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# A 20-h recovery sleep after prolonged sleep restriction: some effects of competing in a world record-setting cinemarathon

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**SUMMARY** The recovery sleep of a 21-year-old normal woman was assessed after she had endured 11½ days of sleep restriction in a world record-setting film-viewing marathon. An exceptional sleep debt was observed as indicated by an instanteous sleep onset, a high sleep efficiency, and a total sleep duration of over 20 hours. Other striking features of this recovery sleep were very short latencies to stages 3 and 4 sleep, return of Stage 4 sleep after 14.5 h, REM *and* SWS sleep rebound, and a linear increase in REM sleep efficiency across 14 consecutive REM–NREM episodes. Seven of nine home dreams reported after this recording contained competition themes, but none relating to the marathon films. Comparisons of the present results with those from subjects in previous record-setting events suggest possible explanations for the extremely long recovery sleep. Results also suggest that analyses of multiple consecutive sleep cycles may provide novel ways of assessing hypotheses about regulation of the REM–NREM cycle.

KEYWORDS dreaming, extended sleep, recovery sleep, REM cycle, REM sleep, REM–NREM sleep cycle, sleep deprivation, sleep stages.

## INTRODUCTION

Publicity stunts and world record-setting events have contributed to our understanding of the effects of extreme sleep restriction. Early scientific studies (Gulevich *et al.* 1966; Dement 1972) of the wakefulness ordeals of Peter Tripp and Randy Gardner have documented the mental and physical sequelae of humans attempting to prevail over sleep and, indeed, remain classic citations to the debate over whether sleep deprivation produces psychotic hallucinations. More recent studies of extended wakefulness during a 147-h record-setting tennis competition (Tafti *et al.* 1990) and duing a 65-h *Trivial Pursuits* marathon (Kamphuisen *et al.* 1992) have furthered research in this idiosyncratic tradition. In the present report, the polysomnographic features of a single 20-h recovery sleep are described; it was recorded immediately after a marathon which was designed to establish a world record for film-viewing. This sleep was recorded from a normal female subject who endured 11½ days of sleep restriction and who consequently placed first in the 1992 Montreal Cinema Parallèle Cinemarathon. She was awarded $2500 and a World Record certificate from the *Guinness Book of World Records* as the World's Most Enduring Film Spectator. This subject also unwittingly produced a recovery sleep which is longer than any which has been reported in the literature for a normal, sleep-deprived subject.

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### Subject

The subject, LD, was 21 y and right-handed, a non-smoking female student in political sciences. Clinical interviews and questionnaires revealed that her birth and developmental history were uneventful apart from a tonsillectomy at age 4. She was in very good physical and psychological health, had no drug or alcohol problems, and was taking no medications. She reported no sleep problems, an impression which was confirmed by an additional polysomnographic recording two months after her recovery sleep. She reported sleeping on average 8 hours per night. Her vision was corrected with eyeglasses or contact lenses which she wore at all times during the marathon.

### Sleep restriction during the film marathon

The film marathon was billed as 'The Longest Film Screening of All Time', in which 136 films were viewed by up to 10 contestants over a period of 250 h. The event itself earned a World Record certificate from the *Guinness Book of World Records* as the World's Longest Continuous Film Projection. Contestants were required to pay specific attention to each film—although they were also allowed to eat at this time. The theatre was sufficiently illuminated to permit officials to monitor contestants continuously for signs of sleep, e.g. the eyes closing, the head nodding forward. If contestants fell asleep, they were awakened with a warning and on the third such awakening they were disqualified from the contest. During the 30-min intermissions between screenings the theatre was fully illuminated and contestants could shower, use the washroom, visit with guests and each other, conduct interviews with the media, walk outside, and – most importantly – nap.

Although in principle contestants could accumulate up to 6 h of sleep per 24-h period by napping, the demands of other activities substantially reduced this amount. LD was contacted by the director of the sleep clinic while the marathon was underway, thus no objective measures of her total sleep restriction could be obtained. However, for the first 4 days she reported sleeping for part of each intermission, for an accumulation of about 4.5 h per day.

On Day 5 she experienced an overhwhelming fatigue which required both of the allowed warnings to arouse her. For the next 24 hours she viewed films in a standing position only, followed by a strategy of either standing, crouching, sitting unsupported on the floor or leaning against a wall. As she found it increasingly difficult to awaken from naps, she avoided them altogether. For the last 3 days of the competition she slept no more than 2–3 hours per day. She ingested very little caffeine (diet soft drinks and chocolate only) and no alcohol throughout the contest. Her total episode of sleep restriction, including wake time before (15.5 h) and after (7.2 h) the competition, was 270 h, 56 min or 11.3 days.

## METHODS

### Recovery sleep recording

LD was taken to the sleep laboratory immediately after the marathon and was prepared for continuous recording on a Grass 9/21 polygraph. A 7-electrode montage was applied to screen for major sleep disturbances and to quantify sleep architecture: LOC/A1, ROC/A2, EMG, C3/A2, O2/A1, ECG, and nasal thermistor. A 14-channel, referential montage was applied for quantitative analyses of the EEG: Fp1, Fp2, F3, F4, F7, F8, C3, C4, P3, P4, O1, O2, T3, T4, linked ear reference. EEG activity was sampled digitally at a frequency of 128 Hz and archived on optical disk. Results of quantitative EEG analyses are not presented here.

LD slept in an electrically shielded, darkened room monitored by a closed circuit video. Lights out was 15:26 hours and she was told she could sleep as long as she wished. An experienced polysomnographer manually scored the sleep record in 20-s epochs (Rechtschaffen *et al.* 1968) from optical disk using ECLIPSE 1.0 software (Stellate Système Enr. 1993). LD signed a consent form and was paid for her participation.

### Home sleep log

Following the laboratory recovery sleep, LD was requested to complete a home sleep log every morning for two weeks. She was also asked to write down her dreams and specify whether they incorporated features from either the movies she had seen or the competition situation.

### Baseline sleep recording

Four months after her recovery sleep, LD agreed to return for one night of baseline sleep recording. She slept in the same room with the same electrode montage as during her first recording. Lights out was at 22:58 hours and lights on at 07:30 hours.

## RESULTS

### Sleep duration, sleep efficiency and wake time

Figure 1 is the hypnogram of LD's total sleep episode, from 15:26 to 11:32 hours the following day (total duration: 20 h, 6 min). Sleep architecture variables were compared with those for a group of 10 normal 20-to-29-yr-old women published in Williams *et al.* (1974, pp. 49–52) (see Table 1); terminology in the following sections is taken from the *Glossary of Standardized Terminology for Sleep-Biological Rhythm Research* (Czeisler *et al.* 1980a). The subject's extreme sleepiness was revealed by several features. First, her sleep onset (SO) was instantaneous. At lights out, the polygraphic record displayed an atypical combination of high-voltage delta EEG, rapid eye movements, and marked EMG activity which was classified tentatively as Stage 1. Second, latencies to stages 3 and 4 were very brief—1.7 and 4.3 min, respectively—and more than two standard deviations below normal for this age group. Third, Stage 4 sleep

 

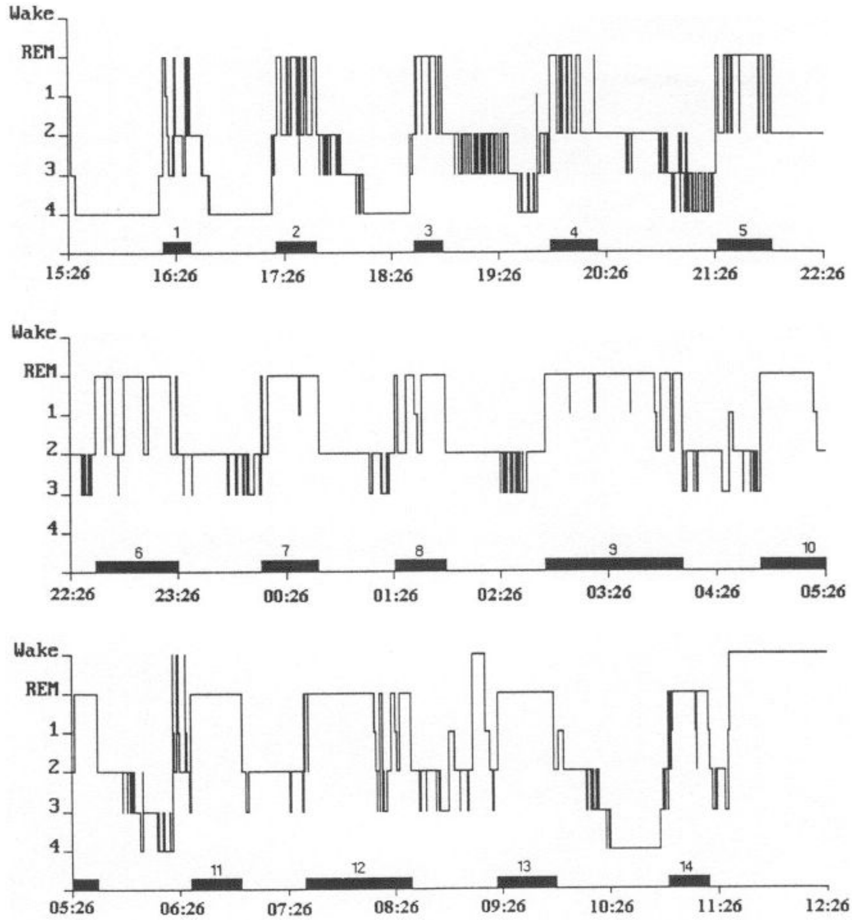


**Figure 1.** Polysomnogram for the recovery sleep following 11½ days of sleep restriction. In each of the 3 panels, time is indicated below the x-axis and the REM episode number (1–14) above it. Sleep/wake stage is indicated on the y-axis. Total sleep time: 20 h, 6 min; first awakening: 14 h, 56 min.

continued uninterrupted for 46 min. Fourth, there were no signs of arousal until 14.9 h of continuous sleep had elapsed.

Two awakenings occurred, both out of NREM sleep episodes. The first, at 14.9 hours after SO, was a fragmented sequence of 40-, 80-, and 40-s arousals. The second, at 17.7 h, was an episode of 6.3 min in duration. The subject later recalled these awakenings, having felt cold, thirsty and severely stiff in her back muscles. At the end of the sleep episode, she awoke feeling dizzy and 'shaky' with a mild headache and pink, inflamed, runny eyes. She recalled no dreams after her final awakening.

## NREM sleep rebound

There was evidence of rebound of stages 3 and 4 sleep (SWS), especially early in the sleep episode. The overall proportion of SWS (25.6%) was about one SD higher than normal controls (17.7 ± 6.7%; Table 1). However, the proportions of SWS occurring in the first (49.1%) and third (18.9%) thirds of the sleep episode were higher than that occurring in the second (7.4%) third, suggesting a return of SWS toward the end of the sleep episode. Inspection of Fig. 1 reveals that recurrence of Stage 4 sleep occurred at about 06.10 hours (14.5 h after SO) and again at about 10.20 hours (19.0 h after SO).

## REM sleep rebound

There is also evidence of increased REM sleep pressure and rebound. Latency to the first REM episode (53.1 min) was almost half of normal (100.2 ± 44.2 min). The direct transition into this first REM episode from Stage 3 sleep is relatively uncommon for adult subjects (Rechtschaffen *et al.* 1968). Total time in REM sleep episodes was 381.7 min or 31.7% of the sleep episode, a value almost two SD above normal (25.2 ± 3.6%). REM sleep was distributed over 14 consecutive REM–NREM cycles (Figs 1 and 2). The length of REM episodes was on average 34.3 min and markedly variable (SD = 17.6; range = 14.7–76.3 min). The distribution of REM episode lengths was moderately well described by a quadratic polynomial ($R = 0.73$).

REM sleep efficiency, defined as the proportion of REM sleep time in a REM sleep episode, increased linearly across the night (Pearson $r_{13} = 0.80$, $P = 0.0003$). The mean

**Table 1** Architecture of 20-h recovery sleep and of the sleep of an age- and gender-matched normal comparison group.

| | Recovery Sleep | Normal Group[a] Mean | SD |
|---|---|---|---|
| Total sleep time (min) | 1205.7 | 430.0 | 21.7 |
| Sleep efficiency index (%) | 99.3 | 96.0 | 2.0 |
| Number of awakenings | 2.0 | 1.1 | 0.8 |
| Latency (min) | | | |
| Stage 1 | 0.0 | 29.4 | 48.6 |
| Stage 2 | 54.7 | 6.6 | 3.7 |
| Stage 3 | 1.7 | 23.8 | 9.5 |
| Stage 4 | 4.3 | 27.2 | 10.3 |
| Stage REM | 53.1 | 100.2 | 44.2 |
| Proportion time in stage (%) | | | |
| Awake | 0.7 | 0.5 | 0.5 |
| Stage 1 | 2.2 | 4.2 | 2.4 |
| Stage 2 | 39.8 | 52.4 | 5.9 |
| Stage 3 | 12.3 | 5.3 | 2.0 |
| Stage 4 | 13.3 | 12.4 | 6.2 |
| Stage REM | 31.7 | 25.2 | 3.6 |
| NREM Sleep | | | |
| Stages 3 and 4 | 25.6 | 17.7 | 6.7 |
| REM sleep | | | |
| Efficiency index (%) | 79.6 | — | — |
| Episode length (min) | 34.3 | 28.0 | 3.9 |
| REM-NREM cycle length (min) | 86.1 | 115.6 | 48.1 |

[a] From Williams, Karacan, and Hursch (1974); $N = 10$ for all means except Stage 4 latency ($N = 9$).

efficiency for the 14 episodes was 79.6%, ranging from a low of 18.2% in episode 1 to a high of 100% in episodes 11 and 13. It is perhaps noteworthy that each of the two episodes for which efficiency was 100% immediately followed one of the brief awakenings.

Mean REM-NREM cycle length, estimated as the time between the *onset* of successive REM sleep episodes (Feinberg and Floyd 1979), was 86.1 ± 17.2 min (range: 62.7–119.7). Cycle length estimated from episode *offsets* (Feinberg and Floyd 1979) was highly comparable: 86.7 ± 16.5 min (range: 70.0–132.3). Nevertheless, the two length estimates were not correlated ($r_{12} = 0.11$, $P = 0.714$).

**Analyses of the REM-NREM cycle**

The occurrence of 14 consecutive REM-NREM cycles permitted correlational analyses of relationships between the ultradian cycle and other REM and NREM sleep parameters shown in Table 2. There was a large positive correlation between REM-NREM cycle length (based on REM episode onset), and length of REM episodes ($r_{12} = 0.87$, $P = 0.0001$), and between REM-NREM cycle length and REM time within REM episodes ($r_{12} = 0.81$, $P = 0.0004$) (see Fig. 2 and Table 2). There were no significant correlations between REM-NREM cycle length and NREM sleep variables. Finally, the variability of REM episode length (SD = 17.5) was found to be much higher than that of NREM episode length (SD = 9.1), even though the mean time in the latter (50.9 min) was much higher than that of the former (34.3 min).

**Post-recovery sleep**

On the two nights immediately following the laboratory recording, LD logged 7 and 9 hours of sleep, respectively. Her average sleep time for the two subsequent weeks was 8.16 (±2.4) h per night. The hypnogram of her baseline sleep recording (Fig. 3) revealed a normal sleep architecture

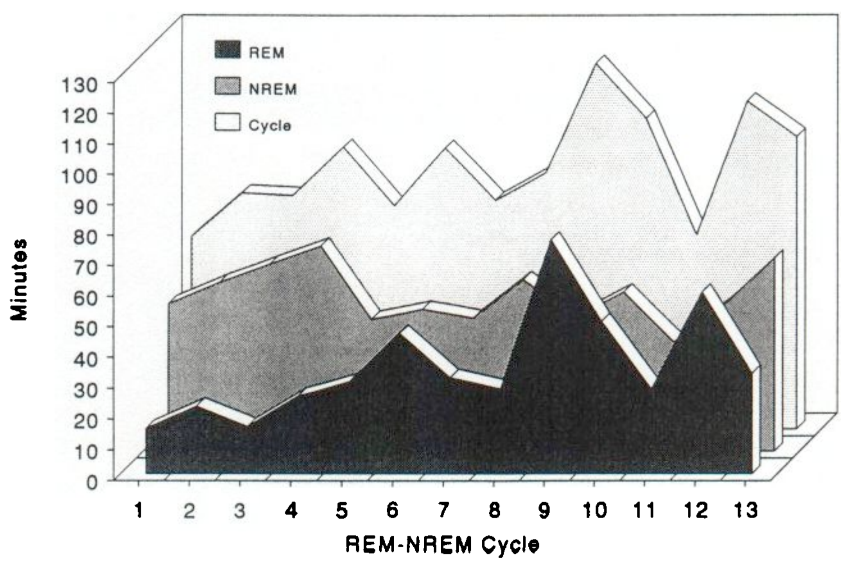


**Figure 2.** Length of time in consecutive REM-NREM cycles in relation to length of component REM and NREM episodes. Length of REM episodes is variable and correlated with length of REM-NREM cycles; length of NREM episodes is less variable and is not correlated with either REM episode length or REM-NREM cycle length.

**Table 2** Architecture of consecutive REM–NREM sleep cycles for the 20-h recovery sleep episode.

| Cycle | Cycle length[a] | | REM episode[b] | | | NREM episode[c] | Effic[d] |
|---|---|---|---|---|---|---|---|
| | *Onset* | *Offset* | *Total* | *REM Epochs* | *NREM Epochs* | *(Total)* | *(%)* |
| | 62.7 | 70.0 | 14.7 | 2.7 | 12.0 | 48.0 | 18.2 |
| 2 | 77.0 | 70.3 | 22.0 | 11.0 | 11.0 | 55.0 | 50.0 |
| 3 | 76.3 | 86.3 | 15.3 | 11.3 | 4.0 | 61.0 | 73.9 |
| 4 | 92.3 | 97.0 | 25.3 | 12.0 | 13.3 | 67.0 | 47.4 |
| 5 | 73.0 | 88.7 | 30.0 | 21.7 | 8.3 | 43.0 | 72.2 |
| 6 | 92.0 | 77.7 | 45.7 | 34.3 | 11.3 | 46.3 | 75.2 |
| 7 | 74.7 | 71.0 | 31.3 | 28.3 | 3.0 | 43.4 | 90.4 |
| 8 | 83.7 | 132.3 | 27.7 | 18.7 | 9.0 | 56.0 | 67.5 |
| 9 | 119.7 | 93.0 | 76.3 | 71.0 | 5.3 | 43.4 | 93.0 |
| 10 | 101.7 | 79.7 | 49.7 | 42.3 | 7.3 | 52.0 | 85.2 |
| 11 | 63.3 | 95.0 | 27.7 | 27.7 | 0.0 | 35.6 | 100.0 |
| 12 | 107.3 | 80.6 | 59.3 | 48.7 | 10.7 | 48.0 | 82.0 |
| 13 | 95.7 | 85.0 | 32.7 | 32.7 | 0.0 | 63.0 | 100.0 |
| 14 | — | — | 22.0 | 19.3 | 2.7 | 20.7[e] | 87.9 |
| Mean | 86.1 | 86.7 | 34.3 | 27.3 | 7.0 | 50.9 | 79.6 |
| SD | (17.2) | (16.5) | (17.5) | (18.0) | (4.5) | (9.1) | (22.9) |

[a] Calculations of REM–NREM sleep cycle length: Onset = REM episode onset to REM episode onset; Offset = REM episode offset to REM episode offset.
[b] Total = Total time in REM episode; REM epochs = Time in REM episode epochs scored REM; NREM epochs = Time in REM episode epochs scored NREM.
[c] Total = Total time in NREM episode.
[d] Effic = REM episode efficiency: REM/Total × 100.
[e] Not included in calculations.

apart from a period of prolonged wakefulness which was produced when a technical problem required scalp electrodes to be replaced. On the home sleep log, LD recalled dreams on 6 of the 14 (42.9%) post-marathon days (i.e. Days 3, 7, 10, 12, 13 and 14), with multiple recalls on some days, for a total of 9 dreams. In these she could identify *no* elements referring to the marathon films, only elements reflecting anxiety and the themes of *competition* (e.g. swimming and yachting competition, horse race, school exam) and interviews with the media.

## DISCUSSION

Many features of LD's increasing sleepiness through the film marathon closely resembled the effects of total sleep deprivation. She felt hopelessly tired after the first day and grew increasingly sleepy up to the fifth day when she reported regaining a 'second wind'. A similar phenomenon has been described in studies of total sleep deprivation as a 'fifth day turning point' (e.g. Pasnau *et al.* 1968). Also, as in other sleep deprivation predicaments (Gulevich *et al.* 1966; Pasnau *et al.* 1968), LD relied upon motor activity (e.g. yoga, awkward postures) to help her fend off sleep during the final days of the marathon.

### Extended duration of recovery sleep

No reports of non-hypersomniac subjects sleeping for 20 consecutive hours could be located in the literature. Even hypersomniac subjects (Billiard *et al.* 1992) and subjects who are self-reported long-sleepers (Webb 1986; De Koninck *et al.* 1990) apparently sleep no more than 15 h without

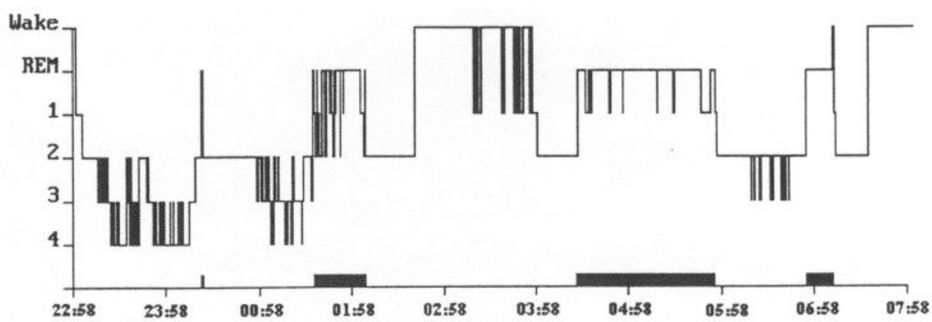


**Figure 3.** Polysomnogram for baseline sleep recorded 4 months after the marathon. Time is indicated below the x-axis and sleep/wake stage on the y-axis. The awakening beginning at 02:37 hours was produced by a technical difficulty.

interruption in the laboratory. Randy Gardner's widely cited wakefulness vigil of 264 h, 12 min, led him to a recovery sleep of only 14 h, 40 min (Gulevich *et al.* 1966). Mr Gardner awoke feeling and appearing essentially recovered, requiring only 8 h of sleep on the subsequent night. Similarly, the *Trivial Pursuits* contestants of the Kamphuisen *et al.* (1992) study, who endured 65 h of continuous wakefulness, also did not report exceptionally long recovery sleep episodes after their ordeals.

In contrast, LD demonstrated a recovery sleep of 20.1 h after 11.5 d of sleep restriction, including 14.9 consecutive hours unmarred by any transient awakenings. The most probable explanation for this finding is that an early afternoon sleep onset combined with a rising circadian sleep propensity later in the sleep episode favored longer sleep. Assuming that the timing of the subject's circadian sleep processes was relatively normal during her recovery sleep, then her 'sleep gate' or phase of maximum sleep propensity would have occurred at approximately 03.00–04.00 hours (Lavie 1989) when over 12 h of sleep had already transpired. Increased sleep propensity may thus have facilitated LD 'sleeping in' for an additional 8 h in the morning. It is instructive to compare this pattern of recovery sleep with that of Randy Gardner, who was totally sleep-deprived for over 264 h (Gulevich *et al.* 1966) but whose recovery sleep started at 06.00 in the morning. Mr Gardner's sleep onset pattern was similar to that of the present subject: a sleep onset latency 'within 2 minutes' (vs instantaneous), a Stage 4 latency of 4 min (vs 4.3 min), a Stage 4 duration of 43 min (vs. 46 min), a latency to stage REM of 52 min (vs 53.1 min). However, unlike the present subject, Mr Gardner terminated sleep spontaneously 14 h, 40 min after sleep onset (20.40 hours). He was at this time likely in the 'forbidden zone' or phase of lowest sleep propensity (Lavie 1989). This situation was completely opposite to that of the present subject and could explain why the durations of their two sleep episodes were so different.

Other possible explanations of the long sleep episode observed in the present study might also be considered. One is that continuous film-viewing and media attention placed an extreme load upon attentional, perceptual and cognitive systems, and that this load somehow boosted the need for recuperative sleep. Clearly, the continuing presence of anxious competition themes in LD's dreams up to 2 weeks after the marathon suggests that the experience had an enormous impact. However, in view of the lack of empirical evidence that extreme stress increases need for recovery sleep, this explanation is best left for future studies.

## Rebound and return of slow-wave sleep

Results provide evidence that SWS rebound after this state of chronic sleep restriction is similar to that following total sleep deprivation. SWS rebound was concentrated in the first third of the sleep episode just as it is after total deprivation (e.g. Berger and Oswald 1960; Kales *et al.* 1970; Achermann and Borbély 1990; Borbély and Achermann 1992). REM sleep was also severely fragmented at this time as it was in the recovery sleep of Randy Gardner (Gulevich *et al.* 1966), suggesting a competing, disruptive influence from an elevated SWS propensity. The fact that the sleep episode began at a time when the circadian propensity for REM sleep is usually very low (Czeisler *et al.* 1980b) may have increased the competing effects of SWS. The present findings are consistent with those of previous studies which indicate that SWS appears to have a higher priority for refurbishment after sleep deprivation than does REM sleep (see review in Borbély 1982). Nevertheless, they also demonstrate unambiguously that SWS rebound can be followed promptly by REM sleep rebound when recovery sleep episode is prolonged (see below).

The return of SWS late in LD's sleep episode was substantial. %SWS in the third section of the sleep episode returned from an extremely low value in the second section (7.4%) to a value somewhat larger (18.9%) than that for a normal night of sleep (17.7%; Williams *et al.* 1974). However, this pattern conformed only marginally to an expected 12-h circasemidian pattern (Gagnon *et al.* 1984; Gagnon *et al.* 1985; Broughton *et al.* 1988), occurring at about 14.5 h after the first SWS episode (i.e. at SO). Nevertheless, large intersubject variations in the delay of SWS return have been reported (e.g. Gagnon *et al.* 1985); one study of subjects chosen for their ability to extend sleep found the acrophase for SWS return to be about 14 hours after SO (Broughton *et al.* 1988). It should be noted, however, that since LD's sleep period began at 15.26 hours in the afternoon, her resurgence of SWS approximately 14.5 h later is consistent with evidence (Gagnon and DeKoninck 1982) that SWS reappearance is a sleep-generated phenomenon rather than one determined by a circadian regulator (see Webb 1986 for discussion).

## REM sleep rebound

REM sleep pressure was also clearly elevated during LD's recovery sleep. Latency to REM sleep (53.1 min) was almost half of the normal value for her age group (100.2 ± 44.2). Augmentation of REM sleep time (to 31.7%) was also a conspicuous 25% over normal. This level of REM sleep time is almost 5% higher than that seen for Mr Gardner (26.8%) in the Gulevich *et al.* (1966) case study of extended total sleep deprivation. Similar REM time increases have not been observed for shorter periods of total sleep deprivation, such as 24, 48, or 65 h (Kamphuisen *et al.* 1992; Rosenthal *et al.* 1991).

It remains unclear what triggered the augmentation of REM pressure in this subject. It seems unlikely that LD's pattern of sleep restriction during the marathon, i.e. her intermittent 10- to 20-min naps between films, curtailed REM sleep to a greater degree than NREM sleep, since such an effect has not been demonstrated with subjects required to sleep on a 30/60 min sleep/wake cycle

(Carskadon and Dement 1977). On the other hand, the subject's sustained concentration on numerous films and her exposure to continued scrutiny by judges and the media are factors which may have contributed to an increased need for REM sleep. Such stressors appear likely to burden the purported memory-processing and emotional-adaptation functions of REM sleep (e.g. Cartwright 1991; Hennevin and Hars 1992; Perlis and Nielsen 1993; Smith 1993). The large number of anxious dreams referring to competition and the media in the two weeks following the marathon is consistent with this possibility.

### Extended sleep as a paradigm for assessment of the REM–NREM sleep cycle

Extended recovery sleep of this magnitude might offer a useful experiment paradigm for exploring chronobiological features of the REM–NREM sleep cycle. Correlational analyses made possible by the large number of consecutive sleep cycles in the present data revealed a striking positive correlation between REM–NREM cycle duration and the length of REM sleep episodes. By contrast, length of NREM episodes, which was markedly less variable than length of REM episodes, was not related to cycle length, nor to the length of prior or subsequent REM sleep episodes. Together, these findings suggest that regulation of REM–NREM cycle length for this subject may have been dependent upon REM sleep factors, whereas NREM sleep factors remained relatively independent and constant. Such findings suggest that extended recovery sleep might be useful as a tool for studying various models of the REM–NREM sleep cycle (e.g. Achermann and Borbély 1992; Massaquoi *et al.* 1992)—perhaps especially in situations where SO time is out of phase with the endogenous circadian pacemaker.

### Postscript: sleep deprivation-induced hallucinations

Apart from an extreme fatigue, the subject in this study displayed relatively few bizarre physical or psychological symptoms during her extended sleep restriction. In response to our questions concerning hallucinations and other odd experiences, she related two instances, neither of which appeared particularly abnormal. In one there occurred a transient change in luminance level—her bagel suddenly seemed more 'intense'—and in a second, she awoke from a deep nap with back and stomach cramps convinced that she must leave the theatre to participate in the making of a film. She came to her senses, returned to the theatre, and narrowly avoided disqualification. The latter experience resembles a state of sleep 'drunkeness' (Roth *et al.* 1972).

Other contestants in the marathon did, however, report experiences which appeared bizarre and which influenced their decisions about whether to remain in the competition. One contestant, a 26-yr-old parking attendant, who watched a total of 133 films over 10 days and who was awarded the $1250 second prize, reported that immediately prior to dropping out of the competition he experienced both severe gastric symptoms ('... I was no longer capable of taking solid food without suffering dizzy spells...') and auditory and visual hallucinations ('... imaginary people sitting behind me whispered my name... I saw a ticking metronome offered to me on an outstretched hand. I half reached out to take it, then quickly forced my hand down onto my knee, hoping nobody had noticed...' (Stedman 1992). It is quite likely that such hallucinations were hypnagogic in nature, since exploratory studies have shown that vivid hypnagogic imagery can be experienced in an upright, seated position (Nielsen *et al.* 1995; Nielsen 1991; Nielsen 1995). At least two other contestants were reputed to have experienced hallucinations before quitting the contest, although these could not be independently confirmed. One involved a contestant who was seen crawling on her hands and knees in a sleep-drunken state, attempting to unbolt the front row of seats; she apparently believed that the competition was over and that she should help take down the seating. Such subjective reports suggest that hallucinatory experiences may indeed be a concern of some individuals who withstand their own desire to sleep in striving to establish new world records.

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