chapter 9

Altered States of Consciousness

Your normal waking consciousness involves a wide range of subjective experiences, depending upon factors such as the physical and social setting, your mood and level of arousal, and whether you are concerned more with the external environment or with your inner mental life of thoughts, images, and memories. Under some conditions your overall pattern of subjective experiences may change so drastically from the normal range that you may recognize that you are in an *altered state of consciousness* (ASC). In addition to changes in your subjective experiences, ASCs also may involve changes in cognitive functioning (such as attention and memory), overt behavior (things you do and say), and physiological responses (such as brain waves).

In the following chapters I will be discussing some of the major altered states of consciousness, including sleep and dreaming, hypnosis, meditation, and states induced by psychedelic drugs. In this chapter I will discuss several general considerations concerning ASCs, including the variety and importance of ASCs, the concept of ASCs, dimensions of altered experience in ASCs, and means of producing and identifying ASCs.

THE VARIETY OF ASCs

Major altered states of consciousness include: sleep, the hypnagogic (drowsy presleep) state, hypnosis, various types of meditation, mystical or transcendental experiences (including satori, samadhi, nirvana, cosmic-conscious-

ness), experimental sensory-deprivation experiences, and states produced by psychoactive drugs such as alcohol, marijuana, LSD, and others. These are often considered to be the major ASCs not because they are necessarily more extreme than other states (though this is true in some cases, such as dream sleep and LSD states), but because they are relatively common and/or they have been studied most intensively. Daydreaming is different from active, externally oriented consciousness, but because it is within the normal range of conscious experience it is usually not considered to be an ASC.

Ludwig (1966) listed a number of less common or less studied conditions that may be classified as minor ASCs, for example, natural sensory-deprivation experiences (as in the arctic or desert), highway hypnosis, profound body immobilization (as in a body cast), brainwashing states, healing trances, religious conversion, spirit possession, fire walker's trance, orgiastic trance, shamanistic and prophetic trance states during tribal ceremonies, mental aberrations during certain *rites de passage* (primitive initiation ceremonies), ecstatic trance (as in the "howling" or "whirling" dervishes), prolonged vigilance (as in serving sentry duty or watching a radar screen), total mental involvement in listening to a charismatic speaker, the mystical, transcendental, or revelatory states occurring spontaneously (usually under ascetic conditions), reading trance (especially with poetry), profound aesthetic experiences, music trance, profound cognitive and muscular relaxation. The inspirational phase of creativity deserves special mention (Martindale 1981).

THE IMPORTANCE OF ASCs

The variety and frequency of occurrence of ASCs in both primitive and civilized cultures gives us every reason to believe that ASCs have been a common human experience since the origin of our species. The capacity to experience ASCs reflects something fundamental in the nature of our mind/brain system, and we cannot hope to understand this system fully until we gain a better understanding of ASCs.

How did the capacity for ASCs come about? Aside from sleep, which is a special case, ASCs may merely represent the malfunctioning of our mind/brain system in response to an abnormal situation. If the normal waking state evolved to serve the function of survival in a changing and potentially hostile environment, then ASCs might be seen as contrary to this survival function. For example, psychoactive drugs might be used to escape from unpleasant reality, to shirk responsibility, and to provide an excuse for uninhibited and irresponsible or aggressive behavior. But a number of positive functions may be served by ASCs.

Functions of ASCs

The adaptive functions of ASCs can be classified in three categories (Ludwig 1966): (1) promoting healing and feelings of well-being; (2) avenues to new knowledge or experience; and (3) social functions.

Promoting healing and feelings of well-being. ASCs have been used to maintain and improve mental health and feelings of well-being, and to re-

lieve or cure physical symptoms that have a psychological basis (psychosomatic illness). For example, hypnosis is used in psychotherapy for a variety of psychological problems (such as trauma, phobias, bad habits) and for the control of pain. States akin to hypnosis have been used in a variety of cultures throughout history—these states include the trances that shamans or medicine men produce in themselves and their patients, and the practices of modern faith healers. Meditation techniques are an aid to relaxation and the reduction of anxiety. The true functions of sleep are not known with certainty, but it is speculated that it serves for maintaining psychological balance as well as for physical rest and restoration. And of course psychoactive drugs, such as tranquilizers, can be helpful when used appropriately.

Avenues to new knowledge or experience. ASCs have served as avenues to mystical or religious experience and for reaching deeper insight into oneself and one's social relationships. ASCs have been sources of creative inspirations for artists, writers, and scientists. And ASCs can enhance aesthetic appreciation of art, music, and poetry, and nature. ASCs are sometimes pursued merely for entertainment, though in some cases (as in drug use) we should ask whether the benefits are really worth the risks.

Social functions. ASCs have been incorporated into religious rituals that serve to promote group cohesiveness, for example, the peyote cult of the American southwest. Seeking of visions through ASCs has been part of tribal initiation rituals and a source of inspiration for religious leaders and their followers. Spirit-possession states serve to reaffirm religious beliefs and promote group cohesiveness. ASCs' social functions are not limited to primitive societies. Both alcohol and marijuana serve as social lubricants and group identifiers for certain segments of society in industrialized countries. Meditation practice has its own subcultures in the West as well as the East.

Why Study ASCs?

ASCs are a natural phenomenon of the human species. They are an interesting and important topic in their own right, and studying them helps to satisfy our curiosity about human nature and human potentialities. Gaining a better understanding of ASCs may help us to understand how they serve their adaptive functions, and perhaps it will enable us to improve the practical uses of ASCs. Also, increased understanding may help us to reduce or avoid possible harmful effects of certain ASCs, such as drug dependency.

The systematic study of ASCs may also help us better to understand the normal waking state of consciousness. Just as the study of psychopathology has helped us understand normal mind and behavior, and the study of people with abnormal or damaged brains has helped us understand normal brain structure and functioning, so also may the study of temporary alterations in consciousness help us to understand normal waking consciousness and cognitive processes.

THE CONCEPT OF ALTERED STATES OF CONSCIOUSNESS

Charles Tart, who coined the term "altered state of consciousness" (ASC) in its modern usage, likes to begin his lectures on ASCs by asking the audience this question:

> Is there anyone here right now who *seriously* believes that what you are experiencing, in this room, at this moment, may be something you are just dreaming? I don't mean picky, philosophical doubts about the ultimate nature of experience or anything like that. I'm asking whether anyone in any serious *practical* way thinks this might be a dream you're experiencing now, rather than your ordinary state of consciousness? (Tart 1975, p. 10).

Except for an occasional troublemaker, everyone generally agrees that they know that they are awake and not dreaming. The point of this demonstration is that we have ways of subjectively checking out our cognitive functioning, and comparing it against a remembered idea of our personal, normal functioning. We may not usually carry out this cognitive check-up in a deliberate, conscious manner. However, we will tend to notice automatically any marked change from normal functioning, such as an instability in our visual perception of the world, a feeling that we are floating, a feeling that time has speeded up or slowed down, or an inability to remember anything about a conversation that we have just finished.

Definition of Altered State of Consciousness

Following from the above considerations, an *altered state of consciousness* (ASC) may be defined as a temporary change in the overall pattern of subjective experience, such that the individual believes that his or her mental functioning is distinctly different from certain general norms for his or her normal waking state of consciousness (Ludwig 1966; Tart 1972b). Several comments on this definition are in order:

(1) *ASCs are not merely changes in the contents of consciousness.* After all, the contents of consciousness can change just because the external situation changes. It would be silly to talk about, for example, a "waterfall state of consciousness" or an "automobile state of consciousness." *Rather, ASCs involve a subjectively experienced change in mental functioning,* for example, the impression that your perception, thinking, memory, or behavior control processes, or some combination thereof, are markedly different from normal.

(2) *ASCs involve a changed pattern of subjective experiences, not merely a change in one aspect or dimension of consciousness.* Dimensions of changed subjective experience in ASCs include changes in attention, perception, imagery, inner-speech memory, emotion, and others to be discussed in more detail in the next section. The changed pattern of subjective experiences leads people to infer that their mental functioning has changed, indicating that they are in an altered state of consciousness.

(3) *ASCs are not necessarily recognized by the individual at the time that they are happening; they may be inferred afterward.* For example, if you are dreaming, or

under the influence of LSD, it may seem to you that reality itself has changed. Only later—when you return to your normal waking state—do you realize that it was your state of consciousness, not reality, that was changed.

(4) *ASCs are relatively short-term, reversible conditions* that may last from a few minutes to several hours. Changes in conscious experience, cognitive functions, and behavior can also occur in psychopathological conditions, such as major depression and schizophrenia, or as a result of brain injury. Major psychopathologies and brain injuries cause long-term or permanent changes in psychological functioning, so they do not fit the concept of altered states of consciousness as the term is used here.

(5) *ASCs are identified by comparison to the individual's normal waking state of consciousness.* But the concept of a "normal" waking state of consciousness is, in a sense, a convenient fiction. Your waking state can vary widely during the course of a day, from an alert, active, externally oriented state to a relaxed or drowsy, inner-oriented, daydreamy state. Also, the typical pattern of waking conscious experiences varies widely from one person to another. Thus, the concept of a normal waking state is a rather loose one. By the *normal waking state* I mean periods when you are awake, not asleep, and you have not done anything to produce an altered state in the usual sense. (For example, you are not in a drug state, hypnotic or meditative state, or under conditions of unusual sensory restriction.) A more detailed analysis might consider different *substates* of the normal waking state. For example, a condition of high arousal and externally oriented attention is a different waking substate than one of low arousal and internally oriented attention.

(6) *The essence of a state of consciousness is the individual's pattern of subjective experiences, not his or her overt behavior or physiological responses.* But researchers who try to study other people's ASCs must make inferences about their experiences from their verbal reports, other overt behaviors, and measurable physiological responses.

Some writers (such as Shapiro 1977) have argued that a state of consciousness must be defined in terms of both a changed pattern of subjective experience and a changed pattern of physiological responses. It is certainly an advantage to the researcher to know that a particular pattern of physiological responses is correlated with a particular pattern of subjective experiences. For example, in dream research the researcher knows that when the sleeping subject's pattern of physiological responses (brain waves, eye movements, muscle tension) indicates that he or she is in the REM sleep state, then it is highly probable that the subject will report a vivid dream if awakened. However, the problem with requiring a physiological pattern to identify an ASC is that for most subjectively altered states of consciousness no distinctive and unique physiological pattern has been identified. Furthermore, physiological patterns have meaning in regard to consciousness only insofar as they have been shown to be highly correlated with variations of conscious experience. Altered conscious experience is the essence of ASCs. Working from the identity theory perspective on the mind-body problem, I do not doubt that, at some level, each variation in subjective conscious state involves some change in brain state. Meanwhile, it would be a mistake to ex-

clude interesting variations of conscious state from the study of ASCs merely because current research technology cannot identify a unique change in brain state correlated with the changed conscious state.

The subjective criteria by which individuals recognize their ASCs, such as apparent changes in perception or memory, are sometimes verifiable by objective research methods. However, in other cases attempts to obtain objective verification may lead to results that appear to contradict the subjective experience. For example, people who are stoned (intoxicated) on marijuana sometimes feel that their hearing is improved, since they are hearing things in music that they had not previously heard. But objective measures show that, in fact, their hearing sensitivity is no better in the stoned state than in their normal waking state. Nonetheless, it is the subjective experience, not the objective measure, that marks the essence of the ASC. (In this example, it seems that when people are stoned they often attend to notes and patterns in the music to which they do not normally attend, leading them to infer incorrectly that their hearing sensitivity has changed.) Discrepancies between the subjective experience (as revealed in introspective verbal reports) and independent objective measures present a problem for research and theory, but such discrepancies do not invalidate the concept of altered states of consciousness. The altered experience is the thing to be explained. To take another example, the fact that someone's dream of being chased by giant rats does not correspond to objective reality does not make the dream invalid or uninteresting; rather, the dream is the thing to be explained.

Though changed subjective experience is the essence of ASCs—that is why we call them altered states of *consciousness*—in many cases there are in fact objectively identifiable changes in mental functioning. The objectively identifiable changes may correspond to subjectively experienced changes. For example, people stoned on marijuana have noticed that, when they try to say a sentence that is too long, they sometimes forget the beginning of the sentence before they get to the end of it. The stoned individuals infer that their memory is not functioning normally. Laboratory research has confirmed the fact that short-term memory is impaired by marijuana. There are also some situations in which people in ASCs are unaware of certain changes in mental functioning, yet objective methods can show that a change has occurred. For example, a stoned or drunk driver might not know that his or her reaction time has slowed, but objective studies show that marijuana and alcohol both slow braking reaction time.

DIMENSIONS OF CHANGED SUBJECTIVE EXPERIENCE IN ASCs

People recognize that they are in an altered state of consciousness when their overall pattern of subjective experience is markedly different from that of normal waking consciousness (Tart 1975). There are several features or dimensions of conscious experience that can change, leading people to conclude that they are in an ASC. Here is a list of dimensions of conscious expe-

rience that can change in ASCs, which I will discuss in more detail momentarily: (1) attention; (2) perception; (3) imagery and fantasy; (4) inner speech; (5) memory; (6) higher-level thought processes; (7) meaning or significance of experience; (8) time experience; (9) emotional feeling and expression; (10) arousal; (11) self-control; (12) suggestibility; (13) body image; and (14) sense of personal identity. (This list was influenced by similar lists presented by Ludwig [1966] and Tart [1975].)

Several similarities between this list of ASC dimensions and the list of aspects of normal consciousness, presented in Chapter 2, will be apparent. However, it is useful to present a new list for our present purpose. Some aspects of consciousness become most conspicuous when they are changed from their normal character.

When I say that an ASC involves a changed *pattern* of subjective experience, I mean that there are changes on several of the listed dimensions. A change on only one dimension probably would not lead you to conclude that you are in an ASC. Nor is it necessary to change on all of the dimensions to be in an ASC. Different ASCs involve changes on different dimensions, and the specific nature of the change on a dimension may differ from one ASC to another. The listed dimensions of change are relatively broad. Some ASC experiences cut across two or more dimensions. Now I will describe the dimensions of subjective experience that can change in ASCs, and give some examples.

(1) *Changes in attention.* In the normal waking state the internal versus external direction of attention can range widely, from primarily external (as in sports) to primarily internal (as in daydreaming), or it can be mixed internal-external (as when you drive a car and daydream at the same time). The direction of attention can also alternate between internal and external in most ASCs. However, in some ASCs the normal flexibility is reduced and attention is directed inwardly to an extreme degree (as in dreaming or concentrative meditation). Also, ASCs may involve a heightened tendency to focus attention narrowly on either an internal or external object or event (as found in increased attentional absorption in concentrative attention and hypnosis). As a consequence of narrowly focused attention, people may notice aspects of their attentional object (such as music) that they would not normally notice, but they are less responsive than normal to other events.

(2) *Changes in perception.* Perception involves the recognition and interpretation of environmental objects and events. Some ASCs, such as drug states, may involve changes in the appearance of objects or changes in the way we hear sounds. Changes in what we perceive may occur due to changes in the direction of attention rather than changes in sensory-perceptual processes *per se*. Perceptual *illusions*, in which objects or events are misidentified, may increase in ASCs. In some drug states *synesthesia* may occur, a condition where input in one sensory modality (such as auditory) may be experienced in a different modality (visual). For example, one observer, stoned on marijuana, reported that when he listened (through stereo headphones) to J. S. Bach's *Goldberg Variations* (played on a harpsichord), it was an intense visual and tactile, as well as auditory, experience.

(3) *Changes in imagery and fantasy.* Visual mental images may be espe-

cially vivid in some ASCs. Increased image vividness may occur during relaxed daydreaming, but visual images are especially vivid in night dreams. Increased image vividness often goes with increased fantasy thought in which people imagine purely fictional stories, often of a fantastic nature, and usually with themselves as the main character. Dreams are the best example, but vivid fantasies also occur in other states, such as relaxed daydreaming or psychedelic drug states. Alternatively, people may experience *reverie*, a sequence of thoughts or images occurring in a free-association manner, without a coherent theme. *Hallucinations* are particularly vivid mental images that are believed to be real. For example, in an ASC you might have a vivid image of a deceased relative, and believe that the person is really there in front of you. Dreams are hallucinations during sleep, but hallucinations can also occur in other states, such as psychedelic drug states or following hypnotic suggestions. An interesting intermediate case between hallucination and illusion occurs when meaningless stimuli are grossly misperceived with the aid of imagination. For example, under conditions of need or anxiety you might hear voices in the wind, imposing structure on a more-or-less random mixture of sounds.

(4) *Changes in inner speech.* Inner speech and narratization may decrease, for example, during meditation and sleep. Also people's inner speech, such as volitional thoughts, may become less connected to their actions or current environment. Overt speech may become less coherent than normal, perhaps due to disruption of short-term memory (as in marijuana intoxication). Changes in verbal thought content are related to other changes in subjective experience, such as increased fantasy.

(5) *Changes in memory.* In ASCs people may notice a decreased ability to recall information from memory. For example, during marijuana intoxication the ability to recall recent events from short-term memory is impaired. The ability to recall events from long-term memory can be disrupted by hypnotic suggestions (hypnotic amnesia). Sometimes, as in hypnosis, people may have the impression that their memory recall is improved during an ASC, though it is often difficult to distinguish between a delusion (false belief) of enhanced recall and true hypermnesia (better than normal memory). A more subtle sort of memory change involves changes in the associations between words or images, such that the flow of ideas in the stream of consciousness is notably different from normal. Some such changes are mere nonsense, but in other cases truly creative combinations of ideas may occur in ASCs.

(6) *Changes in higher-level thought processes.* In ASCs people may have difficulty making decisions or solving problems, perhaps due to the disruption of short-term (working) memory. Also the specific decisions that they make may be different from normal, due to either disruptions of thought processes or changes in values or emotions. In an ASC, such as marijuana intoxication, people sometimes come up with truly creative solutions to practical or artistic problems. More often their solutions are no better, and perhaps worse, than normal, but in the ASC they have a delusion that they are more creative than usual.

(7) *Changes in the meaning or significance of experiences.* A fairly common

ASC experience involves the feeling that certain thoughts or events are profoundly important, perhaps of great creative or mystical significance. This sort of experience may be one of the main reasons why many people enjoy experiencing certain ASCs.

A good illustration of this is a scene from the movie, *Animal House*, in which some college students get stoned on marijuana with their English professor. One of the students becomes fascinated by the thought that an object is made of atoms, and each atom is a little solar system, the electrons being little planets swirling around the nucleus sun. And there must be little people on those little worlds! And Earth must be a planet in an atom on some object on a bigger world, with still bigger people! And so on and on and on. Wow!

Some people have filled pocket notebooks with the profound thoughts that they have had while stoned, lest they be forgotten and lost before they can benefit humankind. Yet, upon returning to the ordinary state these thoughts usually seem utterly boring or mildly amusing, at best.

Arnold Ludwig gave an example from one of his personal experiences when he took LSD for experimental purposes:

> Sometimes during the height of the reaction, I remember experiencing an intense desire to urinate. Standing by the urinal, I noticed a sign above it which read "Please Flush After Using!" As I weighed these words in my mind, I suddenly realized their profound meaning. Thrilled by this startling revelation, I rushed back to my colleague to share this universal truth with him. Unfortunately, being a mere mortal, he could not appreciate the world-shaking import of my communication and responded by laughing! (Ludwig 1966, p. 229).

The *sense of the ineffable* (Ludwig 1966) is a special case of change in the meaning or significance of experience. An *ineffable experience* is, literally, one that cannot be communicated in words. Strictly speaking, many conscious experiences cannot be communicated very well in words, both in the normal state and in various ASCs. However, the term "ineffable experience" is usually applied to a particular class of experiences that might better be characterized as mystical or religious. One of the main features of mystical experience is a profound feeling of "oneness" with all people, with all life, or even with the universe as a whole (Deikman 1966). The true nature of such an experience cannot be communicated in words, yet a mystic experience can have a profound, lasting influence on a person's life. (Mystic experiences will be discussed in more detail in Chapter 17 on meditation.)

In contrast to the feelings of profundity that arise in some ASC experiences, the other side of the coin is that some ASC experiences seem to be exceptionally humorous. This is another case of changed meaning or significance of experience. A group of stoned people may be rolling in fits of laughter at some shared joke, but the joke may be totally unfunny to someone in a normal state of consciousness. Also, the feeling (perhaps delusional) that one's ideas become more creative is another case of changed meaning or significance experienced during ASCs.

(8) *Changed time experience.* The experience of temporal duration may change. For example, to someone who is stoned on marijuana, if their friend

leaves the room for five minutes to get some snacks, it might seem that he or she has been gone for fifteen minutes. Thus, external time seems to have slowed down. Apparent slowing of external time implies that some internal time-judgement process has speeded up. (For example, if an internal clock that normally "ticks" ten times in ten seconds were to tick thirty times in ten seconds during an ASC, then it would seem, subjectively, that the ten-second interval was really thirty seconds long.) Ornstein (1977) distinguished between our ordinary linear time-experience and a nonlinear experience of timelessness or eternal present that sometimes occurs in such ASCs as hallucinogenic drug states or in meditative or mystical states.

(9) *Changes in emotional feeling and expression.* Wide changes in emotional feeling are common in ASCs. These can range from negative emotions of fear, anger, and depression to positive emotions of humor, love, and joy. People may become highly emotionally reactive, responding to events to which they would not normally react. Alternatively, people may become emotionally unresponsive, as in a drugged stupor. The overt expression of emotions, such as affectionate touching, crying, or violent actions, may be uninhibited in ASCs.

(10) *Changes in level of arousal.* In the waking state people's subjective level of arousal may range widely, from low to high. In ASCs extremes of arousal may be reached: for example, extremely low in deep sleep; very low in the hypnagogic presleep state; extremely high in some drug states (as with amphetamines) and in mystical rapture. Fischer (1978; also Martindale 1981) systematically characterized and related a variety of normal and altered states in terms of a dimension of arousal, though of course states of consciousness differ on a variety of dimensions besides arousal.

(11) *Changes in self-control.* There are several aspects to changes in self control. People may become more impulsive, doing things that go against their usual social inhibitions. Or they may become lethargic, failing to initiate ordinary actions. The ability to carry out complex motor actions may be disrupted. All of these changes can occur, for example, during alcohol intoxication.

In some ASCs people's normally voluntary responses may seem to happen automatically, without a sense of volition (as in response to hypnotic suggestions). In some extreme cases (as in certain drug states), where the loss of self control is unintended and people's own actions seem to be happening to them without a feeling of volition, the result may be a frightening experience termed *depersonalization.* (Depersonalization, which can occur in schizophrenia as well as in ASCs, often involves changes in body image [perceived body proportions] as well as changes in self control.) On the other hand, in some extreme cases involving mystical, revelatory, or spirit possession states, people may voluntarily relinquish conscious control "in the hope of experiencing divine truths, clairvoyance, 'cosmic consciousness,' communion with the spirits or supernatural powers, or serving as a temporary abode or mouthpiece for the gods" (Ludwig 1966).

(12) *Changes in suggestibility.* Suggestibility has to do with responsiveness to suggestions. In general terms, a *suggestion* is a communication from one person to another that induces the second person to change his/her behavior or beliefs, without any argument or coercion being involved. Of particular

interest are hypnotic-type suggestions, which involve asking a person to vividly imagine some state of affairs such that, if the imagination is accepted as reality, the person's behavior will change in a manner consistent with the suggestion. For example, a hypnotized subject might be told that flies are swarming around his face and crawling on his skin. In response to the suggestion he might hallucinate the buzzing and the feeling of flies on the skin, and make overt responses of grimacing and brushing the flies away. An increase in this type of suggestibility (hypersuggestibility) occurs during hypnosis and also some other states, such as marijuana intoxication and shamanistic ritual.

(13) *Changed body image.* Changes in perceived body proportions or weight, or inner sensory events, are fairly common in ASCs. For example, you might feel that your head, or whole body, has become very small or very large. Your body might feel very heavy, or so light that you feel that you are floating in the air (subjective experience of levitation). Sensitivity to pain might decrease, perhaps along with the feeling that part of the body has become numb, disconnected, or turned to wood or rubber (as in hypnotic analgesia).

Changes in body image contribute to changes in the sense of personal identity. When such changes occur in toxic or delirious states, they may be frightening. On the other hand, when they appear in a mystical or religious setting, "they may be interpreted as transcendental or mystical experiences of 'oneness,' 'expansion of consciousness,' 'oceanic feelings,' or 'oblivion' " (Ludwig 1966).

(14) *Changed sense of personal identity.* As a result of profound changes in a variety of experiential dimensions—thinking, memory, self-control, body image, and so forth—the sense of personal identity may change. People may feel that they are no longer themselves, since their perception of themselves no longer matches their remembered self-concept. Sometimes a change in perceived personal identity is a positive experience, as when people feel rejuvenated or reborn. At other times the change is unpleasant or frightening, particularly when people feel that they can no longer control their thoughts or actions, as in some drug states. Mystical experiences, in which people lose their sense of self as a separate person and have a sense "unity" with all people, or with all life, or with God, are usually felt to be pleasant experiences.

PRODUCING ALTERED STATES OF CONSCIOUSNESS

How can ASCs be produced? Some ASCs, such as sleep and "highway hypnosis," occur spontaneously under the right conditions. In other cases ASCs are produced deliberately, as in hypnosis, meditation, and drug states. A technique for deliberately producing an ASC is called an *induction technique* or procedure. The conditions that produce spontaneous or unintentional ASCs may be called *induction conditions.* I will not try to make a hard and fast distinction between deliberate induction techniques and spontaneous induction conditions, since the psychological processes are similar in both types of situations. But before I go into detail on the induction methods let us consider what, in more general terms, is required to produce an ASC.

Tart (1975) argued that our normal, alert waking state of consciousness is maintained by certain *stabilizing conditions*, including a sufficient level of physiological arousal, a changing array of external stimuli, and an attitude of maintaining attention to them so that we can make appropriate decisions and responses consistent with our motives. In order to produce an ASC we must first disrupt or *destabilize* the normal state. Destabilization of the normal state is accomplished by the induction technique or conditions. After normal consciousness is destabilized, certain *patterning conditions* produce a new pattern of subjective experience through which we recognize that we are in an ASC. Usually the same conditions that destabilized ordinary consciousness participate in patterning the ASC, though other factors may also be involved, such as the physical and social setting. The ASC will be maintained in a more-or-less stable manner as long as the ASC patterning forces are maintained.

Now I will describe four different types of events that may induce ASCs: (1) change in external stimulation; (2) change in physical activity; (3) change in physiological state; and (4) change in focus of attention (Ludwig 1966). In practice, ASCs are often induced by a combination of two or more of these procedures.

Change in external stimulation. External stimulation may change along several dimensions. (1) The *amount* of sensory input might change, either in its intensity or its frequency. The amount of sensory input might be increased drastically above normal (sensory bombardment, as you might experience at a disco), or it might be decreased severely (as in an arctic whiteout, or in sensory-deprivation experiments). The amount of input may change independently for the different modalities, as when you close your eyes but you can still hear. (2) The *variety* of sensory input might change, without necessarily changing the amount of input. For example, the same stimuli might recur over and over again (as in the incessant beating of drums to a constant rhythm), producing monotony and withdrawal of attention from the environment. (3) The *meaning* of external stimulation might change. The most important cases involve social situations in which we are influenced by what people say (as in a hypnotic induction). Other people's words or actions may influence our expectations or the direction of our attention.

Change in physical activity. Physical activity might change in either amount or variety, or both. For example, you might continue the same circular dance for hours, or you might lie very still. Physical activity has two important features that can affect the state of consciousness: (1) Greater amounts of physical activity produce higher levels of physiological arousal, and conversely, restricted activity lowers arousal level. (2) Physical activity produces feedback in the form of internal, kinesthetic stimulation. In addition, the ability to move about freely enables you to increase the variety of external stimuli that you experience, thus reducing monotony.

Change in physiological state. Each day we experience wide changes in level of physiological arousal. Arousal varies during wakefulness, and

when arousal is low enough we fall asleep. The concept of induction is used loosely in the case of sleep. We can facilitate sleep by lying down in a dark, quiet room, but sometimes sleep eludes us even when we want and need to sleep (insomnia; Chapter 10). Under the right conditions the brain induces sleep in itself. Our voluntary control of sleep is mostly a matter of permission, allowing it to happen.

We can deliberately (or accidentally) induce ASCs by changing our brain's physiological state with psychoactive drugs, such as marijuana, LSD, alcohol, and so forth. Drugs change brain activity by changing the amount of certain *neurotransmitters* (complex biochemicals that transmit nerve impulses from one neuron to another), or by blocking normal neurotransmitter activity or by mimicking neurotransmitters. Particular drugs produce particular effects depending on which of several neurotransmitters they affect and the parts of the brain in which the affected neurotransmitters are located.

Brain functioning can also be altered by the absence of certain chemicals. "You are what you eat," somebody said. Your brain needs adequate levels of oxygen, energy (carbohydrates), protein (to build and maintain its structure), and various nutrients (vitamins, minerals) to produce the various neurotransmitters that keep the flow of neuronal activity going. ASCs might be produced by hypoxia (oxygen starvation), dehydration, starvation (or deliberate fasting), and malnutrition. In addition, some individuals are sensitive to specific foods, such as milk, that can produce symptoms such as sluggish thinking and irritability (Philpott & Kalita 1980).

Change in focus of attention. Here I am referring mainly to voluntary changes in thinking and attention, though sometimes these changes occur accidentally. In concentrative meditation, people deliberately restrict their focus of attention to a particular object (such as a candle), or repeat a particular word or phrase (mantram) over and over (either vocally or subvocally), or concentrate on a particular mental image (such as a waterfall). Trance states sometimes occur accidentally, as when people sit passively and stare absentmindedly at an object. Entry into an ASC (such as hypnosis) may involve a voluntary *suspension of reality testing*, in which we stop critically attending to events and comparing them with our past experience, so that the distinction between imagination and reality, between illusion and fact, becomes blurred (Shor 1959). Thus, in an ASC we may enter a world of hallucination and fantasy.

IDENTIFYING SPECIFIC ASCs

The essence of an altered state of consciousness is the individual's own pattern of subjective experiences. However, researchers need to be able to identify objectively states of consciousness in other people, so they will know when a research subject is in a particular ASC. Ideally, researchers like to have *operational definitions* of psychological concepts by which they specify the exact operation or procedure that is necessary to produce a specific psychological response. For example, it would be ideal if the marijuana intoxication state could be operationally defined as a specific response or set of

responses (subjective and/or behavioral) that is reliably produced by the induction technique of smoking marijuana.

However, Tart (1975) argued that it would be a mistake to define operationally specific ASCs in terms of their induction techniques, since induction techniques do not reliably produce specific ASCs. In some cases an induction technique that works reliably for some people will not work for other people. For example, a substantial minority of subjects fail to enter an ASC in response to a hypnotic induction, and some people do not get stoned when they smoke marijuana (particularly if it is their first experience with marijuana). Also, among those who respond to an induction technique, the pattern of subjective and behavioral responses may vary from one person to another. Furthermore, a particular pattern of responses might be produced by more than one induction procedure. For example, among people who have experienced marijuana intoxication, hypnotic suggestions for "feeling stoned" may be sufficient to produce subjective experiences very similar to those experienced during marijuana intoxication.

Thus, it would be erroneous to say that a specific induction technique *causes* a specific ASC. It would be more accurate to say that the induction procedure *sets the occasion* in which one may enter an ASC. But, as Tart (1975) explained, the specific nature of the ASC, or whether one enters an ASC at all, depends upon the *interaction* of the induction procedure with other conditions, such as the individual's personality, mood, expectations (Kirsch 1985), physiological state, and the social and physical setting.

Tart (1975) argued that ASCs should be identified by the particular pattern of changes in subjective experience and psychological functioning, independently of the induction procedure. He suggested that states might be *mapped* on a multidimensional scale of psychological functions (such as degree of rationality, image vividness, STM duration). While the idea of state mapping is a good one in principle, in practice it presents formidable difficulties, since it would be impossible to measure quantitatively some psychological functions in some ASCs. For example, rational decision making might be measured in the normal waking state and in hypnosis or marijuana intoxication, but not during sleep or meditation. One approach to the problem of state mapping is to have subjects rate their subjective experience on several dimensions immediately after experiencing a particular stimulus condition or state of consciousness (see Pekala & Wenger 1983), though this procedure suffers from the usual memory retrieval problems associated with introspective reporting. Experiences might be recalled more reliably after some ASCs than others, making it difficult to compare different states.

Quasi-operational definitions of ASCs. Since ASCs cannot be given strict operational definitions or reliably mapped in terms of subjective experiences alone, researchers usually define specific ASCs *quasi-operationally*, in terms of a *set* of psychological responses that follow from a particular induction procedure or that occur in a particular physiological state. The set of psychological responses that identify an ASC may include changes in subjective experience as revealed by introspective verbal reports, changes in cognitive task performance, and other behaviors that are believed to be characteristic of that ASC. In the quasi-operational approach, researchers may specify

certain minimal defining features of the ASC, and/or variable characteristics of the ASC, or both.

The quasi-operational approach is less rigid than the traditional operational approach to defining psychological terms. The quasi-operational approach acknowledges that the details of psychological response to an induction technique may vary somewhat from one individual to another. Subjects are considered to be in a particular ASC if they show some, though not necessarily all, of the psychological responses that are characteristic of that ASC. Or if minimal defining features of an ASC are specified, subjects must show the defining features, and perhaps also some of the characteristic features. But subjects who do not meet some specified criteria of psychological response to the induction procedure are not considered to be in that ASC. For example, subjects may be considered to be hypnotized if they respond to several different suggestions for altered experience (such as response inhibitions, hallucinations, posthypnotic amnesia, and so forth; see Chapter 14), but no one specific response (such as hallucination) is required for subjects to be considered to be hypnotized. Or subjects may be considered to be intoxicated on marijuana if they report several of the characteristic subjective responses to marijuana (see Chapter 18). The quasi-operational approach allows that there can be varying degrees (greater or lesser) as well as varied patterns of psychological response in ASCs. For example, the hypnotic state can be experienced at varying degrees of subjective depth, and greater subjective depth is associated with responses to a greater number and variety of hypnotic suggestions.

Physiological responses may be used as indicators of states of consciousness, along with subjective and behavioral responses, in the quasi-operational approach. However, physiological indicators are valid only insofar as they correlate reliably with psychological indicators. For example, REM sleep is an *altered physiological state* that can be identified by certain defining physiological responses (fast brain waves, rapid eye movements, low muscle tension). But REM sleep is classed as an altered state of consciousness not because of its unique *physiological* response pattern, but because of its characteristic *psychological* response pattern, including vivid dreams, reduced rationality and reflective thought, reduced sensitivity to external stimuli, and lack of voluntary movement. REM sleep's physiological responses are so reliably correlated with its psychological responses that the physiological responses have become the main criterion for identifying the REM (dream) sleep ASC (Chapter 10). But REM sleep is a unique ASC. Most ASCs do not have unique identifying patterns of physiological responses, so physiological responses are neither necessary nor sufficient for identifying most ASCs by the quasi-operational approach. For example, though an increase in alpha brain waves is a characteristic response during concentrative meditation, alpha waves also occur in other relaxed wakeful conditions, so alpha waves are not considered to be a sufficient indicator of a meditative state of consciousness (see Chapter 17).

States as natural concepts. States of consciousness are natural concepts. *Natural concepts* are categories of natural objects and events that have some things in common, though they may differ in some ways (Rosch 1973).

A natural category has a *prototype* that is the most typical or representative member of the category (for example, a robin is a prototypical bird). Other members of the category are more-or-less similar to the prototype, but things that are too different from the prototype are not members of the category. Similarly, a state of consciousness (such as marijuana intoxication or a meditative state) can be exemplified by a prototypical case in which certain characteristic responses (subjective, behavioral, physiological) occur. Cases that are similar enough to the prototype state on critical dimensions are considered to be examples of the same state of consciousness, whereas dissimilar cases are not. The point is that no two instances of an ASC are likely to be identical, but we include them in the same category because their similarities are more important than their differences.[1] The boundaries between different states are somewhat arbitrary; states are defined by experiencers and observers for human purposes of thinking and communication, research and theorizing.[2]

As a natural concept, a state of consciousness is a *descriptive category* of human experience. To say that someone is in an altered state of consciousness does not *explain* anything. Rather, the altered subjective experiences and behaviors *identify* the ASC. For example, it would be incorrect to say that a hypnotic subject experienced a temporary paralysis of the arm (in response to a hypnotic suggestion) because he or she was in a hypnotic state. Rather, the response to the suggestion is evidence that the subject is in a hypnotic state. Similarly, a hallucination is not to be explained by a psychedelic drug intoxication state; it is evidence that the person is intoxicated by the drug.

A state of consciousness does not explain anything. Rather, the state—that is, its characteristic subjective and behavioral responses—is what psychological scientists want to explain. There are three levels of analysis for explanations of ASCs: (1) discovering empirical relationships between various induction techniques (and interacting personal, social, physiological, and environmental variables) and the various psychological responses that are characteristic of an ASC; (2) developing psychological theories to explain the observed empirical relationships in terms of inferred mental (cognitive) structures and processes; and (3) developing neurophysiological theories to explain the empirical relationships in terms of brain structures and processes.

STUDYING ASCs: SUBJECTIVE AND OBJECTIVE KNOWLEDGE

As in the normal waking state, there are two types of knowledge about ASCs: direct personal experience and secondary or vicarious experience. Both are valid and important forms of knowledge, but they serve different purposes. People in ASCs may have experiences ranging from terror to entertainment to profound personal insight or religious revelation; the result may be to change the individual in some way, either positively or negatively. Psychological scientists, on the other hand, are interested in understanding how the human mind/brain system works in both normal and altered states of con-

sciousness. It is the nature of science to try to develop theories based on objective evidence, that is, evidence that can be verified by other observers. Thus, while scientists cannot directly know other people's conscious experiences, they can make inferences about them from objective data including introspective verbal reports, performance on cognitive tasks, and physiological measures. Researchers having personal ASC experiences may develop, from their experiences, hypotheses about how the mind works in that ASC. But fair tests of hypotheses require research on other individuals—people who do not know about the hypothesis being tested. Since this book is concerned with the scientific study of consciousness, the emphasis in the following chapters will be on systematic experimental and correlational studies of ASCs.[3]

In the following chapters I will be discussing major altered states of consciousness, including sleep and dreaming, hypnosis, meditative states, and psychedelic drug states. Since it is impossible to discuss everything that is known about ASCs in a single volume, it is necessary to be selective in the coverage. For each state I will briefly describe the characteristic changes in subjective experience and related behavioral and physiological responses. I will go into more detail on selected topics that seem to be particularly important, either for their inherent interest, for their practical applications, or for their relevance to understanding how the mind/brain system works. For theoretical interpretations of the various states I will emphasize theories that are comprehendible from a cognitive psychological viewpoint, in which subjective experience and behavior are produced by processes in the mind/brain system.

SUMMARY

An altered state of consciousness (ASC) is a temporary change in the overall pattern of subjective experience, such that the individual believes that his/her mental functioning is distinctly different from certain general norms for his/her normal waking state of consciousness. The normal waking state refers to periods when one is awake and has not done anything to produce an altered state in the usual sense (that it, one has not used an ASC induction procedure).

For people who experience them, ASCs may be important for three reasons: (1) to promote healing and psychological well-being; (2) as avenues of new knowledge and experience, such as personal insight and artistic inspiration; and (3) to serve social functions, such as religious rituals and promoting group cohesion. Psychological scientists study ASCs as important natural human experiences, and to help understand how the mind/brain system works.

Some fourteen different dimensions of changed subjective experience that can occur in ASCs were described: (1) attention; (2) perception; (3) imagery and fantasy; (4) inner speech; (5) memory; (6) higher-level thought processes; (7) meaning or significance of experience; (8) time experience; (9) emotional feeling and expression; (10) arousal; (11) self-control; (12) suggestibility; (13) body image; and (14) sense of personal identity. Four means of

inducing ASCs were described, including changes in: (1) external stimulation; (2) physical activity; (3) physiological state; and (4) focus of attention. Specific ASCs cannot be defined in terms of the induction procedure alone.

Though the essence of ASCs is the individual's pattern of subjective experiences, scientists need to be able to identify objectively a subject's state of consciousness. In research practice, specific ASCs are usually identified according to a quasi-operational procedure, whereby a specific induction procedure is followed by a characteristic set of psychological responses, including subjective experiences revealed through introspective reports, cognitive task performance changes, and other behaviors. Physiological indicators may also be used, insofar as they correlate reliably with psychological responses. In the quasi-operational approach, subjects must experience some, though not necessarily all, of the characteristic responses to be considered to be in a particular ASC. ASCs are natural concepts in that each ASC has its prototype or typical cases, and other cases are included if they are sufficiently similar to the prototype.

ENDNOTES

[1]A similar approach is used by psychiatrists and clinical psychologists for diagnosing psychopathological conditions. According to the guidelines in *DSM-III* (American Psychiatric Association 1980), each condition (major depression, paranoid schizophrenia, etc.) is diagnosed in terms of a set of behavioral symptoms, where to be diagnosed in a particular category, patients must have a specified number—but not necessarily all—of the listed symptoms. In some cases one or more specific symptoms are required, along with some (but not necessarily all) of the additional symptoms.

[2]Tart (1975) argued that each state of consciousness is unique and stable, and he coined the term *discrete state of consciousness* (dSoC) to emphasize these characteristics. According to Tart's theory, only a limited number of discrete states is possible, since the mind/brain system can stabilize itself in only a limited number of ways. (In physics, a "state" of matter is a relatively unique and stable condition [such as ice, water, or steam]. The word "state" is a loose metaphor when we talk about states of consciousness.) I would argue that, in fact, there is no compelling reason to believe that states of consciousness are necessarily discretely different from each other. Some states are very different from each other, but others may be similar, and it is uncertain whether any state is absolutely unique. Stability is a matter of degree: some states last for a few minutes, others for a few hours. Transition states may last for a few seconds. The longer a state lasts, the more conscious experience will change, and it is somewhat arbitrary whether we call a changed pattern of experience a new state or a variation of the original state. In any case, the question of the uniqueness and stability of states of consciousness is a matter for research; it cannot be settled by a priori theory.

[3]Creative writers' descriptions of their own ASC experiences can be a valuable source of information about ASCs, for both students and researchers. Though self-report case studies do not come from controlled research conditions, writers' descriptions may be of particular interest because they can communicate their subjective ASC experiences better than the typical research subject. For example, Aldous Huxley (author of *Brave New World*) described his mescaline trip in *The Doors of Perception* (Huxley 1954/1970). And Milton Erickson did a detailed case study of Huxley in a hypnotic state (Erickson 1965). Such reports can be a valuable source of ideas for systematic research. Yet we must acknowledge that the ASC experience can never be fully captured by writers' reports, case studies, or controlled research. All such productions are only selective samples of the ASC experience, at best.