Chapter

II

PERCEPTION AND CONSCIOUSNESS

The study of perception and consciousness is of great interest to psychologists because these activities define and reveal much of your psychological interaction with your environment. Think for a moment about how your senses are bombarded constantly by millions of pieces of information from the combined stimuli that surround you at any given moment. It is impossible for your brain to process all of it, so your brain organizes this barrage of sensory data into sets of information that yield form and meaning. That's what psychologists refer to as *perception*.

Clearly, your level of *consciousness*, also commonly referred to as your *state of awareness*, governs to a large extent what you perceive and how your brain organizes it. As you go through your day, night, week, year, and life, you experience many and varied states of awareness: you concentrate (or not), daydream, fantasize, sleep, dream; maybe you've been hypnotized at some point or used psychoactive drugs (even caffeine and nicotine are psychoactive drugs!). These varying mental conditions are all altered states of consciousness that produce changes in your perceptions of the world that, in turn, influence your behavior.

Within the research areas of perception and consciousness, some of the most influential and interesting studies have focused on perceptual abilities in early childhood, sleep, dreams, and hypnosis. This section begins with a famous and influential study that contributed a brilliant and remarkable method that allows researchers to study the thinking processes, the *perceptions*, of preverbal infants as young as a few days old. This method, called *preference looking*, provides insights into the functioning of infants' brains and how they conceptualize the world. The second reading contains two articles that changed psychology because they (1) discovered rapid eye movement (REM) sleep and (2) revealed the relationship between REM and dreaming. Third is an influential and controversial study proposing that dreams are not mysterious messages from your unconscious, as Freud and others suggested (and as you probably believe), but rather that dreams are the result of purely random, electrochemical impulses firing off in your brain while you sleep. Fourth is one of many studies that have influenced traditional psychological thinking by making a case *against* the widespread belief that hypnosis is a unique and powerful altered state of consciousness. This last study offers evidence suggesting that hypnotized people are no different from normally awake people—they are just a bit more motivated to behave in certain ways.

Reading 5: TAKE A LONG LOOK

Fantz, R. L. (1961). The origin of form perception. *Scientific American, 204*(May), 61–72.

If you want to know about other people's perceptions of the world around them, an easy way to find out is to ask them. Depending, of course, on exactly what you ask, they will often tell you. But have you ever tried to ask this of an infant? As much as infants may seem, at times, to be trying to tell you what they are thinking and perceiving, they cannot; they can't talk; they probably could not tell you very much if they could; and, most likely, they couldn't even understand your question!

If you have had the opportunity to spend time around infants (and you all likely have to varying degrees), you may have often thought to yourself, "I wonder what this baby is thinking!" or "If only this baby could talk . . . ." Unfortunately, that's not going to happen (John Travolta's series of *Look Who's Talking* movies aside). But psychologists' interest in studying and understanding infants has been a top priority throughout psychology's history (this book contains seven studies that have focused on infants).

However, in Robert Fantz's discoveries that we will discuss in this chapter, the questions that plagued the researchers were "How can we study an infant's cognitive processes?" "How can we catch a real glimpse inside very young babies' brains to see what might be going on, what they are perceiving, and how much they really understand?"

In the 1950s, Robert L. Fantz, a psychologist at Western Reserve University in Cleveland (now, Case Western Reserve University), noticed something very interesting about infants; however, these were not human infants but newly hatched chicks—that's right: chickens. Fantz reported that almost immediately upon breaking out of their shell, chicks perceive their environment well enough to begin searching and pecking for food. (See "Watch Out for the Visual Cliff!" in the previous group of readings for more about the perceptual talents of chicks.) This suggested to Fantz that chicks, in some ways, actually have superior perceptual abilities than human infants, making the chicks ideal subjects for research in this area. That said, it is important to note that when psychologists study nonhuman animals, their ultimate goal is to apply what they learn to our understanding of *human* behavior, but we will further discuss that issue later.

THEORETICAL PROPOSITIONS

Prior to Fantz's studies, research had clearly demonstrated that human infants are able to perceive the world around them in some rudimentary ways, such as the ability to see light, discriminate basic colors, and detect movement. However, as Fantz pointed out, "It has often been argued that they cannot respond to such stimuli as shape, pattern, size, or solidity; in short, they cannot perceive *form*" (p. 66). But Fantz was skeptical of this argument, so in the late 1950s and early 1960s he set about developing a new research technique that would allow researchers to study in greater detail what infants can perceive; to pinpoint when perceptual skills develop; and to determine the degree of complexity of their perceptual skills. He proposed that human infants, from the moment of birth, not entirely unlike newly hatched chicks, are actually able to perceive various forms, and this can be demonstrated by observing how babies "analyze" their world—that is, *what* they look at and for *how long* they look at it. This method of studying infants' mental abilities, called *preferential looking*, swept through the psychology world and began a revolution, that continues today, into understanding the minds of infants.

METHOD

It wasn't difficult for Fantz to demonstrate some of what newly hatched chicks could and could not perceive. Fantz simply presented the chicks, before they had any experience pecking for real food, with objects of different shapes and sizes and recorded how often they pecked at each one. They pecked significantly more often at round shapes versus pyramid shapes; circles more than triangles; spheres more than flat disks; and when shapes of various sizes of circles were presented, they preferred those that were about $\frac{1}{8}$ inch in diameter over larger or smaller sizes. Without any previous learning, chicks were able to perceive form, and they clearly preferred shapes most like potential food: seeds or grain.

Fantz expressed in his article what you are probably thinking right now: "Of course, what holds true for birds does not necessarily apply to human beings" (p. 67). He considered the possibility that this innate ability in birds to perceive form (and this is true of many bird species) may not have developed during the evolution of primates (including humans), or that perhaps primates acquire such abilities only after a period of development or learning following birth. So, when Fantz turned his attention to primate infants, he needed a new research method because, obviously, primate infants do not peck at anything, and they don't have the motor development to do so even if they are so inclined (which they aren't because infants are not terribly fond of grain and seeds).

Infants do engage in one behavior, however, that might allow them to be tested in a similar way to the chicks: they *stare* at things. If Fantz could figure out a way to see if they stare at some forms predictably more often or longer than others, the only explanation would be that they could tell the difference, that they could perceive form. Working at first with infant chimpanzees, the primate genetically most closely related to humans, Fantz and his associates developed what he called a "looking chamber," which was basically a padded, comfortable bassinette inside of a large, plain box. In the top panel of the box were two openings for presenting objects to the infants and peepholes allowing the researchers to observe the looking behavior of the infants. When the researchers ascertained that infant chimps appeared to show a systematic preference for certain objects over others (determined by duration of staring), they applied the same basic techniques to studying human babies.

The researchers did nothing to interfere with the babies' usual schedule or activities but simply placed the infants into the comfortable, padded viewing box and presented various pairs of object for them to look at. The infants ranged in age from 1 to 15 weeks of age. The stimuli presented to the babies included solid and textured disks; spheres; an oval with a human face; an oval with the features of a human face jumbled up; and shapes and patterns of varying complexity (see Figure 5-1). The researchers revealed the objects in various paired combinations and observed the total amount of time during each 1-minute trial the infants spent staring at the different pairs of objects, as well as which object within each pair they "preferred" (stared at longer). Their findings provided powerful evidence that babies of all ages possess the ability to perceive and discriminate among diverse forms.

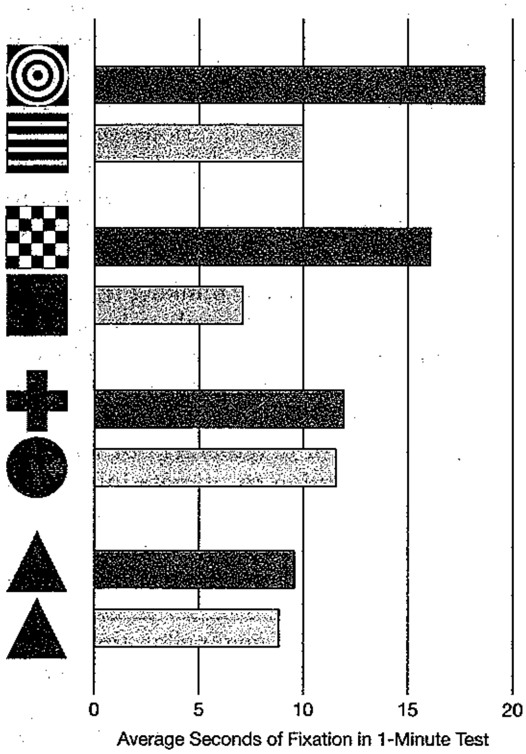

FIGURE 5-1 Infants' interest in form pairs as a function of average looking time for 220 tests. (Source: Fantz, 1961, p. 70.)

RESULTS

For their first round of testing, the babies saw pairs of various black-and-white test patterns, including a square with horizontal stripes and a square with a bull's-eye; a checkerboard and a plain, no-pattern square; a wide plus-sign and a circle; and a pair of identical triangles as control stimuli. The results are graphically illustrated in Figure 5-1. Clearly the infants "preferred" the forms with the greatest complexity (the bull's-eye, stripes, and checkerboard). This degree of preference was the same, *regardless of the infant's age,* which indicates that the ability to discriminate among these forms is innate, present at birth. Beginning at approximately 8 weeks of age, the infants preferred the bull's-eye to the stripes and the checkerboard to the plain square. This time delay implies that either some learning has occurred in those 2 months or that maturation of the brain and/or visual system accounted for the change.

As interesting as these findings were, an important link between the infants' abilities and the earlier studies of the chicks was still missing. If human infants are born with an unlearned, natural ability to discriminate form, we must ask why. For chicks, the answer appears rather straightforward: they perceive the forms that allow them to find nourishment and to survive. How could such an innate ability to perceive specific forms have survival value for human infants? Maybe it is for a similar reason. Fantz wrote:

> In the world of the infant, people have an importance that is perhaps comparable to the importance of grain in the chick's world. Facial pattern is the most distinctive aspect of a person . . . for distinguishing a human being from other objects and identifying him. So, a facelike pattern might be expected to bring out selective perception in an infant if anything could (p. 70).

In other words, human infants do not depend upon form perception for nourishment and survival; they depend on other *people* to care for them. Just as chicks can perceive specific shapes best, it would make sense that infants' perceptual tendencies should favor the human face. And it does.

Fantz's team presented 49 infants between 4 days and 6 months old with three identically sized oval disks. One was painted with the features of a human face, another with those same features scrambled, and the third, the control disk, an oval with just a patch of black at one end equal to the total area of the facial features on the other two disks (see Figure 5-2). The infants

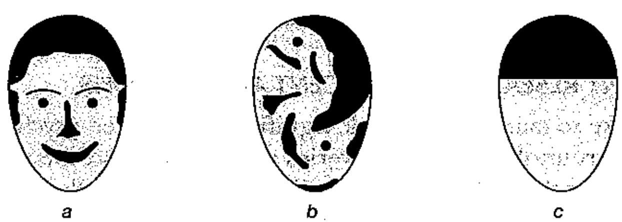

FIGURE 5-2 Fantz's Facial Figure Test. Infants preferred A over B, and strongly preferred A and B over C. (Source: Fantz, 1961, p. 72)

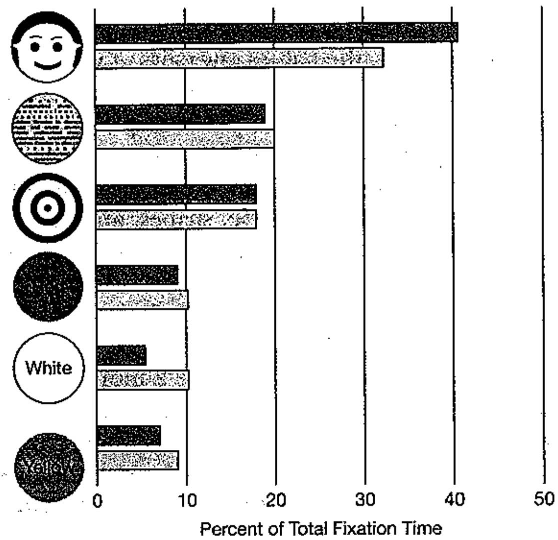

FIGURE 5-3 Infants' looking time for patterns and colors (black bars = 8–12 months; grey bars = over 12 months of age). (Source: Fantz, 1961, p. 72.)

clearly showed greater interest in the ovals with the facial features and stared at them intently while virtually ignoring the control oval. Moreover, this preference was approximately the same strength for all infants *regardless of age*, demonstrating again that basic form perception is present at birth and ruling out a learning or developmental factor.

In the final study reported in this article, the researchers tested the human infants again for their ability to recognize facial forms. The infants were presented with six flat disks, each 6 inches in diameter with the following designs: (1) a human face; (2) a bull's-eye; (3) a random fragment of a printed page (such as a newspaper or textbook); (4) entirely red; (5) entirely fluorescent yellow; and (6) plain white. The time of the infants' first look at each disk was recorded. Which one do you think they looked at the most? If you said "the face," you are correct; they gazed at the human face disk far more than any other form or color (see Figure 5-3).

SUBSEQUENT RESEARCH AND RECENT APPLICATIONS

This study, like so many in this book, significantly changed psychology for two reasons: the groundbreaking discoveries and the method the researcher developed to make those discoveries possible. Until the middle of the 20th century, many behavioral and biomedical researchers assumed that babies were born with few if any perceptual or sensory abilities and that they developed or learned most, if not all, of these skills as they interacted with their environment over time. This idea of the psychologically "empty" newborn was relatively easy to accept because we did not, at the time, possess the necessary research methodologies to reveal very young infants' true capabilities. Fantz gave us preferential-looking methods that, quite literally, opened the doors to the mind of the infant. This method is used so commonly today that it is to psychology what a microscope is to biology: one of the first tools researchers turn to when they want to study how babies think. Of course, the discovery that infants come into the world with various perceptual skills does not reduce the importance of learning and development. But the *inborn* skills researchers have discovered using Fantz's methods appear to set the stage for an infant's future survival and growth. As Fantz points out:

> Innate knowledge of the environment is demonstrated by the preference of newly hatched chicks for forms likely to be edible and by the interest of young infants in kinds of forms that will later aid in object recognition, social responsiveness, and spatial orientation. This primitive knowledge provides a foundation for the vast accumulation of knowledge through experience. (p. 72)

Fantz's discoveries ignited a research revolution into the perceptual abilities of infants. You can see the influence of Fantz's methodological ingenuity throughout the fields of developmental and cognitive psychology. For example, some of the leading researchers in the world in the area of infant cognition, such as Renee Baillargeon at the University of Illinois's Infant Cognition Lab and Elizabeth Spelke at Harvard's Laboratory for Developmental Studies, have made extensive use of Fantz's preference-looking research strategies in many studies (see Talbot, 2006, for a review of this work). In addition, Fantz's work helped clarify when and how well babies can perceive depth and drop-offs as studied in greater detail by Gibson and Walk in their classic research incorporating the visual cliff (see Chapter I).

Probably the most important extension of Fantz's work is credited to Frances Horowitz at the University of Kansas, who discovered that in addition to preferential looking, babies also become bored seeing the same stimulus over and over (Horowitz, & Paden et al., 1972). When you show infants a novel visual pattern (such as those used in Fantz's studies), they gaze at it for a given amount of time, but as you repeatedly present the same stimulus, the amount of time they look predictably decreases. This is called *habituation.* If you then change or alter the pattern, their interest appears to revive and they look at it longer, a response known as *dishabituation.* By combining preferential looking, habituation, and dishabituation methodologies, researchers can now learn a great deal about what very young infants, even newborns, "know" about their world.

For example, in a recent study, researchers wanted to see when humans acquire the ability to distinguish between "possible" objects and "impossible" objects (Shuwarai, Albert, & Johnson, 2007). You undoubtedly have seen so-called impossible objects that we often refer to as optical illusions. Figure 5-4 exemplifies the difference between a possible and impossible object. You looked longer at the impossible one, didn't you? So do babies. Using preferential-looking and duration-of-gaze methods, the researchers found that infants as young a 4 months old indicate an awareness of the difference in that they stared at the

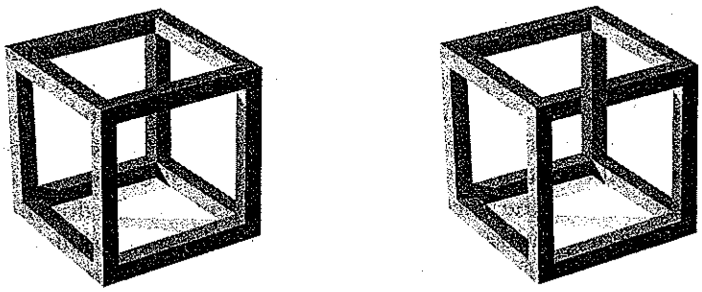

FIGURE 5-4 Babies can distinguish between a possible (a) and impossible (b) object at 4 months old.

impossible object longer, as if to say, "I can see something's wrong with this object and I need to try to figure it out!"

This is just a sample of hundreds of studies conducted every year by developmental psychologists and other behavioral scientists whose fundamental methodologies rest on Robert Fantz's discoveries. These methods are allowing us to peek inside the minds of infants as never before to see what they perceive and how they think. Virtually every time we take another look, we discover that they are "smarter" and perceive more of their world than we ever expected.

Horowitz, F. D., Paden, L., Bhana, K., & Self, P. (1972). An infant-controlled procedure for studying infant visual fixations. *Developmental Psychology, 7,* 90.
Shuwairi, S., Albert, M., & Johnson, S. (2007). Discrimination of possible and impossible objects in infancy. *Psychological Science, 18(4),* 303–307.
Talbot, M. (2006, September 4). The baby lab. *The New Yorker, 82*(27), 91–101.

Reading 6: TO SLEEP, NO DOUBT TO DREAM . . .

Aserinsky, E., & Kleitman, N. (1953). Regularly occurring periods of eye mobility and concomitant phenomena during sleep. *Science, 118,* 273–274. Dement, W. (1960). The effect of dream deprivation. *Science, 131,* 1705–1707.

As you can see, this section is somewhat different from the others in that *two* articles are discussed; this is so because the first study discovered a basic phenomenon about sleeping and dreaming that made the second study possible. The primary focus is William Dement's work on dream deprivation, but to prepare you for that, Aserinsky's findings must be addressed first.

In 1952, Eugene Aserinsky, although a graduate student, was studying sleep. Part of his research involved observing sleeping infants. He noticed that as these infants slept, active eye movements occurred periodically. During the remainder of the night, only occasional slow, rolling eye movements occurred. He theorized that these periods of active eye movements might be associated with dreaming. However, infants could not tell him whether they had been dreaming or not. To test this idea, he expanded his research to include adults.

Aserinsky and his coauthor, Nathaniel Kleitman, employed 20 normal adults to serve as participants. Sensitive electronic measuring devices were connected by electrodes to the muscles around the eyes of these participants. The leads from these electrodes stretched into the next room, where the participants' sleep could be monitored. The participants were then allowed to fall asleep normally (participants participated on more than one night each). During the night, participants were awakened and interrogated, either during periods of eye activity or during periods when little or no eye movement was observed. The idea was to wake the participants and ask them if they had been dreaming and if they could remember the content of the dream. The results were quite revealing.

For all the participants combined, a total of 27 awakenings were done during periods of sleep accompanied by rapid eye movements. Of these, 20 reported detailed visual dreams. The other 7 reported "the feeling of having dreamed" but could not recall the content in detail. During periods of no eye movement, 23 awakenings were instigated; in 19 of these instances, the participants did not report any dreaming, while in the other four, the participants felt vaguely as if they might have been dreaming, but they were not able to describe any dreams. On some occasions, participants were allowed to sleep through the night uninterrupted. It was found that the latter group experienced between three and four periods of eye activity during the average of 7 hours of sleep.

Although it may not have seemed so remarkable at the time, Aserinsky had discovered what is very familiar to most of us now: rapid eye movement (REM) sleep, or dreaming sleep. From his discovery grew a huge body of research on sleep and dreaming that continues to expand. Over the years, as research methods and physiological recording devices have become more sophisticated, we have been able to refine Aserinsky's findings and unlock many of the mysteries of sleep.

For example, we now know that after you fall asleep, you sleep in four stages, beginning with the lightest sleep (Stage 1) and progressing into deeper and deeper stages. After you reach the deepest stage (Stage 4), you begin to move back up through the stages: your sleep becomes lighter and lighter. As you approach Stage 1 again, you enter REM, which is a very different kind of sleep. You do most of your dreaming during REM sleep. However, contrary to popular belief, research has revealed that you do not move around very much during REM. Your body is immobilized by electrochemical messages from your brain that paralyze your muscles. This is most likely an evolutionary survival mechanism that prevents you from acting out your dreams and possibly injuring yourself or worse.

Following a short period in REM, you proceed back into the four stages of sleep called non-rapid-eye-movement sleep (NON-REM, or NREM). During the night, you cycle between NREM and REM about five or six times (your first REM period comes about 90 minutes after falling asleep), with NREM becoming shorter and REM becoming longer (thereby causing you to dream more toward morning). (By the way, everyone dreams. Although a small percentage of individuals never remember dreams, sleep research has determined that we all have them.)

All this knowledge springs from the discovery of REM by Aserinsky in the early 1950s. And one of the leading researchers who followed Aserinsky in giving us this wealth of information on sleeping and dreaming is William Dement of Stanford University. Beginning around the time of Aserinsky's findings, Dement was beginning his decades of groundbreaking research into sleeping and dreaming.

THEORETICAL PROPOSITIONS

What struck Dement as most significant was the discovery that dreaming occurs every night in everyone. As Dement states in his article, "Since there appear to be no exceptions to the nightly occurrence of a substantial amount of dreaming in every sleeping person, it might be asked whether or not this amount of dreaming is in some way a necessary and vital part of our existence" (p. 1705). This led him to ask some obvious questions: "Would it be possible for human beings to continue to function normally if their dream life were completely or partially suppressed? Should dreaming be considered necessary in a psychological sense or a physiological sense or both?" (p. 1705).

Dement decided to try to answer these questions by studying participants who had somehow been deprived of the chance to dream. At first he tried using depressant drugs to prevent dreaming, but the drugs themselves produced too great an effect on the participants' sleep patterns to allow for valid results. Finally, he decided on a novel method of preventing dreaming by waking participants up every time they entered REM sleep during the night.

METHOD DRASTIC

Dement's article reported on the first eight participants in an ongoing sleep and dreaming research project. The participants were all males ranging in age from 23 to 32. A participant would arrive at the sleep laboratory around his usual bedtime. Small electrodes were attached to the scalp and near the eyes to record brain-wave patterns and eye movements. As in the Aserinsky study, the wires to these electrodes ran into the next room so that the participant could sleep in a quiet, darkened room.

The procedure for the study was as follows: For the first several nights, the participant was allowed to sleep normally for the entire night. This was done to establish a baseline for each participant's usual amount of dreaming and overall sleep pattern. Once this information was obtained, the next step was to deprive the participant of REM or dream sleep. Over the next several nights (the number of consecutive deprivation nights ranged from three to seven for the various participants), the experimenter would awaken the participant every time the information from the electrodes indicated that he had begun to dream. The participant was required to sit up in bed and demonstrate that he was fully awake for several minutes before being allowed to go back to sleep.

An important point mentioned by Dement was that the participants were asked not to sleep at any other times during the dream study. This was because if participants slept or napped, they might dream, and this could contaminate the findings of the study.

Following the nights of dream deprivation, participants entered the *recovery phase* of the experiment. During these nights, the participants were allowed to sleep undisturbed throughout the night. Their periods of dreaming continued to be monitored electronically, and the amount of dreaming was recorded as usual.

Next, each participant was given several nights off (something they were very glad about, no doubt!). Then six of them returned to the lab for another series of interrupted nights. These awakenings "exactly duplicated the dream-deprivation nights in number of nights and number of awakenings per night. The only difference was that the participant was awakened in the intervals between eye-movement (dream) periods. Whenever a dream period began, the participant was allowed to sleep on without interruption and was awakened only after the dream had ended spontaneously" (p. 1706). Participants again had the same number of recovery nights as they did following the dream-deprivation phase. These were called *control recovery* and were included to eliminate the possibility that any effects of dream deprivation were not due simply to being awakened many times during the night, whether dreaming or not.

RESULTS

Table 6-1 summarizes the main findings reported. During the baseline nights, when participants were allowed to sleep undisturbed, the average amount of sleep per night was 6 hours and 50 minutes. The average amount of time the

TABLE 6-1 Summary of Dream-Deprivation Results

PARTICIPANT	1. PERCENT DREAM TIME: BASE-LINE	2. NUMBER OF DREAM DEPRIVATION NIGHTS	3a. NUMBER OF AWAKENINGS FIRST NIGHT	3b. NUMBER OF AWAKENINGS LAST NIGHT	4. PERCENT DREAM-OF TIME: RECOVERY	5. PERCENT DREAM-OF TIME: CONTROL
1.	19.5	5	8	14	34.0	15.6
2.	18.8	7	7	24	34.2	22.7
3.	19.5	5	11	30	17.8	20.2
4.	18.6	5	7	23	26.3	18.8
5.	19.3	5	10	20	29.5	26.3
6.	20.8	4	13	20	29.0	—
7.	17.9	4	22	30	19.8 (28.1)*	16.8
8.	20.8	3	9	13	—**	—
Average	19.5	4.38	11	22	26.6	20.1

*Second recovery night.

**Participant dropped out of study before recovery nights.

(Adapted from p. 1707)

participants spent dreaming was 80 minutes, or 19.5% (see Table 1, column 1). Dement discovered in these results from the first several nights that the amount of time spent dreaming was remarkably similar from participant to participant. In fact, the amount of variation among the dreamers was only plus or minus 7 minutes!

The main point of this study was to examine the effects of being deprived of dreaming, or REM, sleep. The first finding to address this was the number of awakenings required to prevent REM sleep during the dream-deprivation nights. As you can see in Table 6-1 (column 3a), on the first night, the experimenter had to awaken the participants between 7 and 22 times in order to block REM. However, as the study progressed, participants had to be awakened more and more often in order to prevent them from dreaming. On the last deprivation night, the number of forced awakenings ranged from 13 to 30 (column 3b). On average, there were twice as many attempts to dream at the end of the deprivation nights.

The next and perhaps most revealing result was the increase in dreaming time after the participants were prevented from dreaming for several nights. The numbers in Table 6-1 (column 4) reflect the first recovery night. The average total dream time on this night was 112 minutes, or 26.6% (compared with 80 minutes and 19.5% during baseline nights in column 1). Dement pointed out that two participants did not show a significant increase in REM (participants 3 and 7). If they are excluded from the calculations, the average total dream time is 127 minutes, or 29%. This is a 50% increase over the average for the baseline nights.

Although only the first recovery night is reported in Table 6-1, it was noted that most of the participants continued to show elevated dream time (compared with baseline amounts) for five consecutive nights.

"Wait a minute!" you're thinking. Maybe this increase in dreaming has nothing to do with REM deprivation at all. Maybe it's just because these participants were awakened so often. You'll remember that Dement planned for your astute observation. Six of the participants returned after several days of rest and repeated the procedure exactly, except they were awakened between REM periods (the same number of times). This produced no significant increases in dreaming. The average time spent dreaming after the control awakenings was 88 minutes, or 20.1% of the total sleep time (column 5). When compared to 80 minutes, or 19.5%, in column 1, no significant difference was found.

DISCUSSION

Dement tentatively concluded from these findings that we need to dream. When we are not allowed to dream, there seems to be some kind of pressure to dream that increases over successive dream-deprivation nights. This was evident in his findings from the increasing number of attempts to dream following deprivation (column 3a vs. column 3b) and in the significant increase in dream time (column 4 vs. column 1). He also notes that this increase continues over several nights so that it appears to make up in quantity the approximate amount of lost dreaming. Although Dement did not use the phrase at the time, this important finding has come to be known as the *REM-rebound* effect.

Several interesting additional discoveries were made in this brief, yet remarkable article. If you return to Table 6-1 for a moment, you'll see that two participants, as mentioned before, did not show a significant REM-rebound effect (participants 3 and 7). It is always important in research incorporating a relatively small number of participants to attempt to explain these exceptions. Dement found that the small increase in participant 7 was not difficult to explain: "His failure to show a rise on the first recovery night was in all likelihood due to the fact that he had imbibed several cocktails at a party before coming to the laboratory, so the expected increase in dream time was offset by the depressing effect of the alcohol" (p. 1706).

Participant 3, however, was more difficult to reconcile. Although he showed the largest increase in the number of awakenings during deprivation (from 7 to 30), he did not have any REM rebound on any of his five recovery nights. Dement acknowledged that this participant was the one exception in his findings and theorized that perhaps he had an unusually stable sleep pattern that was resistant to change.

The eight participants were monitored for any behavioral changes that they might experience due to the loss of REM sleep. All the participants developed minor symptoms of anxiety, irritability, or difficulty concentrating during the REM interruption period. Five of the participants reported a clear increase in appetite during the deprivation, and 3 of these gained 3 to 5 pounds. None of these behavioral symptoms appeared during the period of control awakenings.

SIGNIFICANCE OF THE FINDINGS AND SUBSEQUENT RESEARCH

More than 40 years after this preliminary research by Dement, we know a great deal about sleeping and dreaming. Some of this knowledge was discussed briefly and previously in this chapter. We know that most of what Dement reported in his 1960 article has stood the test of time. We all dream, and if we are somehow prevented from dreaming one night, we dream more the next night. There does indeed appear to be something basic in our need to dream. In fact, the REM-rebound effect can be seen in many animals.

One of Dement's accidental findings, one that he reported only as a minor anecdote, now has greater significance. One way that people may be deprived of REM sleep is through the use of alcohol or other drugs, such as amphetamines and barbiturates. Although these drugs increase your tendency to fall asleep, they suppress REM sleep and cause you to remain in the deeper stages of NREM for greater portions of the night. For this reason many people are unable to break the habit of taking sleeping pills or alcohol in order to sleep. As soon as they stop, the REM-rebound effect is so strong and disturbing that they become afraid to sleep and return to the drug to avoid dreaming. An even more extreme example of this problem occurs with alcoholics who may have been depriving themselves of REM sleep for years. When they stop drinking, the onset of REM rebound may be so powerful that it can occur while they are *awake!* This may be an explanation for the phenomenon known as *delirium tremens* (DTs), which usually involve terrible and frightening hallucinations during withdrawal (Greenberg & Perlman, 1967).

Dement spent decades following up on his early preliminary findings regarding the behavioral effects of dream deprivation. In his later work, he deprived participants of REM for much longer periods of time and found no evidence of harmful changes. He concluded that "[a] decade of research has failed to prove that substantial ill effects result even from prolonged selective REM deprivation" (Dement, 1974).

Research with its origins in Dement's early work reported here suggests that a greater synthesis of proteins takes place in the brain during REM sleep than during NREM sleep. Some believe that these chemical changes may represent the process of integrating new information into the memory structures of the brain and may even be the organic basis for new developments in personality (Rossi, 1973).

RECENT APPLICATIONS

Most experts in the field of sleep and dreaming credit Aserinsky with the discovery of REM sleep. Most studies relating to sleeping, dreaming, or sleep disorders attribute that basic fact to him. Consequently, his early work with Kleitman is frequently cited in many recent scientific articles.

Dement's extension of Aserinsky's work continues to be cited frequently in a wide range of research articles relating to sleep patterns. One such recent study made the remarkable discovery that humans may dream during NREM sleep more than we thought (Suzuki, et al., 2004). Using daytime napping, during which we tend to enter NREM sleep sooner than during normal nighttime sleep, the researchers found that when participants were asked to report on dreams during naps consisting only of NREM sleep they were frequently able to do so. However, the researchers also found that "dream reports from NREM naps were less remarkable in quantity, vividness, and emotion than those from REM naps" (p. 1486).

Another article relying on Dement's 1960 research examined REM during daytime sleep, following a night without any sleep at all (Werth et al., 2002). These researchers found that, compared to nighttime sleep, daytime sleep produces significantly different REM patterns. For example, the number of awakenings needed to prevent REM only doubled at first and then stopped increasing completely. Also, participants displayed only a small REM rebound effect (11.6% compared to 26.6% in Dement's study). These findings imply that our typical patterns of REM are associated with our natural, biological predisposition toward nighttime sleep. In other words, we humans are *diurnal,* not *nocturnal,* creatures.

CONCLUSION

In 2000, Dement, who continues to oversee a very active sleep medicine research program at Stanford University, published, *The Promise of Sleep: A Pioneer in Sleep Medicine Explores the Vital Connection Between Health, Happiness and a Good Night's Sleep*. In this book, written for the nonscientist, Dement draws upon his four decades of research on sleep and applies his vast accumulation of knowledge to helping all of us understand the vital importance of quality sleep and how to achieve it. In his book, Dement (2004) describes us as a "sleep-sick society" and sets forth his goals as a sleep researcher:

> For most of my career . . . I have worked unceasingly to change the way society deals with sleep. Why?
>
> Because the current way, or nonway, is so very bad . . . . It greatly saddens me to think about the millions, possibly billions, of people, whose lives could be improved if they understood a few simple principles.
>
> Changing the way society and its institutions deal with sleep will do more good than almost anything else I can conceive, or certainly that was ever remotely in my grasp to accomplish. (pp. 4–5)

To learn more about Dement's ongoing work at Stanford University's Center for Human Sleep Research, see http://med.stanford.edu/school/psychiatry/humansleep.

Dement, W. C. (1974). *Some must watch while some must sleep.* San Francisco, CA: Freeman.

Dement. W. C. (2000). *The promise of sleep: A pioneer in sleep medicine explores the vital connection between health, happiness and a good night's sleep.* New York: Dell.

Greenberg, R., & Perlman, C. (1967). Delirium tremens and dreaming. *American Journal of Psychiatry, 124,* 133–142.

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Werth, E., Coth, K., Gallman, E., Borbely, A., & Acherman, P. (2002). Selective REM sleep deprivation during daytime—I. Time course interventions and recovery. *American Journal of Physiology: Regulatory integrative and comparative physiology, 283,* R521–R526.

Reading 7: UNROMANCING THE DREAM

Hobson, J. A., & McCarley, R. W. (1977). The brain as a dream-state generator: An activation-synthesis hypothesis of the dream process. *American Journal of Psychiatry, 134,* 1335–1348.

The work of Aserinsky and Dement explored the apparent need for dreaming sleep in humans. Other research has examined the reasons why you dream and some of the functions dreaming might serve. The history of research on dreaming has been dominated by the belief that dreams reveal something about yourself: they are products of your inner psychological experience of the world. This view can be traced back to Sigmund Freud's psychoanalytic theories of human nature.

You'll recall that Freud believed that dreams are the expression of unconscious wishes for things we are unable to have while awake. Therefore, dreams offer insights into the unconscious that are unavailable in waking thought. However, the psychoanalytic approach also contends that many of these wishes are unacceptable to the conscious mind and, if expressed openly in dreams, would disrupt sleep and create anxiety. Thus, to protect the individual, the true desires contained in the dream are disguised in the dream's images by a hypothetical censor. Consequently, the theory asserts that the true meaning of most dreams lies hidden beneath the dream's outward appearance. Freud called this surface meaning of a dream the *manifest content* and the deeper, "hidden" meaning the *latent content.* In Freud's view, to reveal the meaningful information of a dream, the manifest content must be interpreted, analyzed, and penetrated.

Although the validity of a great portion of Freud's work has been drawn into serious question by behavioral scientists over the past 50 years, his conceptualization of dreams remains widely accepted by Western culture in general. (See Reading 30 on Anna Freud for a discussion of other enduring aspects of Freud's theories.) Almost everyone has had the experience of remembering an unusual dream and thinking "I wonder what it really means!" We believe that our dreams have deep meaning about conflicts that are hidden in the unconscious parts of our psyches.

In the late 1970s, Allan Hobson and Robert McCarley, both psychiatrists and neurophysiologists at Harvard's medical school, published a new theory of dreaming that shook the scientific community so deeply that the tremors are still being felt today. What they said, in essence, was that dreams are nothing more than your attempt to interpret random electrical impulses produced automatically in your brain during REM sleep.

They proposed that while you are asleep, a part of your brain, located in the brain stem, is periodically activated and produces electrical impulses. This part of your brain is related to physical movement and the processing of input from your senses while you are awake. When you are asleep, your sensory and motor abilities are shut down, but this part of your brain is not. It continues to generate what Hobson and McCarley regarded as meaningless bursts of neural static. Some of these impulses reach other parts of your brain, responsible for higher functions such as thinking and reasoning. When this happens, your brain tries to synthesize and make some sort of sense out of the impulses. To do this, you sometimes create images, ideas, and even stories with plots. If we awaken and remember this cognitive activity, we call it a dream and invest it with all kinds of significance which, according to Hobson and McCarley, was never there.

Hobson and McCarley's original article, upon which this discussion is based, is a highly technical account of the neurophysiology of sleep and dreaming. Although their work can be found in nearly all textbooks that include information about dreaming, very little of the detail is offered there, due to the complex nature of the researchers' reporting. We explore their article in significantly greater detail, although for clarity and understanding, considerable distillation and simplification are unavoidable.

THEORETICAL PROPOSITIONS

Hobson and McCarley believed that modern neurophysiological evidence "permits and necessitates important revisions in psychoanalytic dream theory. The activation-synthesis hypothesis . . . asserts that many formal aspects of the dream experience may be the obligatory and relatively undistorted psychological concomitant of the regularly recurring and physiologically determined brain state called 'dreaming sleep'" (p. 1335). What they meant by this was simply that dreams are triggered automatically by basic physiological processes, and there is no *censor* distorting the true meaning to protect you from your unconscious wishes. Moreover, they contend that the strangeness and distortions often associated with dreams are not disguises, but rather they are the results of the physiology of how the brain and mind work during sleep.

The most important part of their theory was that the brain becomes activated during REM sleep and generates its own original information. This activation is then compared with stored memories in order to synthesize the activation into some form of dream content. In other words, Hobson and McCarley claim that what is referred to as REM sleep actually causes dreaming, instead of the opposing popular view that dreams produce REM sleep.

METHOD

In their article, Hobson and McCarley incorporated two methods of research. One method was to study and review previous work by many researchers in the area of sleep and dreaming. In this single article, the authors cite 37 references that pertain to their hypothesis, including several earlier studies of their own. The second method they used was research on the sleep and dreaming patterns of animals. They did not try to claim that nonhuman animals dream, because this is something no one can know for sure. (You may believe your pet dreams, but has your dog or cat ever told you what the dream was about?) However, all mammals experience stages of sleep similar to those in humans. Hobson and McCarley went one step further and claimed that no significant difference can be found between humans and other animals in the physiology of dreaming sleep. So they chose cats for their experimental participants. Using various laboratory techniques, they were able to stimulate or inhibit certain parts of the animals' brains and record the effect on dreaming sleep.

RESULTS AND DISCUSSION

The various findings detailed by Hobson and McCarley were used to demonstrate different aspects of their theory. Therefore, their results will be combined with their discussion of the findings here. The evidence generated by the researchers in support of their theory can be summarized in the following points:

1. The part of the brain in the brain stem that controls physical movement and incoming information from the senses is at least as active during dreaming sleep (which they called the *D state*) as it is when you are

awake. However, while you are asleep, sensory input (information coming into your brain from the environment around you) and motor output (voluntary movement of your body) are blocked. Hobson and McCarley suggest that these physiological processes, rather than a psychological censor, may be responsible for protecting sleep.

You will remember from the preceding reading, "To Sleep, No Doubt to Dream," that you are paralyzed during REM dreaming, presumably to protect you from the potential danger of acting out your dreams. Hobson and McCarley reported that this immobilization actually occurs at the spinal cord and not in the brain itself. Therefore, the brain is quite capable of sending motor signals, but the body is not able to express them. The authors suggested that this may account for the strange patterns of movement in dreams, such as your inability to run from danger or the perception that you are moving in slow motion.

2. The main exception to this blocking of motor responses is in the muscles and nerves controlling the eyes. In part, this explains why rapid eye movement occurs during D state, and it may also explain how visual images are triggered during dreaming.
3. Hobson and McCarley pointed out another aspect of dreaming that emerged from a physiological analysis of the D state and that could not be explained by a psychoanalytic interpretation. This was that the brain enters REM sleep at regular and predictable intervals during each night's sleep and remains in that state for specific lengths of time. Nothing is random about this sleep cycle. The authors interpreted this to mean that dreaming cannot be a response to waking events or unconscious wishes, because this would produce dreaming at any moment during sleep, according to the whims and needs of the person's psyche. Instead, the D state appeared to Hobson and McCarley to be a preprogrammed event in the brain that functions almost like a neurobiological clock.
4. The researchers pointed to findings by others that demonstrated that all mammals cycle through REM and NREM sleep. This sleep cycle varies according to the body size of the animal. A rat, for example, will shift between REM and NREM every 6 minutes, while for an elephant a single cycle takes two-and-a-half hours! One explanation for this difference may be that the more vulnerable an animal is to predators, the shorter are its periods of sound sleep during which it is less alert and thus in greater danger of attack. Whatever the reason, Hobson and McCarley took these findings as additional evidence that dreaming sleep is purely physiological.
5. Hobson and McCarley claimed to have found the trigger, the power supply, and the clock of the "dream state generator" in the brain. They reported this to be the pontine brain stem, located in the back and near the base of the brain. Measurements of neural activity (i.e., the brain-chemical activity of neurotransmitters and the frequency of the firing of neurons) in this part of the brain in cats revealed significant peaks in activity corresponding

to periods of REM sleep. When this part of the brain was artificially inhibited, the animals went for weeks without any REM sleep. Furthermore, reducing the activity of the pontine caused the length of time between periods of D state sleep to increase. Conversely, stimulation of the brain stem caused REM sleep to occur earlier and increased the length of REM periods. Such increases in REM have been attempted through conscious behavioral techniques, but these have been mostly unsuccessful. The authors' interpretation of these findings was that because a part of the brain completely separate from the pontine brain stem is involved in consciousness, dreaming cannot be driven by psychological forces.

6. The first five points summarized from Hobson and McCarley's research focused on the *activation* portion of their theory. They maintained that the *synthesis* of this activation is what produces your experience of dreaming. The psychological implications of their theory were detailed by the authors in four basic tenets:
   a. "The primary motivating force for dreaming is not psychological but physiological, since the time of occurrence and duration of dreaming sleep are quite constant, suggesting a preprogrammed, neurally determined genesis" (p. 1346). They did allow that dreams may have psychological meaning, but they suggested that this meaning is much more basic than the psychoanalytic view imagines it to be. They further contended that dreaming should no longer be considered to have purely psychological significance.
   b. During dreaming, the brain stem is not responding to sensory input or producing motor output based on the world around you; instead it is activating itself internally. Because this activation originates in a relatively primitive part of the brain, it does not contain any ideas, emotions, stories, fears, or wishes. It is simple electrical–chemical transmissions. As the activation reaches the more advanced, cognitive structures of the brain, you try to make sense out of it. "In other words, the forebrain may be making the best of a bad job in producing even partially coherent dream imagery from the relatively noisy signals sent up to it from the brain stem" (p. 1347).
   c. Therefore, this elaboration of random signals into dreams is interpreted to be a constructive process—a synthesis—instead of a distortion process by which unacceptable wishes are hidden from your consciousness. Images are called up from your memory in an attempt to match the data generated by the brain stem's activation. It is precisely because of the randomness of the impulses, and the difficult task of the brain to try to inject them with some meaning, that dreams are often bizarre, disjointed, and seemingly mysterious.
   d. Freud's explanation for our forgetting dreams was repression. He believed that when the content of a dream is too disturbing for some reason, you are motivated to forget it. Hobson and McCarley,

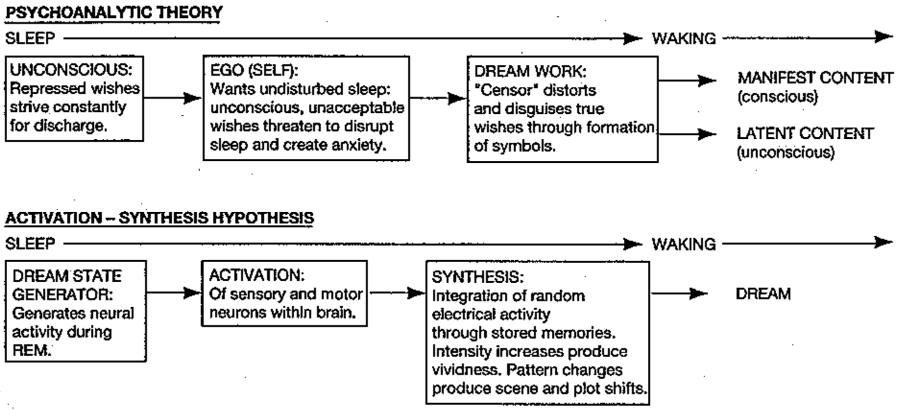

FIGURE 7-1 Psychoanalytic theory and activation-synthesis hypothesis compared. (Adapted from p. 1346)

acknowledging that dream recall is poor (at least 95% of all dreams are not remembered), offered a purely physiological explanation that was concordant with the rest of their activation–synthesis hypothesis. They claimed that when we awaken, the chemistry of the brain undergoes an immediate change. Certain brain chemicals necessary for converting short-term memories into long-term ones are suppressed during REM sleep. So unless a dream is particularly vivid (meaning that it is produced by a large amount of activation) and you awaken during or immediately after it, the content of the dream will not be remembered.

Figure 7-1 illustrates Hobson and McCarley's comparison between the psychoanalytic view of the dream process and their activation-synthesis model.

IMPLICATIONS AND RECENT APPLICATIONS

Hobson and McCarley have continued to conduct research in support of their revolutionary hypothesis of dreaming. Their new conceptualization has not been universally accepted, but no psychological discussion of dreaming would be considered complete without its inclusion.

Twelve years after the appearance of Hobson and McCarley's original article on the activation–synthesis model, Allan Hobson published his book called, simply, *Sleep*. In this work, he explains his theory of dreaming in expanded and greatly simplified terms. He also elaborates on his view about what impact the theory may have on the interpretation of dream content. And, he allows, dreams are not devoid of meaning, but should be interpreted in more straightforward ways. Hobson states his view as follows:

> For all their nonsense, dreams have a clear import and a deeply personal one. Their meaning would stem, I assert, from the necessity in REM sleep for the

> brain-mind to act upon its own information and according to its own lights. Thus, I would like to retain the emphasis of psychoanalysis upon the power of dreams to reveal deep aspects about ourselves, but without recourse to the concept of disguise and censorship or to the now famous Freudian symbols. My tendency, then, is to ascribe the nonsense to brain-mind dysfunction and the sense to its compensatory effort to create order out of chaos. That order is a function of our own personal view of the world, our current preoccupations, our remote memories, our feelings, and our beliefs. That's all. (Hobson, 1989, p. 166)

Another dream researcher took Hobson's sentiments a step further. Foulkes (1985), a leading researcher on daydreaming, also subscribes to the notion that night dreams are generated by spontaneous brain activity during sleep. He has suggested that although dreams do not contain hidden unconscious messages, they may provide us with a great deal of psychological information. Foulkes maintains that the way your cognitive system places form and sense onto the random impulses in your brain reveals information about the importance of certain of your memories and provides insight into your thinking processes. He also believes that dreams serve several useful purposes. One of these arises from dreams you have about experiences that have not actually happened to you. These dreams may assist in preparing you to encounter new or unexpected events—something like a cognitive rehearsal, or "What would I do if . . . ?"

And the research continues. Many studies seek to challenge Hobson and McCarley's conceptualization of the origin and function of dreams. One such study demonstrated how the controversy among sleep and dream theorists lives on. Various individuals in the Freudian-based, psychoanalytic community continues to express their annoyance that Hobson and McCarley's theories leave little room for the Freudian view that dreams are messages from the unconscious. In a journal devoted to Freudian psychoanalysis, Mancia (1999) demonstrates the differences between the psychoanalytic notion of dreaming and the theory proposed by Hobson and McCarley, often referred to as the "neuroscientific" approach. Mancia describes the clash between these two fundamental views with great clarity:

> Whereas the neuroscientists are interested in the structures involved in dream production and in dream organization and narratability; psychoanalysis concentrates on the meaning of dreams and on placing them in the context of the analytic relationship [with the analyst] in accordance with the affective [emotional] history of the dreamer . . . . The brain structures and functions of interest to the neurosciences . . . are irrelevant to their psychoanalytic understanding. (p. 1205)

Of course, Hobson and McCarley very likely would reply that no "psychoanalytic understanding" is possible because no unconscious exists, at least in the Freudian conceptualization of it. That debate, although well worth having, must be saved for another time and place.

A fascinating study citing Hobson and McCarley's study shed some interesting new light on sleep and dreaming. In an article entitled "A Jekyll and Hyde Within," researchers examined hundreds of reports about dreams that occurred during REM sleep as well as dreams that appeared to occur during the early stages of NREM sleep (McNamara, et al., 2005). The researchers focused their analysis of the dreams on social interactions that occurred in the dream reports. They then compared aggressive versus friendly dream social interactions and found some surprising results. Twice as many aggressive interactions occurred in REM sleep dream reports compared to NREM reports (an interesting side note was that none of the dream reports included sexually related interactions).

CONCLUSION

Whether or not you are willing to accept the rather less romantic view of dreaming developed by Hobson and McCarley's research, this is an excellent example of how psychologists or scientists in any field need to remain open to new possibilities even when the established order has existed for decades. Without a doubt, the activation–synthesis model of dreams has changed psychology. This does not mean that we have solved all the mysteries of sleep and dreaming, and perhaps we never will. But it's bound to be a fascinating journey.

Foulkes, D. (1985). *Dreaming: A cognitive-psychological analysis.* Hillsdale, NJ: Erlbaum.
Hobson, J. A. (1989). Sleep. New York: Scientific American Library.
Mancia, M. (1999). Psychoanalysis and the neurosciences: A topical debate on dreams. *International Journal of Psychoanalysis,* 80(6), 1205–1213.
McNamara, P., McLaren, D., & Smith, D., et al. (2005). A "Jekyll and Hyde" within: Aggressive versus friendly interactions in REM and non-REM dreams. *Psychological Science,* 16(2), 130–136.

Reading 8: ACTING AS IF YOU ARE HYPNOTIZED

Spanos, N. P. (1982). Hypnotic behavior: A cognitive, social, psychological perspective. *Research Communications in Psychology, Psychiatry, and Behavior, 7,* 199–213.

The alterations in consciousness with which we are all most familiar are related to sleep and dreaming. The two previous readings have focused on highly influential studies relating to these topics. Another phenomenon relating to altered states of consciousness is hypnosis. Most people see hypnosis as a mysterious and powerful process of controlling a the mind. The phrases and words that surround hypnosis, such as *going under* and *trance,* indicate that it is commonly considered to be a separate and unique state of awareness, different from both waking and sleep. And many psychologists support this view to varying degrees. Nicholas Spanos (1942–1994), however, led an opposing view that hypnosis is, in reality, nothing more than an increased degree of motivation to perform certain behaviors and can be explained fully without invoking notions of trances or altered states.

The beginnings of hypnosis are usually traced back to the middle of the 18th century, a time when mental illness was first recognized by some as stemming from psychological rather than organic causes. One of the many influential individuals who helped bring psychology out of the realm of witchcraft and devil possession was Franz Anton Mesmer (1733–1815). He believed that "hysterical disorders" were a result of imbalances in a "universal magnetic fluid" present in the human body. During strange gatherings in his laboratory, soft music would play, the lights would dim, and Mesmer, costumed like Dumbledore, would take iron rods from bottles of various chemicals and touch parts of afflicted patients' bodies. He believed that these elements and chemicals would transmit what he called the "animal magnetism" into the patients and provide relief from their symptoms. Interestingly, history has recorded that in many cases this treatment appears to be successful (probably due to placebo effects). It is from Mesmer that we acquired the word *mesmerize,* and many believe that his treatment included some of the techniques we now associate with hypnosis.

Throughout the history of psychology, hypnosis (named after *Hypnos,* the Greek god of sleep) has played a prominent role, especially in the treatment of psychological disorders, and it was a major component in Freud's psychoanalytic techniques. Ernest Hilgard (1904–2001) was at the forefront of modern researchers who support the position that hypnosis is an altered psychological state (see Hilgard, 1978; Kihlstrom, 1998). His and others' descriptions of hypnosis have included characteristics such as increased susceptibility to suggestion, involuntary performance of behaviors, improvements in recall, increased intensity of visual imagination, dissociation (the psychological separation from a person's current environmental reality), and analgesia (lowered sensitivity to pain). Until the 1970s, the idea that hypnosis is capable of producing thoughts, ideas, and behaviors that would otherwise be impossible, and that it is an altered state of consciousness, has been virtually undisputed.

However, it is the job of scientists to look upon the status quo with a critical eye and, whenever they see fit, to attempt to debunk common beliefs. Just as Hobson and McCarley proposed a new view of dreaming that was radically different from the prevailing and popular one, social psychologist Nicholas Spanos suggested that the major assumptions underlying hypnosis, as set forth by Hilgard and others, should be questioned. In this article Spanos wrote, "The positing of special processes to account for hypnotic behavior is not only unnecessary, but also misleading . . . . Hypnotic behavior is basically similar to other social behavior and, like other social behavior, can be usefully described as strategic and goal-directed" (p. 200). In other words, Spanos contended that hypnotized participants are actually engaging in *voluntary* behavior designed to produce a desired consequence. He further maintained that although such behavior may result from increased motivation, it does *not* involve an altered state of consciousness.

THEORETICAL PROPOSITIONS

Spanos theorized that all the behaviors commonly attributed to a hypnotic trance state are within the normal, voluntary abilities of humans. He maintained that the only reason people define themselves as having been hypnotized is that they have interpreted their own behavior under hypnosis in ways that are consistent with their *expectations* about being hypnotized. Spanos viewed the process of hypnosis as a ritual that in Western cultures carries a great deal of meaning. Participants expect to relinquish control over their own behavior, and as the process of hypnotic induction develops, they begin to believe that their voluntary acts are becoming automatic, involuntary events. An example of this that Spanos offered is that voluntary instructions are given early in the hypnotic procedure to the participant, such as "Relax the muscles in your legs," but later these become involuntary suggestions, such as "Your legs feel limp and heavy."

In collaboration with various colleagues and associates, Spanos devoted nearly a decade of research prior to this 1982 article, demonstrating how many of the effects commonly attributed to hypnotic trances could be explained just as readily (or even more simply) in less mysterious ways.

METHOD

This article does not report on one specific experiment but rather summarizes a group of studies conducted by Spanos and his associates prior to 1982, which were designed to support his position countering Hilgard's contention (and the popular belief) that hypnosis is a unique state of consciousness. Most of the findings reported were taken from 16 studies in which Spanos was directly involved and that offered interpretations of hypnotically produced behavior other than the common assumption of a unique altered state of being.

RESULTS AND DISCUSSION

Spanos claimed that two key aspects of hypnosis lead people to perceive it as an altered state of consciousness. One is that participants interpret their behavior during hypnosis as caused by something other than the self, thus making their actions *seem* involuntary. The second aspect is the belief discussed previously that the "hypnosis ritual" creates expectations in participants, which in turn motivate them to behave in ways that are consistent with their expectations. The findings of the research Spanos reports in this article focus on how these frequently cited claims about hypnosis may be drawn into question.

The Belief That Behavior Is Involuntary

As participants are being hypnotized, they are usually asked to take various tests to determine if a hypnotic state has been induced. Spanos claimed that these tests are often carried out in such a way as to invite the participants to convince themselves that something out of the ordinary is happening. Hypnotic tests involve suggestions, such as "Your arm is heavy and you cannot hold it up"; "Your hands are being drawn together by some force and you cannot keep them apart"; "Your arm is as rigid as a steel bar and you cannot bend it; or "Your body is so heavy that you cannot stand up." Spanos interpreted these test suggestions as containing two interrelated requests. One request asks participants to do something, and the other asks them to interpret the action as having occurred involuntarily. Some participants fail completely to respond to the suggestion. Spanos claimed that these participants do not understand that they must voluntarily do something to initiate the suggested behavior and instead simply wait for their arms or body to begin to move. Other participants respond to the suggestion but are aware that they are behaving voluntarily. Still other participants agree to both requests; they respond to the suggestion and interpret their response as beyond their control.

Spanos suggested that whether participants interpret their behavior to be voluntary or involuntary depends on the way the suggestion is worded. In one of his studies, Spanos put two groups of participants through a hypnosis induction procedure. Then to one group he made various behavior suggestions, such as "Your arm is very light and is rising." To the other group he gave direct instructions for the same behaviors, such as "Raise your arm." Afterward he asked the participants if they thought their behaviors were voluntary or involuntary. The participants in the suggestion group were more likely to interpret their behaviors as involuntary than were those in the direct instruction group.

Right now, while you are reading this page, hold your left arm straight out and keep it there for a couple of minutes. You will notice that it begins to feel heavy. This heaviness is not due to hypnosis; it's due to gravity! So if you are *hypnotized* and given the suggestion that your outstretched arm is becoming heavy, it would be very easy for you to attribute your action of lowering your arm to involuntary forces (you want to lower it anyway!). But what if you are given the suggestion that your arm is light and rising? If you raise your arm, it should be more difficult to interpret that action as involuntary, because you would have to ignore the contradictory feedback provided by gravity. Spanos tested this idea and found that such an interpretation was more difficult. Participants who believed they were hypnotized were significantly more likely to define as involuntary their behavior of arm lowering than that of arm raising. In the traditional view of hypnosis, the direction of the arm in the hypnotic suggestion should not make any difference; it should always be considered involuntary.

Suggestions made to hypnotic participants often ask them to imagine certain situations in order to produce a desired behavior. If you were a participant, you might be given the suggestion that your arm is rigid and you cannot bend it. To reinforce this suggestion, it might be added that your arm is in a plaster cast. Spanos believed that some people may become absorbed in these imaginal strategies more than others, which could have the effect of leading them to believe that their response (the inability to move their arm) was involuntary. His reasoning was that if you are highly absorbed, you will not be able to focus on information that alerts you to the fact that the fantasy is not real. The more vividly you imagine the cast, its texture and hardness, how it got there, and so on, the less likely you are to remember that this is only your imagination at work. If this deep absorption happens, you might be more inclined to believe that your rigid-arm behavior was involuntary when actually it was not. In support of this, Spanos found that when participants were asked to rate how absorbed they were in a suggested imagined scenario, the higher the absorption rating, the more likely they were to interpret their related behavior as occurring involuntarily. Spanos also noted that a person's susceptibility to hypnosis correlates with his or her general tendency to become absorbed in other activities, such as books, music, or daydreaming. Consequently, these individuals are more likely to willingly cooperate with the kind of suggestions involved in hypnosis.

Creation of Expectations in Hypnotic Participants

Spanos claimed that the beliefs most people have about hypnosis are adequate in themselves to produce what is typically seen as hypnotic behavior. He further contended that these beliefs are strengthened by the methods used to induce and study hypnosis. He cited three examples of research that demonstrated how people might engage in certain behaviors under hypnosis because they think they should, rather than because of an altered state of awareness.

First, Spanos referred to a study in which a lecture about hypnosis was given to two groups of students. The lectures were identical except that one group was told that arm rigidity was a spontaneous event during hypnosis. Later both groups were hypnotized. In the group that had heard the lecture including the information about arm rigidity, some of the participants exhibited this behavior *spontaneously*, without any instructions to do so. However, among the participants in the other group, not one arm became rigid. According to Spanos, this demonstrated how people will enact their experience of hypnosis according to how they believe they are supposed to behave.

The second hypnotic event that Spanos used to illustrate his position involved research findings that hypnotized participants claim the visual imagery they experienced under hypnosis was more intense, vivid, and real than similar imaginings when not hypnotized. Here, in essence, is how these studies typically have been done: Participants are asked to imagine scenes or situations in which they are performing certain behaviors. Then, these same participants are hypnotized and again asked to visualize the same or similar situations (the hypnotized and nonhypnotized trials can be in any order). These participants generally report that the imagery in the hypnotized condition was significantly more intense. Spanos and his associates found, however, that when two different groups of participants are used, one hypnotized and one not, their average intensity ratings of the visual imagery are approximately equal. The difference in the two methods is probably explained by the fact that when two different groups are tested, the participants do not have anything to use for comparison. However, when the same participants are used in both conditions, they can compare the two experiences and rate one against the other. Because participants nearly always rate the hypnotic imagery as more intense, this supports the idea that hypnosis is really an altered state, right? If you could ask Spanos, he would say, "Wrong!" In his view, the participants who participate in both conditions expect the ritual of hypnosis to produce more intense imagery, and, therefore, they rate it accordingly.

The third and perhaps most interesting demonstration of hypnosis addressed by Spanos was the claim that hypnosis can cause people to become insensitive to pain (the *analgesia effect*). One way that pain can be tested in the laboratory without causing damage to the participant is by using the "cold pressor test." If you are a participant in such a study, you would be asked to immerse your arm in ice water (0 degrees centigrade) and leave it there as long as you could. After the first 10 seconds or so, this becomes increasingly painful, and most people will remove their arm within a minute or two. Hilgard (1978) reported that participants who received both waking and hypnotic training in analgesia (pain reduction) reported significantly less cold-pressor pain during the hypnotized trials. His explanation for this was that during hypnosis, a person is able to dissociate the pain from awareness. In this way, Hilgard contended, a part of the person's consciousness experiences the pain, but this part is hidden from awareness by what he called an "amnesic barrier."

Again, Spanos rejected a hypnotic explanation for these analgesic findings and offered evidence to demonstrate that reduction in perceived pain during hypnosis is a result of the participants' motivation and expectations. All the research on hypnosis uses participants who have scored high on measures of hypnotic susceptibility. According to Spanos, these individuals "have a strong investment in presenting themselves in the experimental setting as good hypnotic subjects" (p. 208). The participants know that a waking state is being compared to a hypnotic state and want to demonstrate the effectiveness of hypnosis. Spanos, working with his associate H. J. Stam, performed a similar study involving cold-pressor pain but with one major difference: some participants were told that they would first use waking analgesia techniques (such as self-distraction) and would then be tested using hypnotic pain-reduction methods, but other participants were not told of the later hypnotic test (see also Stam and Spanos, 1980).

Figure 8-1 summarizes what Stam and Spanos found. When participants expected the hypnosis condition to follow the waking trials, they rated the analgesic effect lower in order to, as the authors state, "leave room" for improvement under hypnosis. Stam and Spanos claimed that this demonstrated how even the hypnotic behavior of pain insensitivity could be attributed to the participants' need to respond to the demands of the situation rather than automatically assuming a dissociated state of consciousness.

The most important question concerning all these findings reported by Spanos is whether we should reevaluate the phenomenon called hypnosis. And what does it mean if we were to decide that hypnosis is not the powerful mind-altering force that popular culture, and many psychologists, have portrayed it to be?

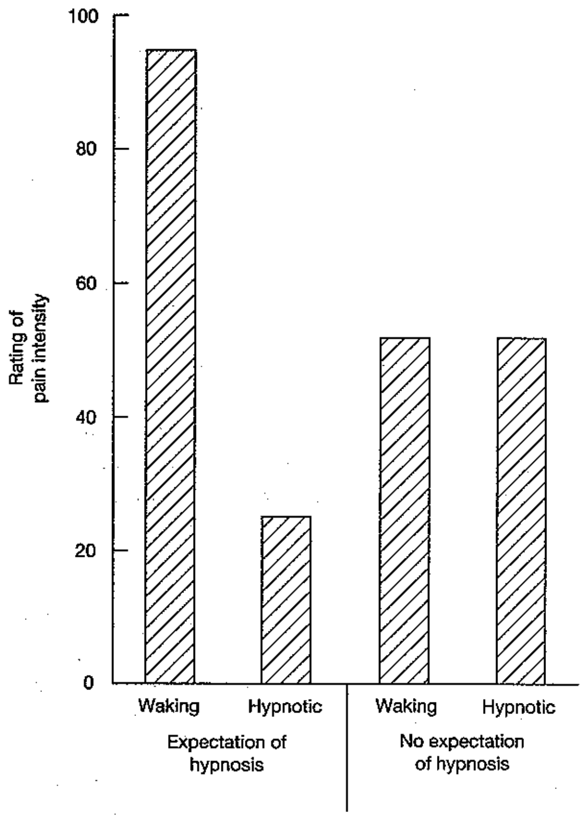

FIGURE 8-1 Waking versus hypnotic analgesia: expectation versus no expectation.

IMPLICATIONS OF THE FINDINGS

In evaluating Spanos's research, you should remember that his goal was not to prove that hypnosis does not exist but, rather, to demonstrate that what we call *hypnotic behaviors* are the result of highly motivated, goal-directed social behavior, not an altered and unique state of consciousness. It is well accepted among most behavioral scientists that people cannot be hypnotized against their will. Furthermore, under hypnosis, participants will not engage in acts they believe are antisocial, and they are not able to perform feats of superhuman strength or endurance. In this article, Spanos has demonstrated how many of the more subtle aspects of hypnosis may be explained in less mysterious and more straightforward ways than that of the hypnotic trance.

What would be the implications of accepting Spanos's contention that hypnosis does not exist? The answer to this question is "Perhaps none." Whether the effects of hypnosis are produced by an altered state of awareness or by increased motivation does not change the fact that hypnosis is often a useful method of helping people improve something in their lives. One reason that there continues to be such widespread and unquestioning acceptance of the power of the hypnotic trance may be that humans need to feel that there is a way out, a last resort to solve their problems if all else fails—something so omnipotent that they can even change against their own resistance to such change.

Whether or not hypnosis is an altered state of consciousness remains a highly controversial issue. But whatever hypnosis is, it is not the panacea most people would like to find. Several studies have shown that hypnosis is no more effective than other methods of treatment to help people stop abusing alcohol and tobacco, improve their memory, or lose weight (see Lazar & Dempster, 1981, for a review of this research).

RECENT APPLICATIONS

A citation of Spanos's 1982 article appeared in a 1997 article offering a new theory to explain the idea that participants perform behaviors involuntarily under hypnosis (Lynn, 1997). This researcher contended that highly hypnotizable individuals perceive their behaviors while "under" as involuntary for several reasons. First, such people enter hypnosis with the *intention* to do what the hypnotist suggests. Second, they strongly *expect* that hypnosis has the power to mold their behavior whether they voluntarily cooperate or not. And third, "the intention to cooperate with the hypnotist, as well as the expectation to be able to do so, create a heightened readiness to experience these actions as involuntary" (p. 239). It is not surprising that this researcher relied on Spanos's work in that the theory mirrors and endorses the ideas set forth in the article that is the subject of this reading.

Another study cited Spanos's perspectives on hypnosis to question certain therapeutic practices often employed by some psychotherapists to induce clients to recover ostensibly "repressed" memories of past sexual abuse (Lynn et al., 2003). The authors contended that hypnosis, along with other therapeutic techniques, may distort memories or even create memories of abuse that never actually took place, especially in early childhood (see the reading on the work of Elizabeth Loftus in Chapter IV for more about recovered memories). The researchers point out, based on Spanos's research, that "Adults' memory reports from 24 months of age or earlier are likely to represent confabulations, condensations, and constructions of early events, as well as current concerns and stories heard about early events" (p. 42). In other words, the belief that hypnosis somehow allows clients to retrieve accurate memories of early traumatic experiences is misguided and may be subject to all the memory errors that exist in a nonhypnotized state. This, the authors contend, may in some cases, lead to false memories and accusation of abuse that never happened. Spanos elaborated his perspective on this potential misuse of hypnotic techniques in his 1994 book, *Multiple Identities & False Memories: A Sociocognitive Perspective.*

CONCLUSION

Clearly, the debate goes on. Spanos continued his research until his untimely death in a plane crash in June 1994 (see McConkey & Sheehan, 1995). A summary of his early work on hypnosis can be found in his 1988 book, *Hypnosis:*

The Cognitive-Behavioral Perspective. Nicholas Spanos was a prolific and well-respected behavioral scientist who has been missed greatly by his colleagues and by all those who learned and benefited from his work (see Baker, 1994, for a eulogy to Nick Spanos). And, clearly, his research legacy will be carried on by others. His work on hypnosis changed psychology in that he offered an experimentally based, alternative explanation for an aspect of human consciousness and behavior that was virtually unchallenged for nearly 200 years.

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