 24)

The meditation path to knowledge is empirical in the sense that it involves direct experience, and subjective in that the meditative state can be directly known only by the experimenter and it may be difficult or impossible to fully describe it in words (ineffable). Meditation stands in contrast to two other major modes of acquiring knowledge: scientific inquiry and reception from authority. Scientific inquiry is empirical and objective, in that its observations are in principle available to and verifiable by other individuals. Knowledge received from authority is nonempirical for the receiver; it is accepted on faith. The most deeply felt and influential knowledge is that gained from direct personal experience, and on some personal and spiritual issues the experience is necessarily of a subjective nature. Thus, meditation may be a path to some types of personal knowledge not available by other means.

TYPES OF MEDITATION TECHNIQUES

There are dozens of specific meditation techniques. Two broad categories of meditation techniques have been distinguished: concentration techniques, and "opening up" or mindfulness techniques (Goleman 1978; Ornstein 1977). The techniques differ in the way attention is deployed. Concentrative techniques restrict attention to a single image or object; mindfulness involves attending to everything in a fresh, nonhabitual way.

Concentrative Meditation

In all forms of concentrative meditation the immediate goal is to restrict attention to a single, unchanging stimulus or thought, in order to achieve what many traditions call "one-pointedness of mind" (Ornstein 1977). An immediate effect of successful concentration is the cessation of inner speech and narratization, the ongoing commentary on experience, memories, and personal concerns in which we often engage when our attention is not fully concentrated on some task at hand. As one TM teacher put it, "Meditation is a way to get that incessant 'roof-brain chatter' to shut up for awhile and give you some peace of mind." Deep meditation is a form of *trance*. The term *trance* has been used in a variety of ways, but its essence is a restricting of attention to one thing, so that the individual's response to distracting thoughts and stimuli is reduced or absent.

A variety of different objects or thoughts have been employed for concentrative meditation (Goleman 1977; Ornstein 1977). In Zen Buddhist meditation, a beginner's technique involves concentrating on breathing and

counting the breaths, one to ten, and repeating. *Mantra* meditation uses special sounds or words that are repeated over and over, either aloud or silently as an auditory mental image. Mantra meditation is used in a number of traditions including Hindu yoga, Buddhism, and Judaism, and is the basis of the TM practice. Another yoga method is concentrating on a visual object, such as a candle flame, vase, waterfall, or *mandala* (a circular design, either simple or complex, often with symbolic significance). Visual mental images of such objects may also be used. *Mudra* meditation involves cyclic repetition of physical movements of arms, legs, or fingers. The *mudra* may be coordinated with a mantra. For example, touching of the thumb to each of the other four fingers, in turn, can be synchronized with each of the four words of the ancient mantra, "Om mani padme hum" (Ornstein 1977). Among the "whirling" dervishes of the Sufi sect of Islam, chanting is coordinated with whirling dancing movements of the body.² In Rinzai Zen the student may be asked to concentrate on a *koan*, a riddle or paradox that cannot be solved by logical thinking ("What is the sound of one hand clapping?" "What did your face look like before you were born?"). Continued concentration on the koan leads to frustration and finally the cessation of logical thinking and liberation from the forms imposed by language (Goleman 1977).

Concentrative meditation is usually practiced for a limited period of time on a regular schedule, once or twice a day. It is hard to concentrate perfectly, though concentration improves with practice. Paradoxically, some of the most important benefits of meditation occur during brief failures of concentration. *Thought intrusions* during meditation may offer profound insights into matters such as self-understanding, philosophical or religious beliefs, or creative solutions to problems in domains such as interpersonal relations, art, and science. However, such valuable thought intrusions cannot be forced. You do not start out deliberately "meditating on a problem." Insights may come once in a while, if you are mentally prepared. You must be patient. The immediate goal is merely to concentrate. According to a variety of traditions that use concentration, with practice people eventually reach an altered state characterized by a loss of sensory awareness, one-pointed attention to the meditation object to the exclusion of all other thoughts, and sublime blissful feelings. Several stages or levels of concentrative meditation states have been described in Buddhist literature (Brown 1977; Goleman 1977, 1978).

Mindfulness Meditation

In "opening-up" or mindfulness types of meditation, the method is virtually the opposite of that in concentrative meditation. Rather than limiting attention to one object or thought, the meditator tries to maintain full awareness of all conscious thoughts, actions, and perceptions. Full awareness is not natural. Normally we go through the day largely on "automatic pilot." We perform many routine actions through habit, without giving them much conscious thought, if any. For example, each weekday morning I get up and wash and shave, fix and eat breakfast, and drive to work on autopilot, with thoughts on other matters such as the things I need to do at work. We also don't give much attention to our routine thoughts and perceptions. For ex-

ample, you might drive a certain road to school or work dozens of times without being able to recall many of the details of things that you see or the exact sequence in which they are encountered.

Opening-up types of meditation are particularly characteristic of advanced Zen Buddhist practices. (In the Zen Buddhist tradition, meditation is called "zazen.") In Soto Zen, in the *shikan-taza* ("just sitting") method, the individual just sits, not thinking of a mandala or breathing, but maintaining alertness and a passive receptivity, being fully aware of every thought and stimulus that enters consciousness, but without making any comment or emotional reaction. Shikan-taza is often practiced with the eyes open, facing a blank wall. It is a form of introspection, believed by Zen practitioners to be a way to notice the difference between mental contents and mental processes and so to discover how the mind works (Claxton 1987). Another Zen practice, "right-mindedness," makes meditation a continuous aspect of daily life. It requires that one maintain full awareness of one's actions, rather than performing them habitually and mindlessly. For example, one should be fully aware of one's movements and perceptions in activities such as washing, eating, and routine tasks at work.³

In mindfulness types of meditation the goal is to break through our habits of automatic perception, thought, and action, to "deautomatize" our experience so we can be more fully aware of it (Ornstein 1977). One takes a *receptive* attitude to experience, rather than a *reactive* attitude. If we can deautomatize our perceptions, perceiving each thing as if for the first time, then presumably we should be able to learn to break through the tendency to react to things (people, self, problems) according to habitual categories and assumptions (Ornstein 1977). Eventually, through mindfulness practice the meditator learns to distinguish between mind and the mind's objects and observe the workings of the mind itself, according to Buddhist psychology (Goleman 1978). According to Buddhist tradition, through mindfulness practice the meditator can journey through several stages of *insight*, including increasingly finer perception of the mind's workings, detachment from the mind and its objects, and a focus on the present moment. Ultimately a mystical state of *nirvana* may be reached, in which consciousness is empty with no awareness of sensations or thoughts (Goleman 1978).⁴

The differences in the techniques of concentrative versus mindfulness meditation are great enough that one would expect different subjective effects from each type of practice. Such differences have been noted by individuals who are highly practiced in each type, and they have been described in Buddhist literature (Goleman 1977). However, there has been little comparative research from a scientific approach. Most of the research has been concerned with concentrative meditation, for two reasons: first, concentrative meditation is a simpler, more uniform practice than mindfulness meditation, so less variability of results would be expected, along with easier theoretical interpretation; and second, when researchers need experienced meditators for subjects, people experienced with concentrative meditation (especially TM) are easier to find than mindfulness meditators in the United States. In the discussion of meditation effects it may be assumed that I am talking about concentrative meditation, unless explicitly stated otherwise.

HOW TO MEDITATE

Based on my experience and that of other meditators from whom I have learned by talking or reading, I offer the following practical advice on concentrative meditation technique for beginners (see also Goleman 1977; Shapiro 1980; West 1987a).

(1) *Body position.* The position or posture of your body is important, because you need to be relaxed, but not so much that you fall asleep. Try sitting on a firm, straight-backed chair; sit near the front of the seat (don't lean against the backrest). Keep your back straight (don't slouch) and rest both feet on the floor (don't cross your legs); rest your hands on your thighs. Alternatively, try sitting on the floor cross-legged, in the lotus position, if you find it comfortable. Breathe in a normal, relaxed way; don't force yourself to breathe in an abnormally deep or shallow manner. Close your eyes.

(2) *Concentration object.* The two most widely used methods are mantra meditation and breath-counting. I suggest that you try each method initially, then choose the one that you like best and stick with it until you become highly practiced with it.

Mantra meditation. Choose a simple word or sound that you like. The best mantras are sonorous, flowing words that can be repeated easily, for example, "Om." The exact sound or meaning of the mantra is probably not very important. In the East, one of the most commonly used mantras is "Om Mane Padme Um" (a translation: "The jewel in the center of the Lotus"). Repeat the mantra over and over throughout the meditation period. Say it slowly enough that you clearly pronounce each syllable. Mantra meditation is usually done silently, but if you can find a private place you might try saying it out loud.

Breath-counting. While you are breathing in a normal, relaxed manner, pay attention to the feeling of movement of the air as it goes in and out. With each exhalation count to yourself "one," then "two," and so on until you reach ten, then start over. Do not try to count the total number of exhalations in the session; that isn't the point. Just concentrate on your breathing, and count exhalations in cycles of ten. That's all.

(3) *Duration and frequency.* According to TM teachers, you should meditate for two twenty-minute sessions each day. I suggest that you begin with ten-minute sessions and gradually work up to fifteen or twenty minutes. Try to be very consistent about meditating every day, at least once, preferably twice.

(4) *Time and place.* Though physically relaxed, you want to be awake and mentally alert during meditation. TM teachers recommend meditating before breakfast and before supper. It is best not to meditate just after a meal, since you may get sleepy at that time. (Alcohol will make the sleepiness problem even worse.) Choose a quiet, private place where you won't be interrupted. To maintain alertness, avoid a room that is too warm. For a new experience, experiment with meditating in a natural place such as a forest, mountaintop, or the seashore.

(5) *Starting and finishing.* It may be hard to suddenly shift gears from an active, externally oriented mode to a more relaxed, internally oriented mode. So begin each session by taking a minute or two to sit quietly and relax

before you close your eyes and begin to actually meditate. At the end of the session, open your eyes and look around, but stay relaxed for a while before you get up. Your chances of maintaining a meditative mood for a while after the session will be increased if you make a gradual transition to normal activity. (Some people sometimes feel dizzy if they abruptly stand up and walk away after meditating.)

(6) *Motivation and attitude.* Using a meditation technique does not guarantee that you will enter a meditative state of consciousness. Meditation takes practice, and some people do it more easily than others. Many beginning meditators quit after a few sessions because they have difficulty concentrating and nothing dramatic happens. It is important to approach meditation with an attitude of patience, thinking of it as a skill that develops with practice. The benefits of meditation are usually subtle, not dramatic. And as with most activities of life, there will be good days and there will be bad days. I ask my students to try meditation for at least thirty days, since many people find that it takes a couple of weeks or more before they begin to feel comfortable meditating and notice some interesting effects.

Your attitude toward failures of concentration is especially important. Beginners are often highly concerned with following the prescribed technique, and they may become frustrated over failures of concentration (thought intrusions). Don't berate yourself for lapses of concentration. When a thought "bubble" floats up into consciousness, don't grasp at it, but just let it float on through, out of consciousness, and go back to concentrating on your meditation object. With practice the thought intrusions will become less frequent, though they will never stop altogether, except perhaps for a minute or so at a time. And bear in mind that the thought intrusions will sometimes contain worthwhile personal insights.

EFFECTS OF MEDITATION: A CASE STUDY

A wide variety of beneficial effects of meditation have been claimed by TM teachers and others. The list includes reduction of anxiety and stress and stress-related illnesses, increased alertness and ability to control attention, improvement in sleep, control of drug and alcohol abuse, greater self-understanding and self-acceptance, more inner independence, positive mood changes, improved interpersonal relationships, and transcendent or mystical experiences. In a later section I will discuss scientific research that tested some of these claims. For now it is worth noting that most of the claimed effects of meditation had their origin in individuals' reports on their meditation experiences.

One limitation of individual case studies is that different people may report different meditation experiences, depending on the particular technique that they used, the amount of practice, and their unique set of personal characteristics (such as personality and cognitive traits, attitudes, beliefs, and expectations). To the extent that an individual is atypical, his or her results may not predict the effects of meditation for typical people, or for you. Nonetheless, case studies are valuable for showing *possible* effects of meditation practice.

Tart's report. The following is a summary of a report by Charles Tart (1972d) following a year of daily practice of TM. I like his report because Tart is an experimental psychologist who was skeptical at first about the possibility of TM having any beneficial effects. Tart is only slightly hypnotizable, and does not slide easily into hypnosis or spontaneous altered states. Thus, the effects reported by Tart are probably rather conservative claims for TM effects, in contrast to the exaggerated claims sometimes made by TM teachers.

(1) *No "bliss consciousness."* Tart's TM teacher had claimed that diligent TM practice would lead to transcendent¹ or "bliss consciousness," an ecstatic state in which one loses all sense of self and experiences a joyful, oceanic feeling. Tart never reached bliss consciousness, though he did feel rather joyful at times.

(2) *"Psychic lubricant."* A second claim by the TM teacher was a sort of "psychic lubricant" effect (Tart's term). This refers to a tendency to have thoughts during meditation about personally meaningful events that were not sufficiently processed at the time of the original event. For example, a friend's subtle remark in a conversation might have gone unnoticed at the time, but during meditation you might become aware of the remark and its implications. Tart reported that he experienced such psychic lubricant effects to a considerable degree. During the first few months of meditation the recalled events were typically days, months, or even years old. But over time he worked through most of the old material so that the thoughts were more about events of the last day. Tart noted that the recalled events were not truly repressed; they were simply events that he hadn't thought about enough to realize their significant implications. Note that such thoughts during meditation are *intrusive thoughts*, in that they represent a failure of concentration on the mantra, but nonetheless they are a potential benefit of meditation.

(3) *Loss of desire for alcohol.* Tart had been in the habit of having a glass or two of wine each evening after work. But he found that he could not meditate effectively for a period of two or three hours after drinking alcohol. "As soon as I turned my attention inward to meditate, it was clear that my intellect was *very* dull, that my mind was wandering from subject to subject, like a man terribly drunk lurching down the street and hardly being aware of his environment" (p. 138). Meditation made him more aware of the negative effects of alcohol, reducing both his enjoyment of alcohol and his pleasure in meditation. Consequently he stopped his daily alcohol habit.

(4) *Mental quiet.* As a result of meditation practice, Tart learned to reach a state of mental quiet, where he could stop thinking for fifteen to twenty seconds at a time, while still being alert to incoming stimuli.

(5) *Reduced tension.* Tart felt that as a result of meditation practice he became a calmer, more relaxed person. "I feel more sensitive to my inner processes, and generally do not get as wound up in my daily activities" (p. 139).

(6) *Need to meditate.* Meditation became a habit with Tart, such that if something prevented him from meditating he felt "slightly jangled and excited" and anxious to sit down and meditate to relax and "let any partially processed material come out."

(7) *Concern with technique.* Initially, like most beginners, Tart was very

concerned with meditating correctly. But after a while he learned to accept the fact that he could not concentrate perfectly, and would always be subject to distractions. Thus he became less obsessed with correct technique: when he realized that he was distracted, he simply returned to the mantra.

(8) *Resistance to cold.* Tart meditated in a room that frequently got very cool (50–60°F). He noted that he didn't feel chilly while meditating, though he started feeling chilly soon afterward. He speculated that the cold-resistance effect might have something to do with a physiological effect of meditation; alternatively, it might be a result of inward attentional focus during meditation.

Tart's report is noteworthy because he found meditation to be worthwhile and enjoyable, even though he could not concentrate perfectly on the mantra, and even though he never reached the mystical state of bliss consciousness. (For other individual case reports see Shapiro [1980], who discussed his own experiences and those of other individuals, including clinical case studies.)

Limitations of case studies. As valuable as they may be for revealing possible meditation effects, individual case studies have several limitations: (1) Meditation experiences vary widely, and the individual making the report may be atypical. (2) In case studies the effects of meditation are usually assessed in an unsystematic manner, such as a personal diary, so the data cannot be readily compared with other cases or group studies, and some important questions may have been overlooked. (3) In case studies it is impossible to distinguish between the effects of meditation practice *per se* and effects due to uncontrolled variables, such as the individual's expectations about meditation's effects, and life-style changes that may accompany long-term meditation practice, such as more time spent relaxing. Thus, while case studies can reveal possible meditation effects and serve as sources of research hypotheses, it is important to do group studies under controlled conditions in order to get firmer evidence on the effects of meditation.

EFFECTS OF MEDITATION: SYSTEMATIC RESEARCH

Some of the claimed effects of meditation were supported by the results of early research on meditation, and the Transcendental Meditation organization, which teaches TM for a fee, has cited that research in its advertising publications (for example, Maharishi International University 1974). However, much of the research on meditation has flaws in design and procedure, such that conclusions drawn from it are questionable. Meditation, by its nature, presents some special research difficulties. I will discuss several of the claims about meditation effects, including phenomenological (subjective experience) effects, and effects on brain waves, physiological arousal, and anxiety. In asking about the effects of meditation, we must also consider problems of doing good meditation research to find out its effects. The answers are only as good as the research methods.

Researchers have asked about the effects of meditation in several time frames: (1) *immediate state effects*, that is, what happens during meditation *per*

se; (2) *short-term aftereffects* of meditation that may last for a few minutes or hours after the meditation session; and (3) *trait effects*, that is, long-term changes in the individual's personality or cognitive traits, attitudes or behavior, as a result of meditation practice.

One of the problems of meditation research is to establish suitable control conditions for comparison. Another problem is that it may take a lot of practice for some subjects to learn to enter a meditative state of consciousness. Solutions to the problems of control and practice may differ, depending on the particular effects being studied and the time frame that is of interest.

Phenomenological Effects of Meditation

In asking about the phenomenological effects of meditation, we are concerned with subjective experiences during meditation practice. A variety of claims have been made by experienced meditators, such as mental calmness, physical relaxation, altered time sense, altered visual and auditory perception, feelings of floating, altered body sensations, insights into interpersonal relationships, creative ideas, and mystical experiences (Carrington 1986; West 1980b). But what does the systematic research show?

Pekala (1987) reviewed a number of studies of the phenomenology of meditation, including single case studies, studies involving meditation groups only, and studies comparing meditation groups with nonmeditation control groups or groups using alternative procedures. In the group studies some sort of subjective experience questionnaire was used in order to get a quantitative estimate of meditation effects.

Pekala evaluated the studies in terms of the adequacy of the subjective experience assessment and the adequacy of the experimental design. Good subjective experience questionnaires should be comprehensive (measure all effects that might occur), have demonstrated reliability (test-retest stability), and have demonstrated validity (be able to distinguish between alternate states of consciousness). Regarding experimental designs, ideally there should be comparisons between meditating experienced meditators and a nonmeditation condition, though it is somewhat controversial whether the best comparison condition is resting nonmeditators or experienced meditators who are resting but not meditating. Ideally there should be controls both for subjects' prior beliefs and expectations about meditation's effects and for experimental demands (situational cues that reveal the researcher's expectations to the subjects).

All of the studies reviewed by Pekala had one or more flaws in assessment or controls. In addition, some of the studies with the best experimental controls had the flaw of using subjects with little or no meditation experience. Under these conditions it is impossible to draw firm conclusions about the phenomenological effects of meditation. The only fairly consistent finding across studies was increased relaxation during meditation. *Variability* of effects is the rule. Different subjects show different responses to meditation. For example, in a questionnaire study of experienced TM meditators, West (1980b) found more than a dozen types of subjective experiences, but none of them were reported by a majority of subjects. The subjective effects re-

ported by experienced meditators show the *possibilities* for meditation effects. But the particular effects experienced by an individual will vary depending on such factors as his or her personality and cognitive traits (such as ability to focus attention), prior attitudes, beliefs, and expectations about meditation's effects, duration of practice, and the particular meditation technique that is used.

Attention control during meditation. Good concentration during meditation means focusing your attention steadily on the mantra and avoiding distracting thought intrusions. Van Nuys (1973) devised an event-recording method of measuring thought intrusions during meditation by having subjects hold an electronic push-button device in their lap while meditating. Subjects were instructed that whenever they became aware of an intruding thought, they should push the button, then return to concentrating on the mantra. He found that better attention during meditation (fewer button-pushes) was reliably correlated with hypnotic susceptibility scores: more highly hypnotizable subjects concentrated better during meditation and had fewer thought intrusions than less hypnotizable subjects.

Kubose (1976) used the push-button method to measure intrusions in beginning meditators over their first ten fifteen-minute meditation sessions. He found that, within sessions, the mean number of intrusions increased from the first to the second to the third five-minute interval. This confirms the informal observations of many beginners that it gets harder and harder to maintain concentration as the session continues. Also, Kubose found that the number of intrusions decreased as training continued. Thus, concentration improved during the first ten sessions of meditation practice. (The practice effect was greatest for the last five-minute interval.) In other studies with the push-button method, thought intrusions occurred less often in experienced meditators (six months or more of practice) than in non-meditators (Spanos et al. 1979b) and less often in more highly motivated beginner meditators than in less motivated beginners (Spanos et al. 1980c).

The event-recording (push-button) method is a quasi-objective way to measure concentration during meditation. However, Spanos et al. (1980c) found no correlation between this measure and self-ratings of "nonanalytic attending" during meditation, and it is uncertain which measure is more valid. Nor is it clear how much the button-push method interferes with meditating, or how much its results are influenced by demand characteristics of the situation. Nonetheless, since no single method of assessing consciousness is perfect, it is worthwhile to try different methods to see whether they yield useful data.

Effects on Physiological Arousal

In the early years of scientific research on meditation, considerable interest was generated by demonstrations of brain wave changes and reductions in physiological arousal during meditation (Wallace 1970, 1977; Wallace & Benson 1972). These findings were important for two reasons. First, they suggested that meditation could be useful as a therapeutic technique for reducing physiological stress reactions. Second, they gave meditation a new

scientific respectability. Scientists, including experimental psychologists, have long been skeptical of introspective reports, including reports of altered states of consciousness during meditation. But physiological responses provide objective evidence that something happens during meditation.

Robert K. Wallace and Herbert Benson (1972) used experienced TM meditators and measured physiological responses while subjects were sitting quietly during three twenty-minute periods: before, during, and after meditation. Thus, each subject served as his or her own control in the before and after periods. The results indicated that during meditation there were significant physiological changes, including reduced respiration rate and volume of air breathed, reduced oxygen consumption and carbon dioxide elimination, and reduced blood lactate. All of these changes suggest that meditation is a hypometabolic state, with reduced energy metabolism. In addition, heart rate and the skin's electrical conductance decreased, suggesting reduced autonomic nervous system arousal, and alpha brain waves increased, suggesting reduced cortical arousal. The physiological changes were greater during meditation than during hypnosis.

The physiological data show clearly that meditation reduces physiological arousal, compared to a premeditation resting period. These results were widely publicized by the Transcendental Meditation organization in their advertising. And in his book *The Relaxation Response*, Benson (1975) recommended a meditation procedure to reduce physiological stress reactions.

However, David Holmes (Holmes et al. 1983) asked whether physiological arousal is reduced more by meditation than by just resting. This question is important for two reasons: It has theoretical implications, since it has been claimed that the meditation practice (mantra concentration) *per se* has physiological effects, and practical implications, since there would be no point in making the effort of meditating if equivalent effects could be produced by the easier method of simply resting. Holmes et al. used a between-groups design to compare meditation with resting.⁵ The meditators were highly practiced at TM (mean seven years), while the control subjects had never learned meditation. Physiological measures were taken during three time intervals: (1) relaxed pretest interval, where subjects merely sat quietly; (2) treatment interval, where the meditation group practiced TM and the control group sat quietly and attempted to rest as much as possible; and (3) relaxed recovery interval. The result was that, from the pretest interval to the treatment interval, meditators showed decreased physiological arousal in their heart rate and breathing and also increased subjective relaxation. However, the comparison between groups showed that physiological and subjective changes were no greater for TM than for just resting. This result suggests that reduced arousal during meditation is due to its rest-relaxation aspects and does not depend on the specific meditation practice (such as mantra concentration) *per se*.

Holmes (1987) reviewed numerous studies on this issue and concluded that while meditation can reduce physiological arousal and increase subjective relaxation while meditation is in progress, it is not superior to other relaxation techniques, such as simply resting, in this regard. He also reviewed studies on the question of whether meditation practice could reduce physiological responses to stressful activities, such as public speaking and viewing

horrifying films of industrial accidents, carried out after meditating. He concluded that controlled experiments provide no convincing evidence that meditation reduces physiological reactions to stressful activities.

Brain-Wave Changes

Increased alpha waves. No meditation research has aroused as much excitement as the discovery of brain-wave changes during meditation (reviewed by Fenwick 1987; Pagano & Warrenburg 1983; West 1980a). Bagchi and Wenger (1957) and Anand, Chhina, and Singh (1961) measured EEG in highly experienced yoga meditators before and during *samadhi* (concentrative meditation) practice. They found that alpha EEG (8–13 Hz) increased during meditation. Kasamatsu and Hirai (1966) studied EEG responses in Japanese priests who were highly experienced in mindfulness meditation. Four levels of EEG response during meditation were distinguished: (1) alpha with eyes open (comparable to the usual alpha during relaxation with eyes closed); (2) increased alpha amplitude; (3) decreased alpha frequency (in Hz); and (4) occasional runs of theta waves (6–7 Hz). Subjects tended to reach higher levels of EEG response as the meditation session progressed, but some subjects reached higher levels than others. The level of EEG response reached was correlated with the amount of meditation practice (from one to more than twenty years) and even better correlated with the degree of progress on the Zen pathway, as rated by the subjects' Zen master teacher. Several more recent studies, using experienced TM meditators, have found increased alpha EEG (increased percent time alpha and/or increased alpha amplitude) during meditation, and some have found theta waves during meditation (review in Fenwick 1987). These EEG findings indicate that cortical arousal is decreased in the meditative state, this decrease presumably being associated with decreased cognitive processing.

Alpha blocking. When novel or unexpected stimuli are presented to relaxed subjects, they normally show an *orienting response* (OR). The OR has several physiological correlates, including *alpha blocking* (blocking of EEG alpha waves for a few seconds) and increased skin conductance (as in emotional reactions). The OR normally *habituates* (decreases) with repeated presentations of a meaningless novel stimulus. Early studies showed an interesting contrast in alpha blocking responses between highly practiced yoga (concentrative) and Zen (mindfulness) meditators. When stimuli such as loud noises and flashing lights were presented during meditation, yoga meditators showed little or no alpha blocking, though they showed the normal alpha-blocking response while just resting without meditating (Anand et al. 1961; Bagchi & Wenger 1957). This result supports the claim that concentrative attention reduces attention to external stimuli. In contrast, when click noises were presented to Zen monks during meditation, they showed the normal alpha blocking response, but surprisingly, alpha blocking did not habituate with repeated stimulation (Kasamatsu & Hirai 1966). This result supports the claim that during mindfulness meditation attention to all stimuli is maintained, as if each event was being perceived for the first time.

Unfortunately, the early findings on alpha blocking during meditation

have not been successfully replicated. Becker and Shapiro (1981) compared alpha blocking responses in five groups of subjects: highly experienced meditators in the Zen, yoga, and TM traditions, as well as control subjects told to either attend to or ignore the stimuli. The stimuli were auditory clicks, which were presented periodically through headphones while the subjects were meditating or resting. All subjects showed alpha blocking to the initial click presentations, including those highly practiced in concentrative meditation (yoga and TM subjects with five to seven years of practice); there were no differences between the five groups. All subjects also showed habituation of the alpha-blocking response (with the response being eliminated by the twenty-fifth trial), including subjects practicing Zen Shikan Taza (mindfulness) meditation; there were no differences between the groups. The same results were found for skin conductance: the conductance-increase response was elicited by early clicks, and the response habituated with repeated click presentations. The authors concluded that earlier conceptualizations of meditation in terms of voluntary attention shifting do not apply to the orienting response to novel stimuli. Apparently, voluntarily turning attention inward during concentrative meditation does not prevent the orienting response from being automatically elicited by a novel external stimulus, nor does mindfulness meditation prevent habituation of the orienting response to a novel stimulus. Before accepting this conclusion as the final word, however, it would be worthwhile to repeat this research using different types of external stimuli. Clicks presented through headphones would seem to be highly intrusive and unnatural, and perhaps more common or natural sounds (voices, music, bird songs, household sounds) would yield different results. Furthermore, there has been no systematic study of subjective reactions to external stimuli during meditation and how they relate to physiological reactions.

Meditation and sleep. The question has been raised whether deep meditation is simply a sleep onset (hypnagogic) state, in view of the theta waves that occur both in deep meditation and in Stage 1 sleep (Fenwick 1987; Pagano & Warrenburg 1983; West 1980a). Several studies have shown that meditators spend an average of about 20 percent of their meditation time in NREM sleep Stage 1 and about 20 percent in Stage 2. Thus, people sometimes become drowsy and fall asleep during meditation, particularly if they were tired at the start of the meditation session (Pagano & Warrenburg 1983). However, experienced meditators can maintain a relaxed wakefulness most of the time while meditating. Compared to control subjects who are just resting, meditators are often better able to resist falling asleep.

In one study (Fenwick et al. 1977), meditators whose EEG showed them to be in the hypnagogic (Stage 1) or sleep (Stage 2) state subsequently insisted that they had been awake and meditating. Were they really asleep? Different investigators have different opinions about whether the EEG data or the subjective reports should be taken more seriously. Conceivably, the subjective experience correlates of EEG patterns are different for meditation and the hypnagogic or sleep states. For example, hypnagogic hallucinations do not typically occur in the meditative state.

Pagano and Warrenburg (1983) compared EEG responses to a brief

tone stimulus during meditation and napping. When the tone was presented during Stage 2 EEG, the response (a K-complex) was identical during meditation and napping. However, in Stage 1 the response (a shift from fast EEG to slower alpha waves) was greater during napping than during meditation. This result suggests that EEG Stage 1 is not psychologically equivalent for meditation and napping.

Furthermore, a detailed comparison of the overall EEG frequency profiles (relative amounts of different EEG wave frequencies) during meditation and napping shows that while the meditation EEG is on a continuum between waking and drowsiness, it is quite different from sleep Stages 1 and 2 (Fenwick 1987; Fenwick et al. 1977; Stigsby, Rodenberg, & Moth 1981). Thus, though people sometimes fall asleep while meditating, the meditation state is not the same as a light sleep state.

Hemispheric shifts. Ornstein (1977) suggested that meditation involves a shift from left-hemisphere dominance to right-hemisphere dominance, since it involves a decrease of verbal-analytic thinking and an increase in intuition and holistic perception (functions associated with the left and right cerebral hemispheres, respectively, in his view). The implication is that the EEG spectrum should show a bilateral shift during meditation, with a decrease in left-hemisphere activity (increased alpha waves) and an increase in right-hemisphere activity (decreased alpha). Several studies on this issue do not provide clear support for this hypothesis. In the early stages of meditation, shifts in EEG hemispheric symmetry sometimes occur; they can be attributed to shifts in the direction of attention with certain meditation techniques, for example, with decreased verbal thinking and increased mental imagery. However, in advanced stages of meditation there is a general decrease in cortical activation (increased alpha and theta waves) without, however, a shift in EEG hemispheric symmetry (review by Earle 1984).

Conclusion. The clearest finding of the EEG research is an increase in the production of alpha waves, and sometimes theta waves, during meditation compared to premeditation baseline measurements. An increase in alpha waves also occurs during relaxation with the eyes closed, though with eyes open alpha is greater during meditation than resting. Increased alpha EEG indicates decreased cortical arousal, reflecting decreased cortical information processing during meditation. The TM organization has cited the EEG results in its advertising, suggesting that the EEG data prove the effectiveness of meditation. It should be pointed out that there is no known benefit of EEG alpha waves *per se*, though under some conditions they are a correlate of beneficial relaxation responses (Benson 1975). (In a later section I will discuss the possibility that alpha-wave biofeedback training can produce a meditative subjective state.)

The studies comparing EEG in meditation and napping should remind us that an altered state of consciousness cannot be defined simply in terms of its induction method. In other words, people who sit down to meditate might enter a meditative state, they might enter the hypnagogic state or fall asleep, or they might remain wide awake and restless. Nor can one necessarily infer backward from the objective EEG pattern to identify the subjective state of

consciousness, at least as far as typical waking, relaxed, and Stage 1 EEG profiles are concerned. This is not to doubt that subjective state differences correspond to underlying neurophysiological state differences, but the EEG is a rather crude measure of brain activity. In order to do research on altered states of consciousness, we must rely on introspective reports. Physiological measures are useful, but they are not sufficient.

LONG-TERM (TRAIT) EFFECTS OF MEDITATION

Many people have reported that meditation has had beneficial long-term effects for them. That is, it has had long-term effects on their personality or abilities that continued outside of meditation practice sessions (trait effects). For example, reduced anxiety and stress reactions, reduced depression, and improved intellectual performance have been claimed. If these claims are valid, there are important implications for the use of meditation in psychotherapy. Unfortunately, much of the research on long-term effects is flawed, and the better controlled research has often failed to support the claims.

Meditation Research Designs and Their Problems

Jonathan C. Smith (1975, 1976) reviewed the methods and problems of research on trait effects of meditation, particularly in regard to anxiety reduction. One problem concerns the necessity of using experienced, well-practiced meditators, since any long-term (trait change) effects of meditation would be expected to depend on extended meditation practice. Another problem is choosing an appropriate control condition against which to assess possible effects of meditation.

In some studies questionnaires about effects of meditation were given to experienced, self-selected meditators (that is, people who decided on their own to meditate, such as people who paid to learn TM and subsequently practiced it for several months or years). The questionnaire method has several flaws: (1) *Inaccurate memory*. It requires subjects to recall the traits (anxiety symptoms and so forth) that they had before they started meditation (perhaps a year or more in the past), and compare them with their current traits. Such recall from long-term memory may be inaccurate even under the best conditions. (2) *Expectancy or placebo effects*. People who choose to meditate expect it to have certain effects, and their expectations could have effects of their own, independent of any effects of meditation practice *per se*. (3) *Cognitive dissonance effects*. Cognitive dissonance is a feeling of subjective discomfort that people feel when they realize that their behavior and their beliefs are incompatible. As a result of dissonance, people may change their beliefs. For example, you would probably feel dissonance if you had practiced meditation for many months and you had obtained no benefits whatsoever. The result might be that you would believe and report that you had achieved some sort of benefit, however imaginary it might be. Thus, though questionnaire studies support the claim that meditation reduces anxiety, the questionnaire method is inadequate to prove this effect.

Some studies have compared self-selected meditators with a control

group of nonmeditators. For example, Davidson et al. (1976) compared groups of nonmeditators, beginning meditators (less than one month of practice), short-term meditators (one to twenty-four months practice), and long-term meditators (over two years practice). They found that increased meditation practice was correlated with decreased anxiety trait scores and increased scores on the Absorption Scale (a measure of the tendency to become attentionally absorbed in imaginative and aesthetic experiences). However, correlational research cannot prove cause-and-effect relationships. Differences between meditators and nonmeditators, or between short-term and long-term meditators, might be due to preexisting differences between the groups, rather than to meditation practice *per se*. For example, in Davidson et al.'s study, higher absorption scores in longer-term meditators might indicate a preexisting trait that enabled them to derive more enjoyment from meditating, thus increasing the likelihood that they would continue meditating. Self-selection studies can be improved by comparing pretest scores on traits of interest (anxiety and so forth) with posttest scores collected after several months of meditation practice. But the lack of random assignment of subjects to conditions still makes interpretation difficult. Also, expectancy and cognitive dissonance effects for meditators can confound this sort of research.

In order to draw convincing conclusions about long-term effects of meditation, it is best to do a true experiment where subjects are randomly assigned to meditation and control conditions. The procedure involves several steps: (1) using only subjects previously inexperienced at meditation, pretest all subjects on the critical measure (such as anxiety); (2) randomly assign subjects to meditation and control groups; (3) train the meditation group subjects to meditate, and ask them to meditate regularly for several months; (4) call back all subjects, both meditation and control, for a posttest on the critical measure; and (5) compare *change scores* between the two groups, to see whether the meditation group changed more than the control group on the critical measure.

The dropout problem. Though a random-assignment experimental design is good in principle, there is a problem with dropouts in the meditation group. Perhaps due to frustration stemming from difficulties in meditating correctly, or boredom from failure to experience any dramatic effects, many beginning meditators quit meditating within a few days or weeks. Thus, there is a serious problem: meditation effects such as anxiety reduction would be expected to be greater, the longer meditation is practiced, but the longer it is practiced, the more dropouts there will be. For example, in an experiment with a six-month TM practice period, some 59 percent of the meditation group subjects dropped out, compared to only 13 percent of the control (no-treatment) subjects (Smith 1976). Unfortunately, the preexisting characteristics of the dropouts may be different from those of subjects who continue meditating. For example, Smith (1978) found that TM dropouts were more psychologically disturbed and less self-critical than those who continued meditating. West (1980b) found a 43 percent dropout rate among people who had paid to learn TM; reported neurotic symptoms were higher among the dropouts than among those who continued meditating. Thus, the

dropout problem works against the random assignment of subjects to meditation and control groups, making it hard to draw firm conclusions about the effects of meditation practice.

Expectancy effects and anxiety reduction. Smith (1976) pointed out another limitation of experimental designs with a no-treatment control group. Such designs do not control for possible expectancy effects in the meditation condition, nor do they control for possible effects of periodic daily relaxation. Thus, it is uncertain whether anxiety reductions in the meditation group are really due to the effects of meditation practice *per se*. In an improved study, Smith recruited volunteers for free anxiety-reduction treatments, gave them pretests on anxiety (questionnaires on mental and physical symptoms of anxiety), and randomly assigned subjects to a TM training group, a no-treatment control group, and a special control group called PSI (Periodic Somatic Inactivity). The TM subjects were taught standard TM techniques by two certified TM teachers, who gave the usual lectures on TM theory and supporting research. PSI was a placebo control treatment intended to produce *expectancy* of anxiety reduction. The PSI subjects heard lectures that included a believable but phony theoretical rationale for PSI practice, which consisted simply of sitting still with the eyes closed; PSI had no mantra or other attention control method. The PSI deception went so far as to use PSI teachers who themselves had been deceived about PSI and believed that it was a tried-and-proven treatment. (This was done because psychotherapy research suggests that psychotherapy works best if therapists believe in the methods that they are using.) The TM and PSI subjects were asked to practice their techniques twice daily for six months, whereas the no-treatment control subjects simply waited. Finally, all subjects were recalled for posttesting on the anxiety measures.

The result was that pretest-to-posttest decreases in anxiety test scores were reliably greater in the TM group than in the no-treatment control group. But anxiety reductions were equally as great in the PSI control group as in the TM group. This result suggests that, at least for anxiety reduction, believing in TM's benefit and/or periodically sitting still are more important than the specific practice of mantra concentration. This conclusion was further supported by Smith's (1976) second experiment, where different groups were taught different practices termed Cortically Mediated Stabilization (CMS). CMS1 was a TM-like meditation practice, whereas CMS2 was virtually an antimeditation technique, where subjects sat still and tried to think a series of "positive thoughts," such as pleasurable fantasies, during each session. The two groups showed equal anxiety symptom reductions. Smith drew two conclusions from his (1976) research: (1) meditation is effective in reducing self-reported anxiety symptoms; but (2) "the crucial therapeutic component of TM is not the TM exercise" *per se* (p. 630). Belief in the effectiveness of meditation is an essential ingredient.

Personality and Cognitive Effects of Meditation

Delmonte (1987; also Pagano & Warrenburg 1983) reviewed a number of studies on personality effects of meditation. Considering both the quality

of experimental designs and procedures and the data, he found no convincing evidence for changes in self-concept, psychosomatic symptomatology, perceived locus of control (internal versus external), or introversion-extraversion. There is evidence suggesting meditation effects of decreased anxiety, decreased depression, and increased psychological well-being or self-actualization.

Delmonte cautioned that some of the apparent differences between meditators and nonmeditators could be due to self-selection effects, either in initially deciding to meditate or in deciding to continue or discontinue meditating. Meditation is less likely to be effective with subjects suffering from long-term anxiety neuroses. Meditation benefits are more likely, the greater the amount of meditation practice. And expectation of benefits is especially important in producing benefits of meditation, as with other psychotherapeutic practices.

Claims of meditation effects on cognitive functioning, supported by early studies comparing self-selected meditators with nonmeditators, have not been supported by newer studies involving appropriate control groups and random assignment of subjects to groups. For example, Yuille and Sereda (1980) compared two types of meditation (three months' practice) with expectancy and no-treatment control groups, and found no effects of meditation practice on short-term or long-term memory, perceptual speed, reading efficiency, or general intelligence.

Implications for psychotherapy. Although its effects are not unique, research suggests that meditation can produce, in some people, relaxation, reduced physiological arousal, and reduced anxiety. Some psychotherapists teach their patients meditation as a means of self-control of anxiety and stress (Carrington 1987; Smith 1987). Meditation may be helpful for treating hypertension and insomnia. Regarding the psychotherapeutic use of meditation, Delmonte (1987) concluded:

Although [meditation] practice has been found to be associated with personality changes in the direction of psychological well-being, it may be incorrect to conclude that meditation techniques 'produce' these changes independently of the practitioner's wishes and desires. Meditation is a self-directed and active process in which a technique is used by a person (not *on* a person) in the context of particular subjective expectations and objectives. For this reason meditation may not be readily dispensed, like medication, to anxious or depressed patients if they show little motivation to practice. The value of meditation may be greater for those who wish to be involved in directing their own development than for those wanting to be 'cured' passively (p. 132).

Smith (1987) stressed the importance of giving subjects a good rationale for meditation to generate positive expectancies and teaching meditation behavior as a type of skill that can be improved with practice and shaped with suitable guidance. He also pointed out the need for research designed to predict who (what personality and cognitive traits) can benefit from what particular type of meditation practice or alternative therapy methods.

THE MEDITATION PARADOX

Much of the evidence reviewed here is negative in the sense that it shows either no effects of meditation or that the effects of meditation (relaxation, anxiety reduction) can also be achieved by other methods and are not necessarily produced by the meditation technique *per se*. In view of the largely negative evidence on meditation, it does not seem worthwhile to spend much time discussing alternative theories intended to explain meditation's effects.⁶ In fact, most meditation research has been atheoretical (not guided by a theory of meditation).

Michael West (1987b) was puzzled by the paradox inherent in the fact that he and other long-term meditators have found great personal benefits from meditation, and yet the evidence from controlled research on meditation's benefits is largely negative. Why the discrepancy? It may be due partly to practical problems in meditation research, such as the need to get motivated but randomly assigned subjects to continue meditating for many months without quitting. Also, as with hypnosis, only a minority may be able to achieve a deep meditative state in which distinctive alterations of consciousness occur, with possible long-term aftereffects. Yet West saw an even deeper basis for the meditation paradox: in his view, the truly important aspects of meditation have not been explored in systematic meditation research. You may have noticed that there was little connection between the aims of meditation—such as personal knowledge and mystical experience—discussed in the introduction to this chapter and the psychological research discussed in later sections. West made the point:

The questions I asked about my meditation were very different from the questions research psychologists asked about meditation. I meditated and examined such things as the nature of shifts in awareness, profound experiences [during meditation], and subtle shifts in the quality of my moment to moment experiencing outside meditation. These are very different questions from those researchers have asked and it is not surprising therefore that we arrived at different answers.

Conducting research on meditation involves conducting research on a method of research, since meditation is the methodology of Eastern psychology. Recognizing this involves 'breaking set' away from seeing meditation as simply a therapeutic tool and viewing it as a vehicle for the exploration of consciousness. Change resulting from meditation according to this view is likely to be subtle, demanding sensitivity of measures beyond personality tests and electrodes (West 1987b, p. 209).

As a means of exploring consciousness, meditation is a form of introspection, subject to all of the limitations of introspection. Rather than viewing it as a means of studying consciousness in general, it is best viewed as a means for individuals to explore their own consciousness and its varieties. West (1982, 1987b) argued that one of meditation's greatest values is to increase the individual's self-awareness and self-understanding. Thus, another paradox of meditation lies in the observation that, while the immediate goal of concentrative practice meditation is to concentrate on the mantra and exclude other thoughts, the intrusive thoughts that occur can offer valuable

insights about the self, values, and interpersonal relationships, as well as creative ideas on other topics of interest to the meditator. These insights cannot be forced. Their unpredictability and their variety of content and type of impact make them hard to study scientifically. Yet to the individual, these insights may be extremely valuable.

Is meditation worthwhile? This question is too vague. The better question is: What benefits can occur from meditation, for what persons, under what conditions? Scientific psychology can attempt to find objective answers based on systematic research. But for the individual searching for benefits such as increased self-understanding, stress reduction, or a means of producing and exploring alterations of consciousness, the question becomes: Is meditation worthwhile for me? The only way to find out is to try it. Approach it with a positive, receptive attitude, and give it a fair trial.

MYSTICAL EXPERIENCES

For many centuries meditation has been a part of religious traditions where it has been used as a means for achieving profound religious or mystical experiences (Deikman 1966; Goleman 1977; Ornstein 1977; West 1982). Mystical experiences are not limited to meditation, however. They can occur spontaneously in some individuals, and the probability of their occurrence can be increased (though not guaranteed) by the use of psychedelic drugs. William James quoted several reports of mystical experience in *Varieties of Religious Experience* (1902/1961), his book on the psychology of religion. Though some mystical experiences are paranoid and frightening, the large majority are pleasant and of a religious nature. The following example came from a Canadian psychiatrist, Dr. R. M. Bucke, in whom the mystical experience arose from a state of reverie.

I had spent the evening in a great city, with two friends, reading and discussing poetry and philosophy. We parted at midnight. I had a long drive in a hansom [a horse-drawn carriage] to my lodging. My mind, deeply under the influence of the ideas, images, and emotions called up by the reading and talk, was calm and peaceful. I was in a state of quiet, almost passive enjoyment, not actually thinking, but letting ideas, images, and emotions flow of themselves, as it were, through my mind. All at once, without warning of any kind, I found myself wrapped in a flame-colored cloud. For an instant I thought of fire, an immense conflagration somewhere close by in that great city; the next, I knew that the fire was within myself. Directly afterward there came upon me a sense of exultation, of immense joyousness accompanied or immediately followed by an intellectual illumination impossible to describe. Among other things, I did not merely come to believe, but I saw that the universe is not composed of dead matter, but is, on the contrary, a living Presence; I became conscious in myself of eternal life. It was not a conviction that I would have eternal life, but a consciousness that I possessed eternal life then; I saw that all men are immortal; that the cosmic order is such that without any peradventure all things work together for the good of each and all; that the foundation principle of the world, of all the worlds, is what we call love, and that the happiness of each and all is in the long run absolutely certain. The vision lasted a few seconds and was

gone; but the memory of it and the sense of the reality of what it taught has remained during the quarter of a century which has since elapsed. I knew that what the vision showed was true. I had attained to a point of view from which I saw that it must be true. That view, that conviction, I may say that consciousness, has never, even during periods of the deepest depression, been lost (Bucke 1901, quoted in James 1902/1961, pp. 313–14).

James (1902/1961) argued that mystical experiences are the origin and foundation of all religions, though in institutionalized religions they have come to be deemphasized in favor of church doctrine. In some religions, such as Zen Buddhism, Hindu yoga, and the Sufi sect of Islam, mystical experiences are sought as a standard part of religious practice, with meditation and *renunciation* of worldly goods and pleasures forming the path to mystical experiences (Deikman 1966). Transcendental meditation is a Westernized form of Hindu practice, offered as a path to possible mystical experiences (a path where renunciation is not required) (Goleman 1977). In fact, mystical or spiritual experiences occur in only a small minority of TM practitioners (West 1980b). It is well to bear in mind that meditation can have other benefits (such as increased self-understanding) even if a mystical state never occurs.

Features of mystical experiences. Mystical experiences or states exhibit wide variety in their details and specific contents, but they share some similarities in their abstract features. Six features may be listed. The first four features were discussed by James (1902/1961); Deikman (1966) added two more to the list. James emphasized the first two—ineffability and noetic quality—as the essential features of mystical experiences. (1) *Ineffability*. Mystical experiences cannot be adequately described in words. Like the experience of being in love, mystical experiences must be directly experienced to be fully understood. (2) *Noetic quality*. At the same time that they are states of feeling, mystical states are also *states of knowledge*. “They are states of insight into depths of truth unplumbed by the discursive intellect. They are illuminations, revelations, full of significance and importance, all inarticulate though they remain; and as a rule they carry with them a curious sense of authority for aftertime” (James 1902/1961, p. 300). The most pervasive theme of mystical insight is a profound experience of unity or oneness, where the self melts into unity with all of nature, or with God. But words cannot adequately describe this experience or its impact on the individual. (3) *Transiency*. Mystical experiences do not last very long, usually just a few seconds or minutes, and rarely as long as an hour. Mystical experiences can be but imperfectly recalled after they fade away, though they can be recognized if they occur again. (4) *Passivity*. Although you can facilitate mystical experiences by practices such as meditation, you cannot force their occurrence. When they happen, they happen spontaneously to people who are in a passive, receptive frame of mind. In many cases they take the person entirely by surprise; perhaps the surprise element increases their impact. (5) *Realness*. Mystical insights are experienced as intensely real, just as you would feel about the reality of something you perceived with your senses. (6) *Unusual percepts*. Mys-

tical experiences are sometimes accompanied by altered perceptions (such as fire, bright light, or a halo around people or objects), visions, or "sensory translation," where changing thoughts are translated into changing sensory images. The unusual percepts are experienced as real.

The scientific approach to mystical experiences. From the viewpoint of scientific psychology, mystical experiences are natural states, in the sense that they are a product of natural—though unusual—psychological and physiological conditions, and not a result of some sort of divine intervention or revelation. James saw mystical experiences as being in a series with related natural experiences, such as *déjà vu*, moments of insight into the meaning or significance of experiences, experiences of awe and wonderment, as well as intoxication and depersonalization. All of these experiences involve a decrease in normal distinctions and category boundaries and increased perception of similarities and connections, as in moments of creative inspiration.

A scientific approach seeks to discover the conditions that are conducive to the occurrence of mystical experiences, though this is difficult because of the rarity and variety of such experiences and the fact that they cannot be reliably produced under controlled conditions. The available evidence and pertinent theories (Deikman 1966; Tart 1975) suggest the following hypotheses about the origin of mystical experiences: (1) Mystical experiences are most likely to occur in people who are capable of spontaneous alterations of consciousness, including absorption and dissociation experiences. (2) The likelihood of mystical experiences can be increased by practices that disrupt and *deautomatize* normal perception and thinking processes, including meditation, sensory isolation, and taking of psychedelic drugs (Deikman 1966). (3) Whether the reorganized consciousness that follows from deautomatization is a mystical experience, and if so, the particular nature and content of the mystical experience, will be influenced by the individual's prior knowledge, attitudes, beliefs, and expectations, as well as the mode of induction of the state (such as drugs or meditation) (Tart 1975).

Some individuals experience alterations of consciousness that are conducive to mystical experiences, but they are not experienced as such due to the absence of a suitable set of beliefs. For example, one summer afternoon I was meditating at my cabin in northern Maine, after over a year of regular concentrative meditation practice. I had an experience in which thinking seemed to stop for several seconds (I'm not sure how long). The experience was "like floating in a green void," with no verbal thoughts or structured mental images. After a few seconds I became aware that I had stopped thinking, and I observed my empty consciousness in a detached manner. Thoughts occurred to the observing part of consciousness, but the empty part continued. I also became aware that my breathing was exceptionally shallow. Afterward, I thought my "empty consciousness" experience (perhaps the same as TM's "transcendental consciousness") was interesting and clearly different from my normal conscious experience and other meditation experiences, but I did not attach any great significance to it. Perhaps this is because I am a relatively skeptical person, and I had not been seeking

a mystical experience. Other things being the same, a different person, with different beliefs and expectations, might have interpreted such an event as a mystical experience. For example, the observing consciousness might have interpreted the "green void" experience as the disappearance of the self and absorption into God. Mystical experiences are more likely to happen in the prepared mind.

The truth or validity of mystical insights. It is important to separate the question of the causes of mystical states of consciousness from the question of the truth or validity of the insights that occur to people in such states. Science cannot judge the truth of mystical insights except insofar as they make claims about topics that can be studied by scientific methods, which is rarely the case. Mystical insights are more likely to be in the realm of faith than in the realm of science. Whether someone's mystical insights are valued by others, or interpreted as signs of insanity, depends upon the particular culture and subculture in which they occur.

James (1902/1961) closed his discussion of mysticism with three points that are worth repeating: (1) Mystical states, when well developed, are usually *authoritative* over those who have them. The mystic's values, behavior, and life course may be changed by a mystical revelation. Mystical experiences are intensely real to those who have them, and there is no point in trying to argue with them from a logical standpoint. "The mystic is, in short, *invulnerable*, and must be left, whether we relish it or not, in undisturbed enjoyment of his creed. Faith, says Tolstoy, is that by which men live. And faith-state and mystic state are practically convertible terms" (p. 332). (2) Nonmystics have no obligation to accept uncritically the revelations described by mystics, nor should mystics expect them to do so, no matter how compelling is the truth of their revelations to the mystics themselves. (3) "The existence of mystical states absolutely overthrows the pretension of non-mystical states to be the sole and ultimate dictators of what we may believe" (p. 335). As a general rule, mystical insights do not contradict the facts known from sensory perception. But mystical states may enable people to see new connections, to make new interpretations of ordinary experiences, and to add new dimensions of emotionality, value, and morality to their lives. Mystical insights need not be accepted uncritically, but they can offer *hypotheses* worth serious consideration.

BIOFEEDBACK AND THE "ALPHA" STATE: ELECTRONIC MEDITATION

Since meditation can produce both a relaxed, meditative state of consciousness and increased production of alpha brain waves, it is tempting to assume that there is some intrinsic relationship between alpha EEG and the subjective meditative state. Conceivably, any procedure that increases alpha waves might also induce a subjective meditative state.

In a report that stirred considerable interest among researchers concerned with consciousness and mind-body relationships, Joe Kamiya (1968,

1972) said that people could learn to either increase or decrease alpha brain waves with biofeedback training, in which a soft tone was sounded whenever the subjects were producing alpha waves. His subjects reported that alpha-enhancement training was associated with a pleasant, relaxed state of consciousness. The subjective state during alpha-enhancement training—termed the “alpha state” or “alpha experience”—has been characterized as a quasi-meditational state. It is a pleasant, serene state of alert relaxation in which thinking is slowed and deliberate and critical thought, thoughts about the self, awareness of the body and the passage of time, and emotionality are decreased (Plotkin 1979).

At first it appeared that alpha-enhancement biofeedback training might be a shortcut to meditative states of consciousness—perhaps even to mystical states. Reports in the popular press led to public interest, and an alpha-feedback industry developed that sold electronic alpha-feedback devices for people to use at home.

However, subsequent research by William Plotkin (1977, 1978, 1980) and others, using careful control procedures, has cast doubts on the earlier conclusions. It has been found that: (1) alpha-biofeedback training does not reliably increase alpha abundance above the level of a baseline control condition; (2) the so-called “alpha state” of consciousness is not a consistent result of alpha-feedback training; (3) the degree of alpha experience is not correlated with the amount of alpha wave production; and (4) factors other than alpha biofeedback *per se* are responsible for producing the alpha state during alpha-biofeedback training. These nonfeedback factors include: sensory deprivation, introspective sensitization (Hunt & Chefurka 1976), perceived success (rather than actual success) at the feedback task, suggestion and expectation for particular subjective effects, and belief in the effectiveness of feedback training for altering subjective experience (reviews in Plotkin 1978, 1979). Plotkin (1980) suggested that, when properly used, biofeedback training may be an “ultimate placebo” technique for inducing alterations of consciousness.

These findings are important because they show how a number of subtle factors can combine to influence a person’s state of consciousness—factors that may be different from the ones that he or she, or the experimenter, originally thought were important. Also, these findings cast doubt on oversimplified assumptions about mind-body relationships by showing that particular subjective states cannot be produced simply by inducing physiological changes that usually coincide with them. But rather than viewing alpha-biofeedback research as a failure, it can be viewed as a success for revealing people’s abilities to control their own states of consciousness. Plotkin put it this way:

The chain of research on alpha feedback, from Kamiya’s first paper to the present, has been valuable in showing us that, although we once thought that a box of amplifiers and filters had made it possible to induce a desirable state of consciousness more rapidly and effectively than ever before, in fact we were really always doing it “on our own.” We simply discovered once again that often people only need a certain degree of faith in their natural powers and abilities,

along with an appropriate setting and simple instructions, in order to accomplish what they feel is normally beyond their potential. . . . The power to enter altered states of consciousness is a *natural* ability that we all can potentially tap; learning how to do this without *external* devices such as electronics and drugs will serve to expand our behavior potential in the widest range of circumstances (1976, p. 97).

SUMMARY

"Meditation" is a ritualistic procedure (or set of procedures) intended to change one's state of consciousness by means of maintained, voluntary shifts in attention. Most meditation techniques fall into one of two categories: concentration techniques (such as Transcendental Meditation), where one tries to maintain focus on one thing (such as a mantra [sound], or breathing), and avoid intrusive thoughts; and mindfulness techniques, where one tries to perceive all thoughts and events freshly, and avoid automatic habits of perception and response.

Meditation research has been most concerned with two temporal time frames of meditation effects: state effects—what happens during meditation—and trait effects—long-term changes in the individual's personality or cognitive traits resulting from meditation practice. Case studies and reports by experienced meditators have revealed a variety of possible meditation effects, but controlled research is needed for firmer evidence. Meditation research is plagued by a variety of problems. Comparisons of self-selected meditators with nonmeditators are hard to interpret because of the possibility of preexisting differences between the groups. But experimental studies with random assignment of subjects to groups suffer from a high rate of dropouts from meditation groups, where dropouts may have preexisting differences from those who continue meditating.

Studies of the phenomenological (subjective experience) effects of meditation are characterized by wide variability of results; relaxation is the most common effect. Several studies have shown reductions in physiological arousal (reduced heart rate, breathing, skin conductance) and reduced cortical arousal (increased alpha waves) during meditation, compared to non-meditation periods. However, other relaxation methods may have equally large effects. As a trait effect, self-reported anxiety symptoms are reduced by meditation practice. However, J. Smith's placebo control group showed just as much anxiety reduction, indicating that the expectation of benefit is more important than the actual meditation practice (such as mantra concentration) in reducing anxiety. West commented on the meditation paradox—the discrepancy between controlled research results and the benefits experienced by many individual meditators—and suggested that researchers have been asking the wrong questions; meditation's main benefit may be in increased self-understanding.

At one time it was thought that biofeedback training to enhance alpha brain wave production could induce a quasi-meditational state, the so-called "alpha state." Subsequent research showed, however, that the alpha state was

really produced by nonfeedback factors such as sensory deprivation, introspective sensitization, suggestion, and expectations.

Meditation has long been a part of religious practices aimed at producing mystical experiences. James emphasized two main features of mystical experiences: ineffability, and its noetic (knowledge) quality. Other features include transiency, passivity, realness, and unusual percepts. Mystical experiences occur in only a small minority of meditators. The likelihood of mystical experiences appears to be influenced by three factors: a personality trait involving the ability to experience spontaneous altered states of consciousness; procedures that deautomatize thinking and perception; and the individual's prior knowledge, beliefs, and expectations.

ENDNOTES

¹Deikman (1966) translated Buddhist theory into modern psychological terms, referring to the *deautomatization* of experience during meditation, leading to a mystical state.

²Some people have noted similarities in the states of consciousness engendered by meditation and by long distance running (Glasser 1976; Spino 1976). Glasser (1976) recommended both meditation and running as types of "positive addiction" to regain self-control and self-esteem.

³Goleman (1977) said of shikan-taza: "In this type of Zen meditation, the student marshals a heightened state of concentrated awareness with no primary object. He just sits, keenly aware of whatever goes on in and around him. He sits alert and mindful, free from points of view or discriminating thoughts, merely watching" (p. 93). Different descriptions of Zen theory are somewhat contradictory (Claxton 1987), and it is not entirely clear whether mindfulness involves a decrease of reflective awareness and sustaining of primary awareness of events or, alternatively, an increase in reflective awareness of our experience. One interpretation is that mindfulness involves an attempt to sustain primary awareness without reflection, but that it can lead to insightful breakthroughs of reflective thought.

⁴The idea of empty consciousness (termed "transcendental" or "pure" consciousness by TM teachers) might seem like a contradiction of terms, insofar as I defined consciousness as a subjective state of awareness of something. The solution to this seeming paradox is that in the state of pure consciousness, the meditator's consciousness is not entirely empty. Rather, the flow of thoughts has slowed severely, until at last the meditator is aware only of the absence of structured thoughts and images.

Michael West commented: "It is very difficult I think to get descriptions about mystical states which satisfy both the naive reader and those familiar with Eastern writings. I think some people would argue strongly with a notion of 'no awareness of sensations or thoughts.' . . . In some traditions people talk about awareness of emptiness; in others they talk of awareness of awareness; and in some Tibetan Buddhist schools they talk of awareness of the cloudless sky where clouds represent thoughts" (1989, personal communication).

⁵An advantage of a between-group comparison (with an independent relaxation-only control group) over a within-subjects comparison (where each subject is tested under both relaxation and meditation conditions) is that it avoids the possibility that in a within-subject comparison experienced meditators might "hold back" their maximum relaxation in the relaxation control period, in order to allow for greater relaxation during the meditation period. Also, experienced meditators report that when they try to rest, they tend to "slip into" meditation, so for them a within-subjects comparison of meditation versus resting would not be appropriate (Holmes 1989, personal communication).

⁶For discussions of Western psychological theories of meditation, see Carrington 1986 and Delmonte 1987. For Eastern traditional interpretations, see Goleman 1977, Claxton 1987, Nar-anjo 1971, and Brown 1977.

⁷Farrow (1977) reported that episodes of "transcendental consciousness" are associated with reduction of breath flow to near zero. His subject, an advanced TM meditator, was asked to

meditate and to push a button whenever she emerged from periods of transcendental consciousness—subjective experiences of unusual mental calmness and clarity without thoughts. Such periods occurred once every fifty-two seconds, and lasted eighteen seconds, on the average. They were associated with: (1) breathing reduced to near zero, with no compensatory hyperventilation afterward; (2) increased theta EEG coherence between different recording sites; (3) decreased heart rate; and (4) reduced phasic skin responses (GSR). The results indicate extreme mental and physical relaxation.