

Cognition and Metacognition in Dreaming and Waking: Comparisons of First and Third-Person Ratings

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Two approaches to measuring dreaming and waking cognition were compared. Forty-three subjects wrote detailed descriptions of a dreaming and a waking experience and also used a questionnaire to evaluate the presence of particular types of cognition and metacognition in the target experience. Later, independent judges rated the subjects' narrative reports for the incidence of the same types of cognition and metacognition. A lower incidence of some types of cognition was observed when assessment was based on judges' ratings of the narrative reports than when subjects themselves assessed the incidence of these events. However, the basic relationship between dreaming and waking cognition was consistent for both measurement approaches. Subjects' and judges' evaluations of dreaming and waking experiences did not differ for internal commentary, sudden attention, focused attention, public self-consciousness, emotion, self-reflection, and thwarted intentions, although both subjects and judges attributed choice to waking experiences more often than to dreaming experiences. The value of using converging measures to compare dreaming and waking cognition is discussed, as well as whether dreaming cognition is best conceptualized as continuous or discontinuous with waking cognition.

KEY WORDS: dreaming; self-awareness; metacognition.

INTRODUCTION

The assertion that metacognitive skills, such as reflective awareness, characterize waking cognition but not dreaming cognition is tacitly accepted by many dream theorists even though little empirical evidence has been offered to support this claim (Haskell, 1986; Kahan, 1994; Kahan & LaBerge, 1994; Purcell, Moffitt, & Hoffmann, 1993; Moffitt, 1995, for recent discussions of deficiency theories). Reflective awareness is awareness of subjective experience itself, for example, of one's

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ongoing thoughts, feelings, or actions (cf. Globus, 1987, Ch 2; James, 1890; Nat-soulas, 1987; Pollio, 1990). A critical feature of reflective awareness, or what Jennings, Holmstrom, and Karp (1986) term "reflectivity," is "a capacity for taking some psychological distance from oneself, e.g., self-objectification" (p. 88).

Recent evidence suggests that sleep cognition surprisingly often includes reflective awareness and other metacognitive abilities (Bradley, Hollifield, & Foulkes, 1992; Kahan, 1994; Kahan & LaBerge, 1994; Kuiken & Sikora, 1993; Purcell, Mullington, Moffitt, Hoffmann, & Pigeau, 1986; Purcell et al., 1993). For example, Kahan and LaBerge (1994) argue that "lucid dreams" (dreams in which the dreamer is aware of dreaming while dreaming) challenge the common view that cognition during dreaming is inherently "deficient" (cf. Green, 1968; Saint-Denys, 1982; van Eeden, 1913). Laboratory-verified lucid dreams provide clear examples of high-order cognitive abilities during dreaming (Hunt, 1989; LaBerge, 1985; LaBerge, 1990). Other research suggests that *nonlucid* dreaming also involves sophisticated cognitive skills, including reflective awareness (Bradley et al., 1992; Darling, Hoffmann, Moffitt, & Purcell, 1993; Kahan, 1994; Purcell et al., 1986). An important implication of this body of research is that dreaming cognition may be characterized by the same range of cognitive abilities as waking cognition. Such continuity across waking and dreaming cognition contradicts the views of many dream theorists who claim that dreaming and waking cognition are qualitatively different (Blagrove, 1992; Domino, 1976; Freud, 1900/1953; Globus, 1987; Hartmann, 1973; Hobson, 1988; Koukkou & Lehman, 1983; Kunzendorf, 1987; Rechtschaffen, 1978; Weinstein, Schwartz, & Ellman, 1988).

Measurement Issues: Appropriate Waking State Comparisons

When studying the relationship between dreaming and waking cognition, it is necessary to select an appropriate waking state comparison. Most discussions of qualitative differences between dreaming cognition and waking cognition have failed to provide comparable samples of waking and dreaming cognition. Instead, dreaming cognition is contrasted with an a priori view of waking cognition as rational, reflective, and "mindful" (Blagrove, 1992; Crick & Mitchison, 1983; Domino, 1976; Foulkes, 1990; Freud, 1900/1953; Hartmann, 1973; Hobson, 1988; Koukkou & Lehman, 1983; Kunzendorf, 1987; Rechtschaffen, 1978; Ullman, 1969). However, the results of a study by Antrobus, Reinsel, and Wollman (1984) call this a priori assumption into question. Narrative reports of dreaming and waking mentation, collected in similar settings, were rated for "dreamlike" quality, hallucinatory quality, and bizarreness. Antrobus et al. found that "REM reports are surprisingly similar in most respects to mentation sampled from the waking state under identical laboratory conditions" and, "surprisingly, bizarreness increases with increasing activation, both within REM sleep and waking, under zero illumination conditions" (p. 103; see also Reinsel, Antrobus, & Wollman, 1992).

The relationship between dreaming and waking cognition deserves empirical inquiry in which every effort is made to sample dreaming and waking experience in a comparable manner. Where such dreaming/waking comparisons have been at-

tempted, researchers generally have observed parallel variations in attention and memory processes (Cartwright, 1981; Foulkes & Fleisher, 1975; Kripke & Sonnenschein, 1973; Starker, 1974; also see Langer, 1989).

Measurement Issues: Reliance on the Narrative Report

Embedded in the controversy over whether dreaming and waking cognition are qualitatively different is the question of how best to measure cognitive and (especially) metacognitive skills. As Purcell et al. (1993) noted, there is a need to develop "psychometrics which reflect the broader range of dream functioning reported in the phenomenological literature" (p. 204). To date, the dreamer's narrative report has been the primary source of evidence for the supposedly distinctive characteristics of dreaming. And yet, how reliable are narrative reports as evidence of cognitive and metacognitive processes? Are certain cognitive and metacognitive abilities obscured by reliance on narrative reports?

Kahan (1994) argues that narrative reports of dreaming probably follow a "story" schema (Thorndyke, 1977) that structures recollection around the "where," "when," "what," and "who" of the dream experience. Descriptions of reflective awareness and other forms of metacognition (e.g., noticing one's internal commentary, one's feelings and thoughts, or one's self-regulating deliberations) are less likely to be included in a spontaneous narrative report, partly because these "processes" are typically not part of one's recollection "schema" (Bower, 1970) or "agenda" (Johnson, 1992). Purcell et al. (1993) make a related point: "What varies is the degree to which the dreamer's intention or action is cognitively developed and acted upon with success for the dreamer, *although these may not be well explicated in the spontaneous dream report*" (p. 213, emphasis added). So, an important question is whether narrative reports provide a valid measure of cognitive abilities during dreaming or, for that matter, during waking. If recollections of both dreaming and waking experiences are normally structured by a story schema that guides recall towards the "what" but not the "how" of an experience, then we would not expect to find much evidence of metacognition in recollections of either dreaming or waking experience.

The Present Study

The goal of the present study was to compare two measures of cognitive and metacognitive processes. For one measure, we used a questionnaire to ask subjects direct questions about particular qualities of their waking or dreaming experience (cf. Pekala, 1991). We expected that this procedure would cue recall for aspects of experience that might be unrepresented in the spontaneous narrative report (Johnson, 1992; Johnson, Kahan, & Raye, 1984; Kahan, 1994). The questionnaire also might attenuate any state-dependent difficulties due to recalling a dream experience from the waking state (Botman & Crovitz, 1990; Eich, 1980). The first measure, then, was subjects' first-person, questionnaire-based assessment of whether

particular cognitive or metacognitive events occurred during their dreaming or waking experiences.

The second measure relied upon subjects' spontaneous narrative reports. Independent judges used the same questionnaire format as the first-person raters to assess these narrative reports for evidence of particular types of cognitive and metacognitive processes. This measure is comparable to the usual form of assessment in dream psychology, which considers judgments of the narrative report its primary data source.

In related research, Gackenbach (1988) compared subjects' and judges' evaluations of dreams, but her objectives and methods differed from the present ones in several ways. First, she was interested in whether dream content (e.g., Hall and Van de Castle, 1966, categories) differed across two groups of target narratives, whereas the present study is concerned with cognitive and metacognitive processes (see Foulkes, 1985). Second, she was comparing lucid and non-lucid dreams, whereas the present study focused on dreaming and waking narratives. Third, in contrast to the present effort, Gackenbach's (1988) procedures did not permit the comparison of self-evaluations and judges' ratings of the *same* target events. Thus, although she found that self-evaluations and judges' ratings of content variables similarly differentiated lucid and nonlucid dreams, her findings do not address whether self-evaluations and judges' ratings of cognitive and metacognitive variables will similarly differentiate dreaming and waking narratives.

Predictions

The procedures used in the present study permitted evaluation of the following hypothesis: if cognitive and metacognitive processes tend to be under-described in the spontaneous narrative report, then evidence of cognition and metacognition in dreaming and waking should be more apparent in subjects' first-person responses on the questionnaire than in the judges' third-person evaluations of the subjects' narrative reports.

METHOD

Subjects. Twenty-two male and 21 female undergraduates ($N = 43$) from a private northern California university participated for partial course credit in introductory psychology courses. Their ages ranged from 18 to 37 ($M = 20$). Subject recruitment included a request for individuals who recalled their dreams on a "regular" basis. All subjects reported recalling an average of 3-5 dreams per week. Eight percent of the subjects reported having kept a dream journal prior to the study. Six percent reported having had one or more lucid dreams in the past 6 months (and the narrative reports in the present study included only one lucid dream).⁴

⁴The present subject sample is a subset of the sample described in Kahan et al. (in press, Study 2). Seven of the original 50 subjects were not eligible for the present study because they had not provided narrative descriptions of their waking or dreaming experiences.

Materials. The Metacognitive, Affective, and Cognitive Experience (MACE) questionnaire was used to measure the incidence of: choice, internal commentary, sudden attention, focused attention, public self-consciousness, emotion, self-reflection, and thwarted intentions (see Kahan, LaBerge, Levitan, & Zimbardo, in press, for discussion of the development of the MACE). Several of the MACE questions are presented in Appendix A. (The complete MACE questionnaire is available from the first author). For each affirmative response, the questionnaire asks subjects to describe an example of the relevant dimension (e.g., attention, self-reflection, internal commentary) from their target dreaming or waking experience. We assumed that an individual providing a valid report of a selected feature should be able to describe an example of that feature from the target experience (cf. Klein & Loftus, 1990; Klein, Loftus, & Burton, 1989).

Orientation Session. In groups of 6-10, subjects met with an experimenter for an orientation session. The experimenters, who were blind to the hypothesis, were undergraduate students trained by the first author in the experimental protocol. During this session, subjects first completed a consent form, gave a telephone number, and listed convenient times to call. Next they provided demographic information and general information about their sleeping and dreaming patterns.

Then subjects received instruction in the use of the MACE. They were informed that the purpose of the study was “to compare experiences that occur during waking and sleeping.” The experimenters explained that subjects were to obtain one sample of a waking experience and one sample of a dreaming experience during the following week. At prearranged times (specified below), the subject was expected to stop other activities, describe the preceding 15 mins of waking or dreaming experience in as much detail as possible, and then complete the MACE questionnaire. The experimenter emphasized that, for each question on the MACE, the subject was to decide whether the target experience included the relevant cognitive or metacognitive process (e.g., choice), and, if so, to describe an example of that process from the target experience. They were also reminded to answer the questions with reference to the target experience *per se*—and not with reference to their experience while completing the questionnaire.

Subjects left the orientation session with two copies of the MACE (one titled “Waking Experience Questionnaire” and another titled “Dreaming Experience Questionnaire”), along with instructions for which sample to obtain first, where to return the materials, and whom to contact if questions arose.

Procedures for Sampling Dreaming and Waking Experiences. Subjects were randomly assigned to one of two conditions for sampling the waking experience, either “Saturday/Sunday” (Sat/Sun) instructions or “Will Call” instructions. Subjects who received Sat/Sun instructions were assigned either Saturday or Sunday as their “waking experience” day. At 2 pm on the assigned day, the subject was to describe the preceding 15-min period in as much detail as possible and then complete the MACE. Subjects were discouraged from planning in advance their activities during those 15 mins. Subjects who received Will Call instructions were telephoned by an experimenter during one of the periods identified as “convenient” during the orientation session. Upon receiving the phone call, the subject immediately recorded the preceding 15 mins and then completed the MACE.

For the dream experiences, each subject chose a morning when a dream was recalled clearly. The subject wrote a detailed description of the final 15 mins (approximately) of the dream and then completed the MACE.

One-half of the subjects in each of the two instruction conditions were randomly selected to complete the Dreaming questionnaire first and the other half completed the Waking questionnaire first. When subjects had completed both the waking and dreaming tasks, they returned their materials to the office of the first author and received the research participation units for their psychology course.

Procedures for Independently Scoring the Subjects' Narrative Reports. Student research assistants duplicated the subjects' narrative reports, removing obvious references to "waking" or "dreaming," as well as introductory remarks (e.g., "the first thing I remembered when I awoke this morning") and closing remarks (e.g., "and then I opened my folder and took out this questionnaire"). A second team of student assistants was trained to apply the MACE to the narrative reports. These judges used the MACE to evaluate the reports for evidence of the eight dimensions of interest (choice, internal commentary, sudden attention, focused attention, public self-consciousness, emotion, self-reflection, and thwarted intentions). Judges were blind to whether a report described a waking or a dreaming experience, to the subjects' responses to the various questions, and to the experimental predictions.

For each question on the MACE, judges read the narrative report for evidence of the relevant cognitive or metacognitive process. If the judge checked "yes" on the questionnaire, the report was annotated to indicate which aspect of the report exemplified the cognition or metacognition in question. Scoring discrepancies were resolved in a three-way discussion involving both judges and the first author. The overall inter-rater reliability was .86.

RESULTS AND DISCUSSION

Preliminary Analyses

A word count was obtained for each narrative report. If the word count for the waking report was less than 25% of the word count for the dream reports, a subject was excluded from the analysis. Using this criterion, two males were dropped from the Sat/Sun instructions group and one female was dropped from the Will Call instructions group. This procedure provided an equal number of males and females in the two instructional conditions ($N = 40$).

The mean word count for dreaming reports was 202 (range: 31 to 532; $SD = 118$) and for waking reports it was 127 (range: 31 to 320; $SD = 69$). Analysis of Variance (ANOVA) was used to analyze word counts as a function of State (Dreaming, Waking), Waking Instructions (Sat/Sun, Will Call), and Sex of subject. Dreaming reports included significantly more words than did waking reports, $F(1, 36) = 22.02$, $MSe = 5040.40$, $p = .001$, although no other differences were significant. Because subjects' dreaming reports contained more words than did their waking reports, word count was used as a covariate in the analyses that follow.

Effects of Waking Instructions

The Will Call instructions group was included in the initial study (Kahan et al., in press) to determine whether subjects' reports of waking experiences varied when waking events were sampled at less predictable times. Although the influence of waking instructions was not of primary interest in the present study, effects of this factor might qualify comparisons between first-person and third-person ratings of the target episodes. Therefore, waking instructions was included as a factor in our analyses.

Analysis of covariance (ANCOVA) was used to analyze the resulting 2 (State: Dreaming, Waking) \times 2 (Instructions: Sat/Sun, Will Call) \times 2 (Evaluator: Subjects, Judges) design with State as a within-subjects factor and Waking Instructions and Evaluator as between-subjects factors. The word count from the narrative reports was included as a covariate.

For two MACE dimensions, "sudden attention" and "focused attention," Waking Instructions interacted with either Evaluator or State. These dimensions will be described first.

Sudden Attention. Subjects reported a higher incidence of "sudden attention" associated with their target experiences than did judges of the subjects' narrative reports, $F(1, 75) = 33.01$, $MSe = .15$, $p < .001$. But, there also was a significant Waking Instructions by Evaluator interaction, $F(1, 75) = 6.05$, $MSe = .15$, $p = .016$, indicating that the difference between subjects and judges in the incidence of "sudden attention" was greater for the Will Call instructions (M diff = .50) than for the Sat/Sun instructions (M diff = .20).

Focused Attention (Attention + Intention). For focused attention, there was a reliable State by Waking Instructions interaction, $F(1, 75) = 7.69$, $MSe = .18$, $p < .01$. For the Will Call instructions, subjects and judges more often attributed focused attention to waking episodes ($M = .68$) than to dreaming episodes ($M = .43$), $F(1, 38) = 4.40$, $MSe = .18$, $p = .04$, whereas, for the Sat/Sun instructions, subjects and judges attributed focused attention to waking episodes ($M = .48$) and to dreaming episodes ($M = .60$) nearly equally often.

The increases in "sudden attention" and "focused attention" during waking experiences in the Will Call condition were likely a result of the phone call made by the experimenter (see Kahan et al., in press, for an extended discussion). The consequence for the present report is that the incidence of "sudden attention" and "focused attention" during waking may be inflated.

Comparisons of First-Person and Third-Person Ratings of Dreaming and Waking Episodes

For the remaining six dimensions (choice, internal commentary, public self-consciousness, emotion, self-reflection, and thwarted intentions), ratings of the dreaming and waking episodes were not influenced by Waking Instructions. Therefore, Table 1 presents the proportions of dreaming and waking episodes rated as including the dimensions of interest, collapsed across the two Waking Instruction

conditions. ("Sudden attention" and "focused attention" are included in Table 1, but the reader is urged to keep in mind that the ratings on these dimensions for the waking episode were also influenced by the Waking Instructions.)

Choice. As expected, subjects reported a higher incidence of choice in both types of target experiences than did the judges, $F(1, 77) = 30.81$, $MSe = .18$, $p < .001$, suggesting that this dimension is under-described in narrative reports (see Kahan, 1994). Also, both subjects and judges more often attributed choice to waking experiences than to dreaming experiences, $F(1, 77) = 23.46$, $MSe = .17$, $p < .001$, suggesting that there is a relative lack of volition within dreams sampled under these conditions.

Internal Commentary. Also as hypothesized, subjects reported a higher incidence of internal commentary (e.g., "I wondered why we were leaving so many of our possessions behind") than judges found in the narrative reports, $F(1, 77) = 7.57$, $MSe = .24$, $p = .007$. However, unlike with choices, internal commentary was associated with waking and dreaming experiences about equally often. The high incidence of such internal commentary in *both* domains contradicts Rechtschaffen's (1978) claim that dreaming is "single-minded," i.e., that it does not include the capacity for participating in an event and simultaneously commenting on it.

Public Self-Consciousness. Contrary to expectations, subjects' ratings of the incidence of public self-consciousness during their target experiences did not differ from judges' ratings of the narrative reports, $F(1, 77) = 1.49$, $MSe = .21$, $p = .23$. Also, no reliable difference was observed in the frequency with which public self-consciousness was associated with waking and dreaming experiences, $F(1, 77) =$

Table 1. Mean Proportion of Subjects ($N = 40$) and Judges Reporting Each Type of Cognitive Event in Dreaming and Waking

Cognitive event		Dreaming episode	Waking episode	D ÷ W ratio
Choice ^{1,3}	Ss	.40 ²	.83 ²	.48
	Judges	.10	.30	.33
Internal Commentary ³	Ss	.90 ²	.83 ²	1.08
	Judges	.63	.68	.93
Sudden Attention ³	Ss	.63 ²	.58 ²	1.09
	Judges	.33	.18	1.83
Focused Attention ³	Ss	.55	.58	.95
	Judges	.48	.58	.83
Public Self-consciousness ³	Ss	.35	.23	1.52
	Judges	.20	.20	1.00
Emotion ³	Ss	.93 ²	.83 ²	1.12
	Judges	.38	.35	1.09
Self-Reflection ³	Ss	.53	.63	.84
	Judges	.33	.50	.66
Thwarted Intentions ³	Ss	.43	.48 ²	.90
	Judges	.33	.20	1.65

Note: Superscripts indicate outcomes for simple main effects.

¹Comparison between dreaming and waking significant at $p < .05$.

²Comparison between subjects and judges significant at $p < .05$.

³Pattern was comparable for subjects and judges, whether the comparison between dreaming/waking was significant (Choice) or was not significant (all other dimensions).

.05, $MSe = .15$, $p > .05$. In fact, rather low levels of public self-consciousness were characteristic of *both* waking and dreaming experiences.

Emotion. As predicted, subjects reported a higher incidence of emotion during their target experiences than judges observed in the narrative reports, $F(1, 77) = 62.48$, $MSe = .17$, $p < .001$. The frequency of rated emotion did not differ reliably across waking and dreaming experiences, $F(1, 77) = .62$, $MSe = .17$, $p > .05$. Thus, it would seem that judges' ratings of the dream narrative under-describe the incidence of emotion when compared with subjects' self-assessments, although it also may be that first-person questionnaire procedures bring attention to very mild or fleeting feelings that are typically ignored.

Self-Reflection. Contrary to expectations, subjects' reports of self-reflection (e.g., "I was thinking about why my ex-boyfriend was being so nice to me") during their target experiences did not differ from the judges' ratings of the narrative reports, $F(1, 77) = 3.41$, $MSe = .31$, $p = .07$. Also, there was no significant difference in the frequency with which evaluators attributed self-reflection to waking versus dreaming experiences, $F(1, 77) = 2.63$, $MSe = .16$, $p = .11$.⁵ The rather common occurrence of self-reflection during *both* waking and dreaming contradicts familiar claims that dreaming lacks the capacity for self-reference (e.g., Blagrove, 1992; Hobson, 1988; Rechtschaffen, 1978).

Thwarted Intentions. As hypothesized, subjects reported a higher incidence of thwarted intentions (unusual difficulty accomplishing a task) in their target experiences than judges observed in the narrative reports, $F(1, 77) = 6.86$, $MSe = .21$, $p = .01$. There was no reliable difference in the frequency with which thwarted intentions were associated with waking and dreaming experiences, $F(1, 77) = .87$, $MSe = .23$, $p = .28$.

Within-Subject Correspondences Between Dreaming and Waking Reports

For all dimensions except choice, the occurrence of cognitive and metacognitive processes from the MACE questionnaire did not differ across waking and dreaming reports for either subjects (first-person ratings) or judges (third-person ratings). In general, these patterns provide evidence of considerable "continuity" in cognitive and metacognitive capacities across waking and dreaming. Another way of addressing the "continuity" question, consistent with Foulkes' (1985; 1995) claim that dreaming cognition reflects waking cognitive abilities, is to consider the strength of association between subjects' ratings (or between judges' ratings) of the dreaming and waking episodes. For example, did subjects who rated their dreaming episodes as including internal commentary also rate their waking episodes as including internal commentary? Or, do judges' assessments of internal commentary in a subject's dream narratives correspond to their assessments of internal com-

⁵Kahan et al. (in press) reported that self-reflection was more often attributed to waking than to dreaming reports by subjects. This change in the relationship between dreaming and waking self-reflection probably occurred because the current analyses included word counts for the narrative reports as a covariate.

mentary in subjects' waking narratives? To address these questions, Phi coefficients were computed for each dimension (Ferguson & Takane, 1989).

Reliable associations between subjects' ratings of their dreaming and waking experiences were observed for three of the eight dimensions: internal commentary (Phi = .50, $p = .001$), focused attention (Phi = .34, $p = .03$), and self-reflection (Phi = .31, $p = .04$). Also, reliable associations between judges' ratings of the dreaming and waking narrative reports were observed for two dimensions: internal commentary (Phi = .34, $p = .03$) and self-reflection (Phi = .37, $p = .02$). In sum, there was some evidence for within-subject "continuity" in the occurrence of these types of cognition and metacognition.

GENERAL DISCUSSION

The present study compared first-person ratings and third person-ratings of samples of waking and dreaming experiences. First-person ratings were the subject's direct MACE questionnaire assessment of the occurrence of particular cognitive or metacognitive processes in the target event. Third-person ratings were provided by two trained judges who used the same format as the MACE questionnaire to evaluate the subjects' narrative reports of the target events. As expected, third-person ratings of the narrative reports revealed a generally lower incidence of choice, internal commentary, thwarted intentions, sudden attention, and emotion (see Table 1). However, while judges observed a lower incidence of these dimensions in the subjects' narrative reports than subjects themselves reported, the *pattern* across waking and dreaming events was consistent for both first- and third-person raters. That is, both the subjects *and* the judges of the subjects' narrative reports found that dreaming and waking possessed comparable levels of internal commentary, sudden attention, thwarted intentions, focused attention, public self-consciousness, emotion, and self-reflection. Also, both subjects *and* judges rated dreaming events as involving less choice than waking events.

The present findings suggest the utility of gathering both first-person and third-person ratings of particular dimensions of affect, cognition, or metacognition. The converging measures provided by the subjects' and judges' ratings of dreaming and waking experiences increase the validity of any claims concerning the relationship between dreaming and waking cognition. Converging measures also permit us to continue the discussion of how to index private, unobservable events such as dreams, imagery, mood, and attitudes (see also Pekala, 1991; Stoyva & Kamiya, 1968; Weinstein, Schwartz, & Arkin, 1991).

Implications for "Continuity" versus "Discontinuity" Views of Dreaming Cognition

The present findings are consistent with the proposition that dreaming and waking cognitive and metacognitive processes are more similar than different (e.g., Cartwright, 1981; Foulkes, 1985; 1995; Kahan & LaBerge, 1994; Moffitt, 1995; Mof-

fitt et al., 1988). Our data indicate, for example, that internal commentary and self-reflection are often associated with dreaming experiences, consistent with claims that dreaming and waking involve the same types of high-order cognition (e.g., Kahan & LaBerge, 1994; Moffitt et al., 1988; Moffitt, 1995). Further, for both internal commentary and self-reflection, there was a reliable within-subjects association between ratings of the dreaming and waking reports, whether the ratings were first-person (by the subjects themselves) or third-person (by the judges).

An unresolved methodological question is whether self-reflection and internal commentary occur during the act of recollection rather than during the target experiences per se (cf. Foulkes, 1990). However, the same concern might be raised about evidence for these types of metacognition during waking. If self-reflection or internal commentary is only added during the recollective process, then what would constitute valid evidence of cognitive or metacognitive processes during the original (waking *or* dreaming) experience? Perhaps the convergence of measures, such as the ratings provided by subjects and judges, is the most compelling evidence available for the presence of these types of metacognition in dreaming.

Qualifications and Suggestions for Future Research

There remain two other concerns regarding the present study. First, there is a basic confound in that *subjects* rated their *experience* using the questionnaire (having just recorded the narrative), while the *judges* rated the narrative *report* using the questionnaire. Thus, there were differences in who is rating (subject, judge) and in what is rated (recent experience, narrative report). In light of this confound, the degree of convergence between subjects' and judges' ratings is perhaps even more impressive. Nevertheless, this confound must be kept in mind when evaluating the pattern of responses for subjects and judges. Second, it must be acknowledged that support for the hypothesized continuity in cognition across waking and dreaming is claimed by virtue of non-significant differences between ratings of dreaming and waking experience. Perhaps dreaming and waking cognition do, indeed, differ but these differences were not reliable here because of sample size limitations, uncontrolled sources of error, etc.

We may be able to increase our confidence in the claim that particular types of cognition and metacognition characterize waking and dreaming by sampling waking and dreaming events immediately after their occurrence (see also Kahan et al., in press, for a discussion of other controls). Also, a "thought sampling" procedure (cf. Kerr, Foulkes, & Schmidt, 1982) might be used, in which subjects are interrupted several times a day (and night) and asked to describe their mental activity using structured questionnaires (also see Pekala, 1991). A related strategy might involve pre-training subjects to distinguish between the characteristics of a recollected experience per se and the inferences they make during the process of recall.

Of course, if metacognition only occurs during recollection and never during the original experience, we may never be able to describe dreaming or waking cognition per se. The reflective verbal report remains a primary, although inevitably

indirect, index of dreaming experience, which cannot be “mapped” onto observable external events in the way that reports of waking experience can.

Conclusions

Episodic recall of dreaming experiences did not evidence the global deficiencies in cognition asserted by many investigators—relative to episodic recall of waking experiences (see especially Blagrove, 1992; Hobson, 1988; Rechtschaffen, 1978). In fact, waking *and* dreaming experiences were frequently characterized by metacognition, including the ability to divide one’s attention (e.g., between the ongoing events and one’s reaction to them); to focus one’s attention on a task or goal; and to be self-reflective. Thus, the present data affirm that the differences between waking and dreaming cognition are not categorical, even though there may be *relative* differences in the frequency with which some events occur during waking or dreaming (e.g., choices). Although a lower incidence of some types of metacognitive experiences was observed when assessment was based on judgments of the traditional narrative report than when subjects assessed the incidence of these events via questionnaire, this basic pattern was consistent across waking and dreaming events.

The present study adds to the growing evidence that dreaming and waking include the same range of cognitive and metacognitive abilities (e.g., Foulkes, 1985; 1995; Kahan et al., in press; Moffitt, 1995; Purcell et al., 1986; Purcell et al., 1993), and also contributes to the development of reliable psychometric procedures for indexing cognition over the sleep/wake cycle.

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APPENDIX A

The Metacognitive, Cognitive, and Affective Experience (MACE) Questionnaire

Question 1: "At any time did you choose between alternative actions after consideration of the options?" (e.g., I decided to finish my homework instead of going to the movies)

[Dimension = choice]

Question 2: "Did you internally comment on any event, or wonder about anything?" (e.g., I wondered who locked the door)

[Dimension = internal commentary]

Question 4: "Did you focus for a period of time on accomplishing a particular objective?" (e.g., I looked all over for my keys)

[Dimension = focused attention]

Question 5: “Were you concerned about the impression you made, how you looked, or how you appeared to others?” (e.g., I was afraid I’d seem foolish if I asked a question)

[Dimension = public self-consciousness]

Question 7: “Did you think about your own thoughts, feelings, attitudes, motivations, or behavior?” (e.g., I thought about the fact that I’m always concerned about getting to places on time)

[Dimension = self-reflection]