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22

Consciousness in Dreaming

A Metacognitive Approach

Tracey L. Kahan

Consciousness

Over a century ago, William James wrote: "The universal conscious fact is not 'feelings exist' and 'thoughts exist' but '*I* think' and '*I* feel'" (James 1890: 226). In other words, central to consciousness is the self-as-observer, what James called 'the knower.' As Baars explains, "the self is that which has access to consciousness" (1997: 153). (Also see Dennett, 1978.) The notion of self-as-observer implies dual levels of awareness: The contents of experience (participant perspective) are the object of awareness (observer perspective).

Consider the following narrative, for example:

> I am traveling with M. B. next to a river, moving slowly in the direction opposite the current. On the opposite bank, I see a huge, solitary pine tree growing very close to the edge of the bank. Its lower branches have been removed to avoid their dragging in the water. I find myself wondering who cut these branches off. The tree is beautifully shaped—tall, symmetrical, with enough space between the limbs to see the full silhouette against the sky. *I think to myself, "I really should say something to M. about how beautiful and striking this tree is," but I decide not to say anything.* We continue upriver. (Kahan 2001; emphasis added)

In this narrative, the individual is simultaneously experiencing the beauty of the tree (participant perspective) and noticing the thoughts she has about sharing this experience with her companion (observer perspective). This situation is similar to what Ernest Rossi termed "self- reflectiveness" (SR), which he defined as "the examination of one's thoughts, feelings, or behavior." (p. 139). Self-reflectiveness involves the dual levels of awareness alluded to by James, "an experiencing self immersed in its own pattern of awareness and . . . the secondary level of awareness examining the experiencing self" (Rossi 1972: 139).

Metacognition

Self-reflectiveness also is one dimension of what cognitive psychologists call "metacognition," or the awareness of one's cognitive processes. Metacognition also may include the deliberate direction of one's thought processes (Nelson and Narens 1990). Thus, in addition to self-reflectiveness, metacognition includes intentionality and self-regulation. Alan Rechtschaffen describes the relationship among these skills as follows: "Volitional control, at least phenomenologically, immediately implies reflectiveness, i.e., one part of the mind tells another part where to go [*intentionality*], observes its progress [*self-reflection (monitoring)*], and corrects its deviations [*regulation*]" (1978: 99; emphasis added).

In the earlier "tree" narrative, for example, there is evidence of intentionality and behavior regulation as well as the aforementioned self-reflection. The storyteller's remark that she "should say something" about the tree demonstrates intentionality, in this case the intention to express herself. Her decision "not to say anything" illustrates behavior regulation in that she chooses between two possible courses of action (saying something versus saying nothing). And we see self-reflection in her comment "I find myself wondering who cut these branches off."

The Metacognitive Model

The metacognitive model proposed by Nelson and Narens (1990, 1994) is one way to characterize the interplay between self-awareness, intentionality, and behavior regulation, considered by many theorists to be key components of consciousness (Baars 1997; Dennett 1978; Flavell 1979; Kihlstrom 1987; Nelson 1996; Varela, Thompson, and Rosch 1995).

In their metacognitive model, Nelson and Narens first distinguish between a person's ongoing phenomenal experience and his or her goals and intentions. According to the metacognitive model, phenomenal experience occurs at the "object-level" and goals or intentions at the "meta-level" (see figure 22.1). Information flows between the object and meta levels in both directions. "Metacognitive monitoring" occurs when information flows from the object level to the meta level, such as when we examine our ongoing experience in relation to our goals and intentions. For example, an actor notices where he is on the stage in relation to his goal of remaining visible to the audience. "Control" (or behavior regulation) occurs when information flows from the meta level to the object level, such as when we select a behavior that promises to fulfill our intentions. So the same actor *intentionally* turns to face the audience in order to be seen. Consider the following narrative, for example:

> "I am in Bishop and I go to the high school. I tell them I am a student and that I need to see a guidance counselor. The secretaries are doing nothing; they are sitting around in a dingy caramel-colored office, ratting their hair, chomping gum and chatting . . . I decide to go look for myself and find someone to help me. I have my resume with me, and I say that I need help with it. I think to myself how incompetent this person is that is helping me and they say that I need to put completely different jobs on there. I decide to leave . . ." (C. Doherty 2001, unpublished data).

At the object level, the narrator is describing her experience of visiting a high school. At the meta level, her intention is to find a guidance counselor to review her resume.

Metacognitive monitoring is exemplified by her observation that the secretaries are doing nothing and cannot help her achieve her goal. And, finally, control, or behavior regulation, is seen in the narrator's decision to go and find someone to assist her.

Accuracy per se is not a critical aspect of this model. As Nelson explains, "the individual participant can be treated as an *imperfect* measuring device of his or her own cognitions, in which the individual's metacognitive monitoring is assumed to sometimes contain errors or distortions . . ." (1996: 106). So a child who is monitoring how well he understands a difficult story may decide he needs to reread a particular passage only once in order to increase understanding when, in fact, he may have needed to reread that passage three times to achieve his comprehension goal.

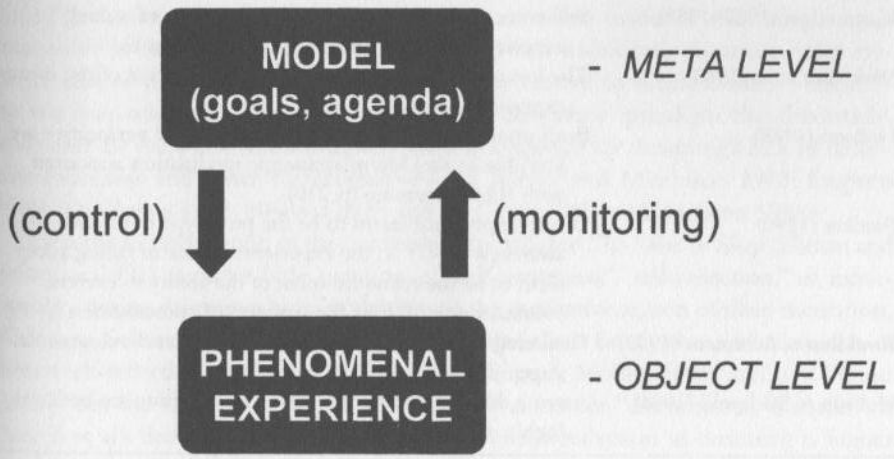
Metacognition in Sleep

Until recently, metacognition, like consciousness more generally, was viewed as a potentiality of the *waking* mind alone. What are now called metacognitive skills (self- reflectiveness, intentionality, and self-regulation) were presumably *absent* during sleep. (See Rechtschaffen 1978; Hobson 1988.) In the next section, we consider the evidence for the claim that metacognitive skills are, indeed, suspended during sleep.

Metacognition Does Not Occur During Sleep

As noted above, the prevailing view has been that metacognition occurs *only* during our waking hours; that self-reflection, intentionality, and behavior regulation are absent or seriously deficient during dreaming. (See Kahan and LaBerge 1994; Levin 2000; Purcell, Moffitt, and Hoffmann 1993, for recent discussions of "deficiency theories.") No less than William James (1890), the founder of psychological science in the United States, held that self-reflection, or "self-consciousness," to use James's term, characterizes waking but does not occur during sleep. As Kunzendorf (1987–1988) explains:

Figure 22.1 The Metacognitive Model, adapted fro Nelson and Narens (1994).



> James' recollective theory of self-consciousness implies that dream images and waking images are not only different, but literally "dissociated," from each other. Because dreams contain their own quality of familiarity *but not the waking quality of self-consciousness,* dream memories are dissociated from waking memories. Accordingly, these two dissociated sets of memories result in two dissociated experiences of self-consciousness: a waking self alternating with a sleeping self. (5, emphasis added)

Freud (1953) also saw dreaming and waking as inherently different. According to Freud, ego control was suspended during sleep, and the dreaming mind regressed to the more primitive cognitive style, or "primary process thinking," associated with the unconscious mind. (Also see Koukkou and Lehman 1983.) In contrast to the "secondary processes" of rationality, order, and clarity that characterize waking mentation, dreaming was seen as illogical, bizarre, and involving magical thinking (e.g., Domino 1976). In describing the dissociation between waking and dreaming, Freud and other theorists who followed him went so far as to assert that dreaming processes parallel those of psychosis. (See especially Hobson 1988: 9, 229–230; Hobson 1994; Shafton 1995: 235–238.)

James's and Freud's assertions regarding the absence of high-order cognitive skills during dreaming have profoundly shaped contemporary research in cognitive dream psychology. (See especially Foulkes and Cavallero 1993; Haskell 1986; Hunt 1986.) Underlying all of these claims is the assumption that dreaming is *dissociated* from waking and that dreaming cognition is "deficient." The assertion that dreaming does not, cannot involve self-reflectiveness or volition has served as an unstudied, a priori assumption underlying much of the theoretical and empirical work on the mind in sleep (Arkin, Antrobus, and Ellman 1978; Blagrove 1992; Crick and Mitchison 1983; Ellman and Antrobus 1991; Empson 1989; Foulkes 1985, 1990; Globus 1987; Green and McCreery 1994; Hartman 1973; Hobson 1988; Hobson and Stickgold 1994; Kahn and Hobson 1993; Koukkou and Lehmann 1983; Kunzendorf 1987–88; Rechtschaffen 1978; Sartre 1940; Weinstein, Schwartz, and Ellman 1988; Winson 1990.) (See table 22.1 for examples of the specific claims made by some of these theorists.) It is noteworthy that many of these theorists assert that there are *absolute* differences in cognition and metacognition across the dreaming and waking. In other words, a quality of waking cognition (e.g., self-reflection, intentionality, or self-regulation) is presumed absent in dreaming. Underlying these claims is the assumption that dreaming is generated by a different neurocognitive system than that which generates waking cognition/experience; hence, the notion that dreaming is "dissociated" from waking (Freud 1953; Hobson, 1988; Hobson and Stickgold 1994; Hobson, Pace-Schott, and Stickgold 2000; Koukkou and Lehmann 1983; Rechtschaffen 1978; also see Kahan 2000 and Nielsen 2000 for recent discussions of "one-generator" versus "two-generator" models of dreaming).

Table 22.1 Theorists Who Claim that Metacognition Does Not Occur in Dreaming

Theorist	*Claim*
James (1890)	Dreams do not contain the waking quality of self-consciousness.
Freud (1953)	Ego control is suspended during sleep, and dreaming is characterized by primary process thinking.
Rechtschaffen (1978)	Dreaming is "inherently" non-reflective (pp. 98–101).
Kunzendorf (1987–1988)	Self-consciousness is a defining characteristic of waking experience, but not dreaming experience (p. 6).
Weinstein et al. (1988)	The loss of reflective awareness is a central aspect of the dream experience (p. 445).
Hobson (1988)	Both orientation in the world and self-critical perspective are lost [due to the] loss of aminergic modulation associated with REM dreaming (p. 210).
Foulkes (1990)	Dream experience seems to be the prototype of passive awareness (p. 47) . . . the experiential price of falling asleep seem to be the relinquishment of the ability to exercise voluntary control over the contents of consciousness (p. 49).
Koukkou & Lehmann (1993)	Dreaming cognition is regressive, to an earlier developmental stage.
Hobson & Stickgold (1994)	Assume that dream consciousness and cognition are both highly state dependent phenomena (p. 1).

What Is the Evidence that Metacognitive Skills Are Suspended in Sleep?

Only a few of the above-mentioned theorists have offered *empirical* support for their claims. Just how convincing *is* the evidence that metacognitive skills are rare or absent in dreaming; that dreaming is "just degraded cognition" (Shafton 1995: 95)? We now turn to what is, arguably, the most influential of this empirical work.

In an article that is frequently cited as evidence for the deficiencies in dream cognition, Alan Rechtschaffen declares that dreaming is *inherently* nonreflective and lacking volition (1978: 98–101). Echoing Freud, Rechtschaffen claims that there is a suspension of ego control during dreaming that "results in the inherent nonreflectiveness of dreaming consciousness, including the typical absence of lucidity (awareness of dreaming)" (cited by Kahan and LaBerge 1994: 248). Surprisingly, Rechtschaffen's primary evidence for the nonreflectiveness of dreams comes from his own dream experiences and his study of the dream reports of four undergraduate students. (See Rechtschaffen 1978: 98–100.) For example, Rechtschaffen writes: "I cannot remember a dream report which took the form, 'Well, I was dreaming of such and such, but as I was dreaming this I was imagining a different scene which was completely unrelated'" (1978: 102). Rechtschaffen's anecdotal observation that he has never experienced "imagining" while dreaming does not constitute evidence that imagining is impossible in dreams; nor do the experiences of four individuals constitute valid evidence that *all* dreaming is nonreflective. It is a testament to Rechtschaffen's credibility as a sleep scientist, and the popularity of the "deficiency" paradigm, that this article, now over 20 years old, is still routinely cited as evidence for dreaming's lack of reflective awareness and other metacognitive skills (Crick and Mitchison 1983; Empson 1989: 92; Globus 1987: 80–84; Green and McCreery 1994: 12; Hobson 1988).

Even the second edition of the comprehensive volume *The Mind in Sleep* (Ellman and Antrobus 1991) includes little mention of "self-awareness," "self-reflection," or intentionality during dreaming. In their chapter on the qualitative aspects of sleep mentation, Weinstein, Schwartz, and Arkin (1991) do describe, albeit briefly, the seminal studies of dream self-reflection conducted by Purcell, Mullington, Moffitt, Hoffmann, and Pigeau (1986). But the authors do not discuss the implications for "discontinuity theories" of Purcell et al.'s findings that the normative level of self-reflection in dreaming is higher

than generally assumed and that dream self-reflection can be increased through attentional training. Weinstein et al. also discourage further consideration of the potential for metacognition during dreaming by arguing that dreaming, particularly dreaming during phasic REM (rapid eye movement), involves a *suspension* of reflective self-awareness.

Activation-Synthesis Model of Dreaming

A well known and controversial contemporary dream theory is the activation-synthesis (AS) model, originally developed by J. Allan Hobson and Robert McCarley (Hobson and McCarley 1977, and updated by Mamelak and Hobson in 1989). The AS model begins with two basic assumptions. First, certain phenomenological features "define" dreams: intense emotions, scene shifts, plot coherence, amnesia for the experience, loss of orientation in the world, bizarre transformations, and the suspension of a self-critical perspective (Hobson 1988). A second major assumption of the AS model is that the phenomenological or psychological qualities of dreams are the direct consequence of the particular neurophysiological changes that occur during REM sleep (formal isomorphism). According to the model, the psychological experience of dreaming represents the forebrain's "best effort" to organize, integrate, and impose meaning on the random cerebral activation initiated by the brain stem during REM sleep (Hobson 1988: 210; Hobson 1990; Hobson and Stickgold 1994; Mamelak and Hobson 1989). For example, the suspension of a self-critical perspective and the associated delusional acceptance of the dream experience as "real" are presumably the result of a switch from the (waking) mode of information processing dominated by the aminergic system to a mode of information processing dominated by the cholinergic system (Hobson and Stickgold 1994: 13).

Notwithstanding the continuing evolution of the activation-synthesis model (see Hobson et al. 2000), the assumption of a formal isomorphism between dreaming features and REM raises several issues. (Also see Foulkes 1993; Nielsen 2000; Solms 2000). One is whether the "formal characteristics of dreaming" mentioned earlier constitute the necessary psychological features of dreaming; the community of dream researchers has not, in fact, reached consensus on how to define dreaming or on what constitute the normative characteristics of dreams. (See especially Hunt 1989: 69–76 for detailed discussion of problems in the definition of dreaming; also see Foulkes 1990 and Snyder 1970 for empirical studies of the phenomenological features of normative dreaming).

A second basic issue with the activation-synthesis model is that identifying dreaming with REM sleep has been, and continues to be, highly controversial. Numerous theorists have questioned the equation of REM with dreaming, particularly in light of unequivocal evidence of non-REM (NREM) dreaming, including dreaming so vivid that it is indistinguishable from REM dreaming. (See Bulkeley 1997; Domhoff 1999; Foulkes 1999; Kahan 2000; Nielsen 2000; Purcell et al. 1993; Van de Castle 1994 for recent discussions of REM versus NREM dreaming.) And the recent neuropsychological evidence offered by Mark Solms indicates that REM is neither necessary nor sufficient for dreaming to occur (Solms 1997, 2000). Even the earliest, classic, experimental studies of dreams acknowledged NREM dreaming: "it was immediately clear to Dement that dreaming is not entirely confined to the REM phase. . . . And some of the reports from non-REM sleep were *indistinguishable by any criterion* from those obtained from post-REM awakenings" (cited by Hobson 1988: 143; emphasis added).

Evidence for the AS Model of Dreaming/Waking Neurocognition

In research recently conducted by Hobson and his colleagues, the stated goal is to offer evidence for their neurobiological model of dreaming-waking phenomenology (see especially Hobson et al. 2000; Hobson and Stickgold 1994; Kahn and Hobson 1993; Kahn, Pace-Schott, and Hobson 1997 for reviews of this work).

For example, in an ambitious and ongoing study of the phenomenal qualities of dreams, Hobson and his colleagues have evaluated the qualitative and organizational features of home dreams. Narrative reports were obtained from different sleep stages, where REM and NREM sleep were identified from sleep records obtained via the "Nightcap." The Nightcap is a device designed by Hobson that uses eye movement and head movement activity to distinguish REM and NREM sleep. (See especially Mamelak and Hobson 1989.) The Nightcap does not distinguish between NREM stages ¾ (slow-wave) sleep and NREM stage 2 sleep.

Stickgold, Pace-Schott, and Hobson (1994), used the Nightcap to collect sleep samples from eleven subjects over ten nights. Of the 149 sleep-stage-defined reports, 59 percent (88) were from spontaneous REM awakenings and 41 percent (61) were from spontaneous NREM awakenings. The authors found that reports from REM sleep awakenings were typically longer than reports from NREM: 24 percent of REM reports were longer than 500 words, while only one NREM report was this long. At the same time, it is notable that 10 percent of the NREM reports were more than 200 words). Further, 83 percent of the REM reports (N = 88) contained sleep mentation, compared with 54 percent of the NREM reports (N = 33) (p. 24).

Reporting on the qualitative aspects of the data collected by Stickgold et al. (1994), Hobson and Stickgold (1994) conclude that REM dreams are "more perceptually vivid, more motorically animated, and more emotionally charged than NREM reports and that NREM reports tended to be more thought-like and contained more representations of current concerns than did REM sleep reports" (2). The authors then say that "it seemed reasonable to conclude that the activation level of the brain was the *major* determinant of these observed differences" (3). However, the empirical work of an Italian group, Bosinelli, Cicogna, and Cavallero, indicates that the content and memory sources of REM and NREM dreams are much more similar than different. (See especially Cavallero and Cigogna 1993; Cicogna, Cavallero, and Bosinelli 1991.) Also, the level of brain activation needed to support dreaming is not exclusive to REM sleep, as John Antrobus's work has also demonstrated. (See especially Antrobus 1990, 1991; Cavallero and Cigogna 1993; Solms 1997, 2000.)

In related articles (Hobson and Stickgold 1994; Kahn et al. 1997), this argument is extended to include the presumed qualitative differences in *waking*, REM, and NREM. However, the evidence cited for the hypothesized cross-state differences does not include direct comparisons of metacognitive processes, such as self-reflection, volition, or self-regulation, *across* waking and sleep.[1]

David Foulkes's Cognitive Approach to Dreaming

David Foulkes, another prolific and influential dream researcher, approaches dreaming from a cognitive-developmental perspective (Foulkes 1985, 1990, 1993, 1999). Foulkes is essentially a "continuity" theorist, one who argues that the same cognitive system is

responsible for waking and dreaming cognition. However, with respect to metacognitive skills such as self-reflection, Foulkes's position has been that we can only *represent* self-reflection in dreams in a reproductive fashion. That is, we might "remember" an instance of self-reflection from waking, but we do not engage in self-reflection in a spontaneous fashion *within* the dream (Foulkes 1990: 51). Foulkes argues that dreaming is a conscious construction of a *model* of the waking self-in-world. Referring to his own dreams, Foulkes acknowledges (1990: 51) that there is reflection *in* dreams about ongoing events but little self-reflection about how current dream events relate to one's sense of self (autobiographical history). Thus, Foulkes agrees with other theorists who have argued that dreaming lacks "self-consciousness" because, typically, we are not fully aware that the dream experiences we are having are a "construction" of the imagination, and we are not fully aware of our current waking conditions when we are dreaming (e.g., Kunzendorf 1987–88: 6; Rechtschaffen 1978; Weinstein et al. 1988: 440).[2]

In summary, the "deficiency" theorists emphasize the presumed differences between waking and dreaming cognition, and assert that dreaming lacks the waking cognitive skills of self-reflection, intentionality, and behavior regulation. But are these metacognitive skills absent in dreaming? None of the research just reviewed directly tested this hypothesis.

Metacognition Does Occur During Sleep

Metacognition in Lucid Dreaming

In a "lucid dream," one is *aware* of dreaming *while* dreaming (Godwin 1994; Green and McCreery 1994; LaBerge 1985; Van Eeden 1913). In addition to this self-reflection on "state," which is their defining feature, lucid dreams often include other compelling examples of metacognition in sleep. For example:

> I have my skates with me. . . . On the floor that I will be skating on are blankets and hoops, like nets. I think the set-up must be for some sort of skating game. I am disappointed but will stay anyway. I remember that I have not skated since grade nine. I walk about, then fix the heel of my skate onto my foot properly as I think of the latest past events. Then I realize that the latest events have all been dreams. *I know that I am dreaming.* I get full of energy and run. I find myself running in the woods. I am naked. It is sunny out. I think to myself "Joe told me I would have a lucid dream, and I did!" I pass through skinny trees that look like alders. I can't feel them going through me. I stick out my right hand and watch the tree images pass through my arm (or my arm pass through the trees). When I want to touch the trees I grab them and bend them. They do not feel very solid; they feel the way a rotting tree feels. Briefly, while still running, I think of changing the scene by closing my eyes. I open them again quickly to find I am still in the same scene. I keep on moving. . . . (Gillis, reported by Sacksteder 1993: 13)

In this narrative, we see *intentionality* ("I think of changing the scene by closing my eyes"), *behavior regulation* ("When I want to touch the trees I grab them and bend them"), *reasoning* ("I think the set-up must be for some sort of skating game"), and *self-reflection on thoughts* ("I think to myself 'Joe told me I would have a lucid dream'"), as well as the aforementioned *self-reflection on state* ("I know that I am dreaming"). Without question, such lucid-control dreaming exemplifies metacognition during sleep.

In laboratory studies of lucid dreaming, intentionality is especially important because participants must be able to induce awareness of dreaming while dreaming (lucidity) and also to remember the activities they agreed to carry out in the lucid dream. For example, in research reported by LaBerge and Zimbardo (2000), the dreamers had to remember their presleep intention to trace a circle (*volition*) and then actually engage in that activity in the lucid dream (*behavior regulation*). (See Hearne 1978 and LaBerge, 1985, 1990, for discussion of other studies in which particular tasks are carried out in the lucid dream.) An obvious advantage of laboratory studies of lucid dreaming is that, because these studies include standard measurements of sleep physiology, investigators can determine the sleep stage and other physiological correlates of lucid dreaming (Brylowski, Levitan, and LaBerge 1989; LaBerge, Levitan, and Dement 1986). The physiological recordings also indicate when the participant "signaled" that she became lucid, as well as when she began and ended the pre-agreed-upon task. This permits researchers to correlate the psychophysiological measures with the onset of lucidity (self-reflection) and with the deliberate execution of the task (self-reflection and intentionality). (See Baars 1997 and Kahan and LaBerge 1994 for further discussions of lucid dreaming as metacognition.) Such research has established that lucid dreaming occurs in bona-fide sleep, typically REM sleep (LaBerge, Nagel, Dement, and Zarcone 1981), and that the onset of lucidity (awareness of dreaming) is accompanied by an increase in the density of eye movements within REM (see LaBerge 1990 for further discussion of the psychophysiology of lucid dreaming).

Curiously, in spite of the obvious metacognitive skills involved in lucid dreaming, many influential dream theorists have been disinclined to revise their view of dreaming cognition to include metacognitive capabilities. Harry Hunt, for example, remarks: "the experience of lucid dreaming is just as distinct from 90 percent of our waking experience (which all too often is precisely marked by its lack of vividness and subjective sense of significance) as it is from 90 percent of our dreaming experience" (1989: 120).

A similar observation is made by Rechtschaffen: "the fact of occasional lucidity in dreams is useful as a demonstration of what most dreams are not" (1978: 100). The implication of Hunt's and Rechtschaffen's remarks is that lucid dreaming is not only unusual, but stands in stark contrast to nonlucid dreaming, with its lack of self-reflection and volitional control. (Also see Foulkes 1990, 1991.) More recently, even noted "deficiency" theorist Allan Hobson has acknowledged that lucid dreaming may occur with some frequency for certain individuals, but he has also taken the position that lucid dreaming should be considered a unique dream state, with its own neurophysiological correlates. (See Hobson et al. 2000.) Again, lucid dreaming is set apart from "most" dreaming, which many theorists continue to believe is deficient in the high-order cognitive skills that characterize waking cognition. However, researchers like Stephen LaBerge and Jayne Gackenbach have established that lucid dreaming is far from infrequent and that most people who are motivated to develop lucid dreaming skills are able to do so. (See Gackenbach and LaBerge 1988).

Metacognition in Nonlucid Dreaming

What of metacognition in *non*lucid dreaming, where there is no explicit awareness of dreaming while dreaming? Interestingly, many theorists have asserted that high-order cognitive skills do occur in nonlucid dreaming (Cartwright 1981; Cicogna et al. 1991;

Fitch and Armitage 1989; Foulkes 1985; Kahan 1994; Levin 2000; Mason et al. 1997; Moffitt 1995; Purcell et al. 1986; Rossi 1985; Snyder 1970). (See table 22.2 for representative claims.) And a number of empirical studies have investigated the occurrence of metacognition in nonlucid dreaming (e.g., Bradley, Hollifield, and Foulkes 1992; Kahan 1994; Kahan and LaBerge 1996; Kahan, LaBerge, Levitan, and Zimbardo 1997; Purcell et al. 1993; Purcell et al. 1986; Snyder 1970).[3]

Snyder (1970) conducted a large-scale study comparing the phenomenology of waking and dreaming. This work is described in a chapter by Schwartz, Weinstein, and Arkin (1978) in the first volume of *The Mind in Sleep* (Arkin et al. 1978). Snyder collected 635 reports from REM sleep from 58 adult men and women over 250 subject nights and rated numerous aspects of their content. (See Schwartz et al. 1978: 147–151.) Snyder concluded that dreams are "not so dreamy after all" (150) and that cognition across waking and dreaming is essentially continuous. According to Schwartz et al., "[T]he broadest generalization possible about the nature of dream experience is its more or less faithful reflection of daily life" (148). Of particular interest is Snyder's observation of volition in dreams: "references to making decisions (either their mere contemplation or actual implementation) were present in 10–50 percent of subjects' dreams," and of "reflective contemplation: silent observation and detached musing about dream events external to the self appeared in about 17–75 percent of dreams. . . . In general, all of these four cognitive elements, volition, reasoning, memory processes, and reflection were least often observed in the group of short dreams and most often seen in the dreams of over 300 words" (149).

Table 22.2 Theorists Who Claim that Metacognition Does Occur in Dreaming

Theorist	*Claim*
Snyder (1970)	The ongoing "reflectiveness" in REM dreaming is similar to that of waking.
Cartwright (1981)	The qualitative aspects of dreaming and waking mentation are similarly rhythmic.
Foulkes (1985)	Dreaming includes the same range of cognitive abilities as waking.
Rossi (1986)	There is a continuity of dialectical conscious processes between waking and dreaming.
Purcell et al. (1986)	Self-reflection does characterize dreaming, especially REM dreaming.
Fitch & Armitage (1989)	Sleep mentation is on a continuum with, and directly affects, waking cognition (p. 873)
Cicogna et al. (1991)	Abstract self-reference does occur during dreaming and is not restricted to REM sleep.
Moffitt (1995)	[Dreaming shows] similar variation in the organization of consciousness as does waking awareness, from nonmindedness through singlemindedness to fully reflective awareness of self and state (p. 29).
Mason et al. (1997)	Reflective awareness occurs during REM and slow-wave sleep.

Curiously, Schwartz et al. discount Snyder's research on the basis of "many methodological flaws" (150), yet they acknowledge (151) that the same basic patterns were observed by Kramer, Winget, and Whitman (1971). The fact that Snyder's findings did not, at the time, inspire widespread research into the relationship between waking and dreaming cognition underlines the general acceptance of the historical view that dreaming and waking are dissociated. And although Snyder did investigate dream phenomenology (Snyder, Karacan, Thorp, and Scott 1968; Snyder 1970), he did not continue this line of inquiry. It is interesting to note that thirteen years later, in the second volume of *The Mind in Sleep,* Schwartz and colleagues again discuss the qualitative aspects of sleep mentation (Weinstein et al. 1991) and argue that self-reflection is altogether suspended in REM sleep.[4]

Sheila Purcell, Alan Moffitt, and their colleagues at Carleton University developed a scale for measuring dream self-reflectiveness based on Rossi's developmental theory of self-reflectiveness (Rossi 1972, 1985). Purcell et al. utilized their dream self-reflectiveness (DSR) scale in two studies (both reported in Purcell et al. 1986). The first experiment assessed the level of DSR in dreams sampled from different sleep stages; the second experiment determined whether DSR could be increased through attentional training. In the first study, twelve individuals who remembered more than five dreams per week (high-frequency dream recallers) and twelve individuals who recalled fewer than one dream per week (low-frequency dream recallers) spent four nights in the sleep lab. Each night dream reports were requested following scheduled awakenings from stages 4, 2, and REM sleep, and upon awakening. The narrative reports were later scored by two raters for the highest level of self-reflection exhibited in the dream. For each participant, a mean SR score was computed for all dreams recalled from a given sleep. The main finding was that mean SR was higher for the seventy-one reported REM dreams ($M = 4.22$) than for the fifty reported stage 2 dreams ($M = 3.45$) or for the nineteen reported stage 4 dreams ($M = 3.74$). Self- reflectiveness in stage 2 and stage 4 dreams did not differ. There were also individual differences in DSR: high-frequency dream recallers had higher DSR scores than did low-frequency dream recallers, and the DSR score was more highly correlated with word count for high-frequency dream recallers.[5]

The typical SR score was 3 ("dreamer completely involved in dream drama; no other perspective"), a finding that could be used to argue that dreams often do not involve self-reflection. However, dream metacognition is clearly seen in reports with DSR scores of 5 (internal commentary), 7 (self-reflection: dual perspectives of participant and observer), 8 (volition), or 9 (lucid dreaming). (The scale value of 6 is more appropriately considered a measure of dream bizarreness than of dream self-reflection.) Summing across these four scale values (5, 7, 8, or 9), then, metacognitive skills were observed in roughly 40 percent of REM dreams, 20 percent of stage 2 dreams, and 25 percent of stage 4 dreams. (See Purcell et al. 1986: 42). In Experiment 2, Purcell et al. demonstrated that the level of DSR could be increased experimentally, particularly for the Schema group, which combined reality testing ("Am I dreaming now") and prospective memory training (remembering to engage in schema rehearsal whenever a leather bracelet worn during the study was noticed). The research of Purcell et al. (1986) is compelling because it indicates that dreams sampled in the laboratory include a higher incidence of metacognition than was previously claimed, that dream SR is correlated with self-reported dream recall frequency, and that the level of dream SR can be increased

through experimental manipulation of intention and attention. At the same time, several methodological limitations need to be acknowledged. First, and most important, is the questionable construct validity of the DSR scale. This scale confounds several different metacognitive skills (self-reflection, intentionality, control), and also includes scale values that have little to do with self-reflection (e.g., scale value 6, which measures transformations, an aspect of dream bizarreness). Thus, this scale is not measuring what it was designed to measure: the *continuum* of self-reflection (see Kahan 1994 for further discussion of issues in measuring dream self-reflection.) Second, all of the participants in Experiment 2 were from the same college class, and this class was instructed by one of the primary investigators. This selection procedure increases the likelihood that demand characteristics and experimenter bias impacted the results. These students, who were assigned to one of five different groups for the experiment, may well have discussed the experiment among themselves. Also, participants may have chosen to report only those dreams they felt were consistent with the implied goal of increasing dream self-reflection; indeed, groups with higher SR had fewer dreams. Nevertheless, the Purcell et al. (1986) studies are important because they represent the first experimental work to directly investigate self-reflection in dreaming. (Also see Darling, Hoffmann, Moffitt, and Purcell 1993 for research on the stability of DSR scores across temporal units of the same dreams collected by Purcell et al. 1986.)

In a subsequent, more carefully controlled study, Purcell et al. (1993) essentially replicated their earlier findings regarding the distribution of dream self-reflection scores, with the notable difference that the modal dream SR score was now 5 ("dreamer thinks over an idea or has definite communication with someone"), compared with the earlier modal dream SR score of 3 ("dreamer completely involved in dream drama") (Purcell et al. 1986). (See Kahan 1994 for a study that reveals a similar distribution of DSR scores.)

Purcell et al. (1993) also developed a nine-category scale to measure intentionality in dreaming (dream control), with higher numbers representing greater intentionality. For example, a category 8 rating indicates the dream involved intentional regulation of some aspect of the dream mechanics, and a category 9 rating is given when intentional control is evident *and* the dreamer is aware of dreaming (lucid-control dreaming).

Ninety-five participants kept dream journals for three weeks in the context of one of three instructional conditions similar to those used by Purcell et al. (1986). The Baseline group was asked only to keep the dream journal. The Attention Control group completed a report skills questionnaire in addition to recording any dreams. The Schema group recorded their dreams and completed the dream control questionnaire (week 2) and the self-reflectiveness scale (week 3). The Schema group, which engaged in schema rehearsal (e.g., "Am I dreaming now?") whenever they noticed the leather bracelet they were assigned to wear, was the only group taught dream control. Each group included roughly the same number of self-reported frequent and infrequent dream recallers. Overall, frequent dream recallers showed more dream control (M = 5.1) than did infrequent recallers (M = 4.8), and, for all subjects, the mean level of dream control increased across the three weeks. These results again demonstrated that metacognitive skills—volition, in this case—do occur in dreaming and that metacognition can be increased simply by increasing one's attention to the reporting of dreams and reinforcing the intention to notice the process or content characteristics of one's dreams. Purcell et al. further conclude that their results "are supportive of a feedback loop between [waking and dreaming] states, mediated by attention and intention, by which both states can co-evolve" (1986: 244–245). (Also see Moffitt et al. 1988.)

Kahan (1994) compared two approaches to the measurement of dream self-reflectiveness and volition: third-person ratings (using the Moffitt DSR scale) and participants' first-person ratings of the content and process dimensions of their dreams. Eighteen female and twelve male college students made journal entries five days a week for three weeks in order to raise their level of dream recall. During the next two weeks, participants recorded and evaluated eight dreams (four dreams per week), using the Dream Rating Scale (after Johnson 1988; Johnson, Foley, Suengas, and Raye 1988; Johnson, Kahan, and Raye 1984). Third-person ratings were made by first transcribing the participants' 239 reports and then scoring them for dream self-reflectiveness using the Moffitt DSR scale. The distribution of SR scores obtained by Kahan (1994) was remarkably similar to that reported by Purcell et al. (1993: 228). Consistent with Purcell et al., the judges in Kahan's (1994) study scored Category 8 ("control") for 1.3 percent of the dream narratives and Category 9 ("lucidity") for .8 percent of the dream narratives. These percentages contrast with the incidence of control (volitional dreaming), particularly self-control, when rated by participants: 72 percent of the dreams were rated as including "control over own thoughts" and 64 percent were rated as including "control over their own feelings." (See Kahan 1994, table 1.) Overall, participants reported the same metacognitive skills as were noted by judges in the narrative reports. However, the incidence of these metacognitive skills was higher when participants assessed their own dream experiences using the Dream Rating Scale, compared with the judges' ratings of participants' narrative reports. Kahan's findings suggest that the incidence of metacognition may be seriously underrepresented in the narrative reports and underscore the need to develop alternative measures of dream metacognition.

Kahan (1994) also observed that 23 percent of the dream reports were rated as including some awareness of control but no awareness of dreaming, and 15 percent of the reports were rated as including some awareness of dreaming but no awareness of control. (See table 22.3.) Thus, although the awareness of dreaming (lucidity) and volition in dreaming (dream control) are highly correlated, these two dimensions of metacognition are dissociable. (Also see LaBerge 1985; Purcell et al. 1993.) So, although increased self-focus has been found to increase self-regulation in dreaming (Purcell et al. 1993) and in waking (Carver and Scheier 1981), increased self-focus may not typically include an explicit awareness of *state*.

In summary, the research reviewed above offers evidence that dreaming does involve metacognition, including self-reflection, intentionality, and self-regulation. This work presents a clear challenge to the traditional view that metacognition is absent in dreaming. As such, these studies are important in their own right. At the same time, a number of methodological and theoretical issues have yet to be resolved. For example, what constitutes the most valid (and reliable) measure(s) of dream metacognition? First-person ratings of the process aspects of dreaming? Third-person ratings of the narrative report? Some combination of the two? (See, e.g., Wilson 1994.) And should dreams be sampled in the home setting, the laboratory setting, or both? From a theoretical standpoint, does the occurrence of self-reflection in dreaming mean that dreaming and waking are *continuous?* Continuity implies relatively greater similarity (than dissimilarity) across waking and dreaming, including nonlucid dreaming, and that the same range of cognitive (and metacognitive) skills occurs across

waking/dreaming. The underlying assumption here is that the *same* cognitive system that operates during waking also operates during sleep/dreaming. (See Antrobus 1991; Cavallero and Foulkes 1993; Foulkes 1985, 1993, 1999; Hall and Norby 1972; Hunt 1989; Kerr 1993; Levin 2000; Moffitt 1995.)

The question of how dream metacognition and waking metacognition are related cannot be answered without assessing the variety and frequency of reflective and other metacognitive activities in dreaming relative to waking (Kahan and LaBerge 1994, 1996). This call was issued by Cavallero and Foulkes (1993: 137): "If we take the possibility of continuities in waking and dreaming mentation seriously, we not only must study both in a comprehensive study of the human mind, but also must study them comparably."

The next section discusses recent research in which the goal was to obtain comparable samples of metacognition in dreaming and in waking.

Metacognition Across Dreaming and Waking

Notwithstanding the methodological challenges associated with obtaining "equivalent" measures of waking and dreaming experience (see Kahan and LaBerge 1994 for a discussion of this issue), a clear understanding of cross-state cognition and metacognition requires that measures of the content and process characteristics of dreaming be compared with measures of waking experience that are as comparable as possible. If a person's metacognitive skills in dreaming are assessed retrospectively, for example, then the same person's metacognitive skills in waking should also be evaluated retrospectively.

In a series of studies (Kahan and LaBerge 1996; Kahan et al. 1997; Kahan and LaBerge 2000) involving, over time, increased rigor in the methods used to sample dreaming and waking experiences, the objective was to obtain comparable measures of metacognitive skills across waking and sleep. The next section first describes the method used in each study to obtain samples of waking and dreaming metacognition. Then, a comparison of the findings across the three studies is made in order to highlight consistent patterns in the incidence of different aspects of metacognition across waking and sleep.

Kahan et al. (1997) obtained samples of waking and dreaming metacognition from thirty-eight "practiced/lucid" dreamers and fifty "novice" dreamers. The practiced dreamers were members of an organization that provides educational and research opportunities related to lucid dreaming. The eighteen male and twenty female individuals reported average dream recall of eight dreams per week, with a range of zero to twenty eight, prior to the study, and 84 percent of the participants reported having had at least one lucid dream in the prior six months. Upon awakening from a dream that was clearly remembered, these "practiced" dreamers provided a narrative report of the dream and completed the Metacognitive, Affective, and Cognitive Experience (MACE) questionnaire, which assessed the incidence emotion and eight dimensions of metacognition: Choice, Internal Commentary, Unexpected Attention, Sustained Attention, Public Self-Consciousness, Event-Related Self-Reflection, Event-Unrelated Self-Reflection, and Unusual Experiences. (See Kahan et al. 1997: 137.) For the waking sample, participants again provided a narrative report of their experience, this time for the fifteen minutes prior to their reading of the instructions for the study, and then completed the MACE.

The "novice dreamers" were twenty-six male and twenty-four female college students; only 6 percent of these individuals reported having had at least one lucid dream in the past six months. For the dream sample, all subjects chose a weekend morning to report a well-remembered dream and also complete the MACE. For the waking sample, half of the participants were called by an experimenter at a random time during the day; the remaining participants stopped their activities at 2 P.M. on a prearranged day and reported and rated their waking experiences. Novice dreamers assessed the presence of emotion and seven dimensions of metacognition: Choice, Internal Commentary, Unexpected Attention, Sustained Attention, Public Self-Consciousness, Event-related Self-Reflection, and Thwarted Intention.

In the Kahan and LaBerge (1996) study, the narrative reports of dreaming and waking from forty of the original fifty "novice" dreamers in the Kahan et al. (1997) study were assessed by two independent raters. The raters used the MACE to evaluate the incidence of metacognition in the narrative reports, permitting a comparison of first- and third-person ratings of metacognition across the samples of dreaming and waking experience.

The third study (Kahan and LaBerge 2001) involved twenty-six individuals, with an age range of eighteen to fifty-two, whose average dream recall was between five to eight dreams per week. Participants again used the MACE to judge the presence or absence of emotion and various metacognitive activities in sleep and waking. However, Kahan and LaBerge increased the rigor of the methods used to sample waking and dreaming experiences. A variation of the event sampling procedure employed by Kerr, Foulkes, and Schmidt (1982) was used to obtain six event samples from each participant, four from sleep and two from waking. Also, the timing of the samples was controlled with the use of specially designed equipment.

Two samples were obtained from REM sleep and two from NREM sleep using the DreamLight®, a computerized device developed by Stephen LaBerge to induce lucid dreams. The DreamLight is intended for home use and is similar to Hobson's Nightcap. (See Mamelak and Hobson 1989; Stickgold et al. 1994.) Sensors in the DreamLight mask relay information about vertical eye movements and head movements to the computer, which uses this information to predict REM or NREM sleep. Studies in the sleep lab that compared standard polysomnographic measures with sleep staging from the DreamLight have established that the DreamLight is generally reliable in discriminating REM sleep, NREM sleep, and waking (LaBerge and Levitan 1995).

Waking samples were obtained with the aid of a preprogrammed beeper (the Programmable Electronic State Tester or PEST®), also developed by Stephen LaBerge. The participant wore the beeper on a chosen day and also kept an envelope containing the reporting materials handy. When the beeper vibrated, the participant stopped his or her activities and provided a one-page description of the events of the roughly fifteen-minute period just prior to the sounding of the beeper. The participant also completed the MACE questionnaire.

In each of these studies, samples of waking and dreaming experiences were obtained and the participants evaluated various dimensions of metacognition using the MACE questionnaire. Table 22.3 presents the percentage of "yes" responses to each question for experiences sampled from NREM, REM, and waking. Several interesting patterns emerge in these data. First, metacognition occurs with considerable frequency in dreaming, including NREM dreaming. Second, four types of metacognition occurred with comparable frequency across waking and both REM and NREM dreaming (Sudden Attention, Unusual Difficulty, and Self-Reflection on External Events), and three types of metacognition occurred with comparable frequency across waking and REM sleep (Internal Commentary, Sustained Attention,

and Public Self-Consciousness). Only three of the measured dimensions occurred with higher frequency in waking than in REM sleep (Choice, Self-Reflection on own thoughts and feelings, and Self-Reflection on own behavior). Thus, these data indicate that metacognition in dreaming, especially dreaming sampled from REM sleep, is more similar to waking cognition than it is different

Questions concerning the incidence of emotion and six dimensions of metacognition were common to all three studies, thereby permitting an informal cross-study comparison of these dimensions: Choice, Internal Commentary, Unexpected Attention, Sustained Attention, Public Self-Consciousness, and Self-Reflectiveness. In the first two studies (Kahan and LaBerge 1996; Kahan et al. 1997), the question about self-reflection asked whether any instance of self-reflection occurred: "Did you think about your own thoughts, feelings, attitudes, motivations, or behavior?" In the third study, which sampled both REM and NREM dreams (and waking experiences), three different questions were asked about the incidence of self-reflection: "Did you think about your own thoughts or feelings?" "Did you think about what you were doing?" "Did you think about what was happening around you?" (See table 22.3.)

Metacognition More Often Attributed to Waking Than to Dreaming Experiences

Across all three studies, as well as across third-person and first-person ratings (Kahan and LaBerge 1996), "choice" was less often associated with dreaming experiences than with waking experiences (See table 22.4.) Novice dreamers (Kahan and LaBerge 1996; Kahan et al. 1997; Kahan and LaBerge 2000) attributed "choice" to about 46 percent of their dreams, and practiced/lucid dreamers (Kahan et al. 1997) to about 53 percent of their dreams. The same percentages for waking reports were 79 percent (novice dreamers) and 69 percent (practiced dreamers), respectively. Overall, participants rated about 50 percent of their dreaming versus 74 percent of their waking experiences as including "choice." Independent raters observed "choice" in 10 percent of participants' dream reports and in 30 percent of participants' waking reports (Kahan and LaBerge 1996). Choice may have been overrepresented in the first two studies because the sampling method required participants to select the time they provided their waking sample. As such, their experiences during the prior fifteen minutes necessarily involved making a choice.

The incidence of Self-Reflection was, in general, also lower in dreaming than in waking. Novice dreamers (Kahan and LaBerge 1996; Kahan et al. 1997; Kahan and LaBerge 2000) attributed "Self-Reflection"(SR) to about 45 percent of their dreams, and practiced/lucid dreamers (Kahan et al. 1997) to about 40 percent of their dreams. For waking reports, these percentages were 54 percent and 55 percent, respectively. The third study (Kahan and LaBerge 2000) asked about three different objects of self-reflection. A higher percentage of waking experiences were rated as including SR "on own thoughts or feelings" (44 percent) or "on own behavior" (65 percent), as compared with the same ratings of dreaming experiences (19 percent and 29 percent, respectively). On the other hand, SR on external events was more often attributed to REM dreaming (52 percent) than to waking (38 percent) or NREM (38 percent) experiences. Thus, it may well be that the incidence of self-reflection varies with the "object" of the reflection and/or the sleep stage from which experiences are sampled.

Table 22.3 Percentage of "Yes" Responses to MACE Questions about Different Aspects of Metacognitive Experiences[a] Sampled from NREM Sleep, REM Sleep, and Waking (N = 26)

	When Samples Were Obtained				
Dimension	*NREM (NR)*	*REM (R)*	*Waking (W)*	*R:W Ratio*	*NR:W Ratio*
Choice[b]	19%	52%	69%	.75	.28
Internal commentary[d]	38%	60%	58%	1.03	.66
Sudden attention[c]	25%	33%	38%	.87	.66
Focused attention[d]	37%	63%	75%	.84	.50
Public self-consciousness[d]	19%	38%	27%	1.41	.83
Emotion[e]	62%	75%	75%	1.00	.83
Self-reflection (on):					
Own thoughts/feelings[c]	19%	27%	44%	.61	.43
Own behavior[c]	29%	44%	65%	.68	.45
External events[e]	38%	52%	42%	1.24	.90

[a]These dimensions represent those that were evaluated in two other two studies (Kahan & LaBerge 1996; Kahan et al. 1997), as well as in this study (Kahan & LaBerge 2001).
[b]Waking > REM > NREM, $p < .05$.
[c]Waking > REM = NREM, $p < .05$.
[d]Waking = REM > NREM, $p < .05$.
[e]Waking = REM = NREM, $p < .05$.

Table 22.4 Aspects of Metacognition Tending to Have a Higher Frequency in Waking than in Dreaming

Dimension	*Sample*[a]	*(N)*	*Dreaming Episode(s)*	*Waking Episode(s)*	*D:W Ratio*
Choice	Pract (P)	(38)	.53	.79	.67[b]
	Novice #1 (N1)	(50)	.46	.84	.55[b]
	P + N1	(88)	.50	.82	.55[b]
	Novice #2	(40)	.40	.83	.48[b]
	Judges	(2)	.10	.30	.33[b]
Self-reflection	Pract	(38)	.40	.55	.71
	Novice #1	(50)	.48	.62	.77
	P + N1	(88)	.44	.59	.75[b]
	Novice #2	(40)	.53	.63	.84
	Judges	(2)	.33	.50	.66

[a]Samples were the Practiced Dreamers (N = 38) (Pract) and the Novice Dreamers (N = 50) (Novice #1) described in Kahan et al. 1997, and the Novice Dreamers (N = 40) (Novice #2) and Independent Judges (N = 2) (Judges) described in Kahan & LeBerge 1996. The Novice #2 sample is a subset of the Novice #1 sample; the Judges' ratings were made of the dream reports provided by the Novice #2 sample.
[b]Comparison between dreaming and waking is significant at $p < .05$.

In short, of the six dimensions that were measured in all three studies, only Choice and certain types of Self-Reflection were consistently attributed to waking experience more often than to dreaming experience.

Metacognition More Often Attributed to Dreaming Than to Waking Experiences

In all three studies conducted by Kahan and her colleagues, Public Self-Consciousness (PSC) was consistently attributed to dreaming experiences (40 percent of all dreams) more often than to waking experiences (26 percent of all waking experiences). (See table 22.5.) However, the comparison of PSC in dreaming versus waking reached significance only for the Practiced/Lucid dreamers and for the analysis that combined the Novice and Practiced Dreamers. (See Kahan et al. 1997). PSC in waking may well have been underestimated given that the procedure for sampling waking experience, especially in the first two studies, inclined participants to make their waking reports and ratings when they were alone. Even in the third study, in which the waking samples were taken following a beeper signal, participants could elect to wait until the next signal if the timing was inconvenient, for example, if the individual was driving and could not pull over easily. Perhaps participants were also inclined to defer to the next signal when they were with other people.

A similar pattern was observed for Emotion, which, although it is not a metacognitive skill, is often considered to be a "defining" feature of dreaming (Hartmann 1998; Hobson 1988; 1993; Kramer 1993). Emotion was more often attributed to dreaming experiences (89 percent of all dreams) than to waking experiences (76 percent) when participants reported and rated a dream they remembered well upon awakening in the morning (spontaneous dream recall) (Kahan and LaBerge 1996; Kahan et al. 1997). However, in the DreamLight study, for dreams sampled from late-night REM and NREM sleep, emotion was attributed to dream reports and waking reports equally often (62 percent, 75 percent, and 75 percent for NREM, REM, and waking experiences, respectively).

Table 22.5 Aspects of Metacognition and Emotion Tending to Have Higher Frequencies in Dreaming than in Waking

Dimension	*Sample*[a]	*(N)*	*Dreaming Episode(s)*	*Waking Episode(s)*	*D:W Ratio*
Public self-consciousness	Pract (P)	(38)	.53	.32	1.66
	Novice #1 (N1)	(50)	.34	.22	1.55
	P + N1	(88)	.44	.27	1.63[b]
	Novice #2	(40)	.35	.23	1.52
	Judges	(2)	.20	.20	1.00
Emotion	Pract	(38)	.87	.71	1.22
	Novice #1	(50)	.92	.80	1.15
	P + N1	(88)	.89	.76	1.17[b]
	Novice #2	(40)	.93	.83	1.12
	Judges	(2)	.38	.35	1.09

[a]Samples were the Practiced Dreamers (N = 38) (Pract) and the Novice Dreamers (N = 50) (Novice #1) described in Kahan et al. 1997, and the Novice Dreamers (N = 40) (Novice #2) and Independent Judges (N = 2) (Judges) described in Kahan & LeBerge 1996. The Novice #2 sample is a subset of the Novice #1 sample; the Judges' ratings were made of the dream reports provided by the Novice #2 sample.
[b]Comparison between dreaming and waking is significant at $p < .05$.

Metacognition Attributed to Dreaming and Waking Experiences with Comparable Frequencies

In all three studies, the incidence of "Internal Commentary" was comparably high for dreaming and waking experiences. (See table 22.6.) Overall, 75 percent of all dreaming and 71 percent of all waking experiences were rated by participants as including "Internal Commentary."

No consistent trend was observed for either Sustained Attention or Sudden Attention. In general, 69 percent of the dreaming and 69 percent of the waking experiences were rated as including "Focused Attention." However, two out of the three samples (Practiced Dreamers in Kahan et al. 1997, and participants in Kahan and LaBerge 2000) attributed focused attention to waking experiences more often than to dreaming experiences. The opposite relationship was observed in the sample of novice dreamers (Kahan et al. 1997). In general, 60 percent of the dreaming and 47 percent of the waking experiences were rated as including "Sudden Attention." However, this time, two of the samples (Practiced Dreamers and Novice Dreamers in Kahan et al. 1997) attributed sudden attention more often to *dreaming* than to waking experiences. In the third study, sudden attention was attributed to dreaming and to waking with

Table 22.6 Aspects of Metacognition and Emotion Tending to Have Comparable Frequencies in Dreaming and Waking

Dimension	*Sample*[a]	*(N)*	*Dreaming Episode(s)*	*Waking Episode(s)*	*D:W Ratio*
Internal commentary	Pract (P)	(38)	.92	.87	1.06
	Novice #1 (N1)	(50)	.88	.80	1.1
	P + N1	(88)	.90	.84	1.07
	Novice #2	(40)	.90	.83	1.08
	Judges	(2)	.63	.68	.93
Focused attention	Pract	(38)	.76	.84	.91
	Novice #1	(25)	.68	.48	1.42[c]
	Novice #2	(40)	.55	.58	.95
	Judges	(2)	.48	.58	.83

[a]Samples were the Practiced Dreamers (N = 38) (Pract) and the Novice Dreamers (N = 50) (Novice #1) described in Kahan et al. 1997, and the Novice Dreamers (N = 40) (Novice #2) and Independent Judges (N = 2) (Judges) described in Kahan & LeBerge 1996. The Novice #2 sample is a subset of the Novice #1 sample; the Judges' ratings were made of the dream reports provided by the Novice #2 sample.
[b]Comparison between dreaming and waking is significant at $p < .05$.
[c]Comparison involved only the 25 Novice Dreamers who selected the time for recording the waking episode, because the "will-call" instructions for the other 25 participants artificially elevated the incidence of focused attention in the waking condition (Kahan & LaBerge 1996).

comparably low frequencies (25 percent, 33 percent, and 38 percent for NREM, REM, and Waking experiences, respectively). (See table 22.3.)

In summary, this series of studies clearly demonstrates that metacognition does occur in dreaming, including NREM dreaming. Across the three studies, a consistent cross-state relationship was observed for a number of metacognitive skills (e.g., Choice; Self-Reflection; Public Self-Consciousness; Internal Commentary) as well as for emotion. The patterns for Sustained Attention and Focused Attention were less reliable. The findings of Kahan and her colleagues indicate that dream metacognition occurs with considerable frequency, that the differences in metacognitive skills across waking and dreaming are more likely quantitative than qualitative, and that metacognition in dreaming, especially dreaming sampled from REM sleep, is more similar to waking cognition than it is different. Kahan's research also suggests we need a more nuance understanding of the relationship between waking and dreaming cognition. There are *both* similarities and differences in cognition and metacognition across waking and sleep, and additional research is needed to map these cross-state variations. (Also see Kahan and LaBerge, 2001.)

Dreaming Cognition, Waking Cognition: Some Considerations for Future Research

When designing future research on cross-state variations in consciousness and cognition, both methodological and theoretical issues warrant consideration.

Methodological Issues.

First, it is important to consider the ways in which theoretical biases might impact one's measurement approach. For example, if we make the a priori assumption that reflective awareness or intentionality does not characterize dreaming experience, then we are less likely to work to develop reliable methods for measuring such events. Similarly, if we assume that reflectiveness or intentionality do characterize dreaming, participants may be inclined to overstate the presence of these events in order to "please" the investigators. Or if we believe that waking is uniformly "conscious" and rational and that we can simply assume the characteristics of waking as the backdrop against which we compare dreaming, then we are not likely to make an effort to systematically compare the cognitive, metacognitive, or affective characteristics of dreaming and waking.

Second, what constitute the most valid (and reliable) measures of metacognition across sleep and waking? For example, what is the most appropriate waking situation to compare with dreaming? Some investigators have compared dreaming with waking imagery (Levin 2000; Strauch and Meier 1996), whereas others have compared dreaming with waking *experience* (Kahan and LaBerge 1996, 2001; Kahan et al. 1997). What are the most appropriate research techniques for sampling dreaming and waking consciousness? (See Pekala 1991.) Are questionnaire-based measures that utilize affirmative probes, such as those employed by Kahan and her colleagues and Hobson and his colleagues (Hobson and Stickgold 1994) more valid and reliable than third-person ratings of narrative reports? (See Kahan 1994.) How many participants and how many samples are needed to obtain "stable" measures? Should measures taken in the home setting or the lab setting? How critical is the need for converging measures of phenomenology, cognition, and psychophysiology? As Howard Gardner (1994: 44–45) has suggested: "If cognitive

scientists want to give a complete account of the most central features of cognition [and consciousness], they (or other scientists) will have to discover or construct the bridges connecting their discipline to neighboring areas of study—specifically, to neuroscience at the lower bound, so to speak, and to cultural studies at the upper."

Converging measures of phenomenology, cognition, and neurophysiology would be helpful, not for purposes of reducing one level of analysis to another, but in order to understand the correspondences between these different levels and whether there are neurophysiological or state constraints on consciousness. (Also see Antrobus 1991; Kahan and LaBerge 1994; Nelson 1996; Varela et al. 1995.)

Theoretical Issues

Future research also should consider individual difference factors beyond dream recall frequency. It may well be that some of the findings from the "discontinuity" and "continuity" camps could be accounted for by individual differences. David Foulkes's longitudinal studies of children's dreaming, for example, clearly demonstrate that the cognitive sophistication of dreaming is related to waking cognitive development (Foulkes 1995, 1999). There is also a development course for the acquisition of metacognitive skills, although not all individuals develop all aspects of metacognition. (See Byrnes 2001; Foulkes et al. 1991; Kuhn 2000.) Furthermore, cognitive and other characteristics of dreams have been shown to be related to individual differences in, for example, experiencing level (Hendricks and Cartwright 1978), waking affective insight (Nielsen, Kuiken, and McGregor 1989), creativity (Domino 1982; Levin and Lamontoro 1997–98), attitude toward dreams (Tonay 1993), need for cognition (Blagrove and Hartnell 2000), daydreaming style (Starker 1984–85), mental boundaries (Hartmann, Rosen, and Rand 1998), absorption in imaginings (Schredl, Jochum, and Souguenet 1997), and current concerns (Saredi, Baylor, Meier, and Strauch 1997).

The characteristics of an individual's dreams are also influenced by his or her presleep intentions or motivation, as demonstrated in LaBerge's research on lucid dreaming and the work of Purcell, Moffitt and their colleagues on nonlucid dreams. Interest and practice in "cultivating" dreaming skills (lucid control dreaming, problem-solving dreams, or "teaching" dreams) will, therefore, have an impact on the level of dream recall as well as the specific characteristics of those dreams (Cartwright and Lamberg 1992; Hunt 1989; LaBerge 1985; Tedlock 1992; Young 1999). As Purcell et al. (1986: 436) write: "attention paid to dreaming sets in motion the process by which waking and dreaming self-reflectiveness may become codetermining."

One's religious practices and cultural values also shape the incidence and forms of dreaming, including dream consciousness. "Attention" and "intention" are more likely to be applied to dreams and dreaming when one's religious or cultural communities encourage dreaming and dream sharing (Bulkeley, 1994; Bulkeley 2000; Hunt 1989; Jung 1965; Kuiken and Sikora 1993; Moffitt et al. 1988; Young 1999).

Buddhist scholar Serinity Young (1999: 119), for example, points to the power of dreams to transform one's waking experience: "Dreams can reveal to an individual insights so powerful that the concerns or realities of waking life are lost in the blinding light of this new awareness. Such a dream shapes their reality, shapes their understanding of the waking world."

On a related note, anthropologist Barbara Tedlock (1992) has argued that we need to put the discussion of dreaming/waking cognition and experience in the context of

our Western cultural perspective on dreaming as "unreal" and waking experience as "real." Cognitive scientists, in particular, would do well to consider their bias toward waking cognition as the "pinnacle" of cognitive achievement. It is possible that dreaming cognition and consciousness surpass that of waking precisely because there are unlimited possible worlds and possible selves that can be represented in dreaming.

Conclusion

This chapter explored whether dreaming cognition and consciousness are discontinuous or continuous with waking. With a focus on the metacognitive skills of self-reflection, intentionality, and behavior regulation, we reviewed evidence for the divergent claims that metacognition is either absent or present in dreaming. Recent work on both lucid and nonlucid dreaming clearly indicates that metacognition does occur in dreaming, and with considerable frequency. This research shows that the same range of metacognitive skills occurs in dreaming as in waking, although certain metacognitive skills (e.g., choice and self-reflection on one's own thoughts, feelings, or behaviors) occur less often in dreaming than in waking.

Future research on cross-state cognition and consciousness must replicate these findings and also push both the methodological and theoretical boundaries of previous research. We need to investigate how individual differences as well as cultural and religious factors shape consciousness both within and across waking and sleep. (Also see Hunt 1995.) By considering these "boundaries" in future investigations of consciousness in dreaming and waking, and continuing to hone our methodologies, ultimately we may design a more accurate map of the entire territory of human consciousness. As Havelock Ellis remarked, "dreams are real while they last; can we say more of life?"

Notes

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1. Recently Hobson and his colleagues have focused on dream bizarreness as the most distinctive feature of dreaming and have attempted to account for dream bizarreness in terms of REM neurophysiology. (See Hobson 1988; Hobson and Stickgold 1994; Kahn and Hobson 1993; Kahn, Pace-Schott, and Hobson 1997). However, their own empirical work provides only equivocal support for this claim, and other research on dream bizarreness indicates that bizarreness is overrepresented in spontaneously recalled home dreams as compared with dreams sampled in the sleep laboratory (e.g., Bonato, Moffitt, Hoffmann, Cuddy, and Wimmer 1991; Cipolli, Bolzani, Cornoldi, De Beni, and Fatioli 1993; Robinson-Riegler and McDaniel 1994). This research raises questions about the claim that bizarreness is, in fact, the central defining feature of dreaming, as claimed by Hobson and his team (e.g., Hobson and Stickgold 1994:10).

2. Foulkes's claims regarding metacognition in dreaming are unfortunate for cognitive dream psychology. In spite of his "call" to include dreaming in the domain of cognitive psychology and the necessity for quality empirical work on dream cognition (e.g., Foulkes 1993), a ready extension of his theoretical position is that there is little value in investigating dream cognition, since it merely "reflects" waking cognition. Thus, anything that cognitive psychologists might wish to know about cognition is essentially revealed by studying waking cognition, thereby avoiding the expense of a sleep laboratory and the methodological challenges inherent in dream research. However, this seemingly sensible conclusion flies in the face of earnest arguments, including those made by Foulkes himself, of why cognitive psychologists *should* study dreaming. (See Foulkes 1985, 1991b, 1999; Foulkes and Cavallero 1993; Haskell 1986; Hunt 1986).
3. For whatever individual cases are worth, the "tree" narrative discussed earlier was a report from a nonlucid dream.
4. Weinstein, Schwartz, and Ellman (1988) define "reflective self-awareness" as "an awareness that one was having an internal, mental experience with no external referents" (p. 211). This is the traditional definition of *lucid* dreaming (Van Eeden 1913) and should not be confused with Purcell and associates' concept of "self-reflection" as an "examination of one's thoughts, feelings, and behaviors" (Purcell et al. 1986: 424). Weinstein and coworkers' claim that heightened REM activation is associated with a suspension of the awareness of state is especially curious in light of evidence that the onset of lucid dreaming is associated with phasic REM. (See LaBerge and Dement 1986; LaBerge 1988, 1990).
5. The comparisons across high- and low-frequency dream recallers included an N of forty eight, because data from Experiment 1 were combined with data from the baseline condition of Experiment 2.

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23

Dialogue with a Skeptic

Frederick Crews and Kelly Bulkeley

This exchange is a revised transcript of a conversation between Frederick Crews and myself at a public symposium titled "Beyond Freud and Jung? The Interpretation of Dreams, Religion, and Culture," sponsored by the Religion and Psychology Area (Area 5) of the Graduate Theological Union in Berkeley, California on September 23, 2000. Fred's comments and my response to them are a fitting conclusion to this book because they highlight the ongoing challenges that face anyone who seeks to explore and understand the realm of dreams.

Comments of Frederick Crews

Let me begin by asking what we are really after today, in this largely religious setting and company. Is it a cross-cultural study of dreams? If so, much can be accomplished. It's a wonderful field of intellectual endeavor, and books on the subject are pouring out. The latest, I believe, is *Dream Cultures: Explorations in the Comparative History of Dreaming,* edited by David Shulman and Guy G. Stroumsa (Oxford University Press, 1999). Books like that can tell us a great deal. However, they don't tell us about dreams and dreaming per se, much less about an alleged cross-cultural significance of dreams. Rather, they explore what different societies have made of dreams. There can be no methodological objection to such study. But if this present company is inclined to wax transcendental about dream meaning, drawing some kind of spiritual comfort from it, I will have to be counted in the opposition.

The problem is simple and fundamental. If we are inclined to make pronouncements about the meanings of dreams based on our own intuitions, our own presuppositions, we must face the awkward fact that every society has always found just what it wants to find in dreams. That being so, we ought to be wary of showing the same parochialism ourselves. Outside of the sleep laboratory, I don't believe we even get terribly reliable knowledge of the bare content of dreams. Unless you wake someone up immediately when you sense that he or she is dreaming, you are dealing with summarized dream reports, not with dreams, and those reports reach you with a significant time lag that provides the dreamer with time to interweave the sheer memory of