INTERNATIONAL DESIGN CONFERENCE - DESIGN 2002
Dubrovnik, May 14 - 17, 2002.

TOWARDS A DESIGNER WORKING CULTURE THAT ENCOURAGES SLEEP AND DREAMING

K. H. Hilton

Keywords: Sleep, Dreaming, Deprivation, Lucidity, Creativity, Working Culture

1. Introduction

There are concerns that we may need more sleep per night than we believe, to fully realise our performance potential. Our general recommended sleep period would appear to be closer to 10 hours, to acquire higher quality performance, for creative thinking, decision-making and teamworking. Test participants who claimed to feel alert and performing well after their average period of sleep were found to increase test performance by up to 25% after as little as an additional 1-hour of sleep. [Maas 1998]. However, in respect of individual differences it is suggested that the goal should be the additional 1-hour of sleep, which may not equate with the general 10-hour target.

> *'Surveys have shown that adults sleep an average of 7.5 hours, with a standard deviation in the sample of about 1 hour. That is, two thirds of the population can be expected to sleep between 6.5 and 8.5 hours per night, about 16 per cent regularly sleep over 8.5 hours, and another 16 percent sleep under 6.5 hours.'*
>
> *[Empson 1993]*

In addition there is the issue of awareness.

> *'Many people – perhaps most – seem unaware of their sleep deficit. Rather, they regard sleep as expendable, as an activity, which can be shortened with few consequences. However, it has been shown that negative mood states are inevitable consequences of sleep deficits.'*
>
> *[Thayer 1996]*

In addition to the occasional risky, low reward or break-even client contracts, we may be party to a growing social acceptance of a work culture. Where in order to gain respect from superiors and peers, we now feel encouraged to work longer hours than we are contracted to, at the workplace or at home. Not complying with this culture may create a sense of guilt, or fear of consequences. Few actually feel in a position to question this culture, overwhelmed by the apparent general acceptance. Some perceive the incongruities but rationalise their conformity by describing their intent as being beneficial to effectiveness, in both official and sacrificial time. Pulling all-nighters, taking work home and shrugging it off as 'part of the job', is now seen in many professions including design, as an act of heroism by the peer group. [Maier 2001].

However, sleep patterns may influence our brain activity, and the probability and quality of dreaming. Sleep is a cyclic activity, enforced by what are called *zeitgebers*, and examples include light and dark, and social cues like meal times. Parkinson *et al* [1996] found that the time an individual chooses to, or is able to go to sleep may influence mood the following day. Going to sleep earlier has been generally

associated with greater alertness and a more cheerful mood, which encourages individuals towards a more creative, open-minded and less critical approach.
Deprivation of sleep and dreaming have been found to cause a number of effects, such as tiredness, boredom and irritability, and performance decrements in:

Visual perception
Serial reaction and sustained attention
Short-term recall
Long-term recall
Implicit learning
Psychomotor tasks such as tracking
Logical reasoning and mental arithmetic.

[Matthews *et al* 2000]

These effects of sleep deprivation may also depend upon individual differences and working environments [Matthews *et al* 2000]. The effects of sleep deprivation have been found to be offset among those individuals who have high arousal levels and fast reaction times. This does not mean that using mental, physical or chemical stressors are viable coping strategies for sleep deprivation. Such approaches may be liable to create health problems for certain individuals. Similarly, whilst the function of dreaming is not yet fully understood it indicates that the deprivation of dreaming can result in psychological deterioration, suggesting it also serves a maintenance and balancing role.
It is also suggested by Laberge and Rheingold [1990] and Montangero [1993], that dreaming has additional benefits to offer those in the creative professions, in the way that dreaming becomes a vehicle for our communication with the subconscious. We may be more aware of associated ideas during dream experiences. It is suggested that dreams and daydreams may provide individuals with opportunities for associations and scenarios through undirected thought. However, lucid dreaming, the awareness and ability to direct dream content, would appear to contradict this premise, and yet there are accounts of people solving problems through lucid dreaming. Laberge and Rheingold [1990].
So, to increase creativity and decision-making performance as well as health benefits, it is suggested that we strongly consider changing our working culture to be more proactive towards sleep and dreaming needs. However, to do so we must first review the evidence and better understand the potential benefits that sleep has to offer. Only then may we judge the level of compromise and potential fool's gold of habitual overtime work and insufficient sleeping. The intent for this paper then, has been to investigate designers sleep and dreaming experiences, with the aim of answering the following two questions:

1. Are practising designers showing any signs of insufficient sleep that can be considered to negatively influence their abilities for creativity, and quality decision-making?
2. Are designers commonly able to find solutions to design problems through their dream experiences?

2. Method

The very nature of sleep, and particularly dream investigations, can mean that obtaining objective information becomes extremely challenging through certain lines of enquiry. In addition to this, the value of generalisation seems questionable in the face of individual differences. Nevertheless, there are four methods to be considered.
Observation uses controlled environments and the application of test equipment to record events objectively. It may involve the waking of participants during their dream periods in order to answer a set of structured questions. The ecological validity of this approach however, has been called into question, especially when the participants are not recorded in their normal sleeping environment.
Diary Self-Report uses structured diary accounts for data collection. However, the validity of self-report as a method for recording dream content has also been questioned, because participants have to reflect upon a period of mental activity that they do not have complete conscious recall for.

Questionnaires are another form of self-report method, but may be used at a more general level for respondent reflection upon their sleeping and dreaming, asking them questions that require yes/no or rated replies, which could be used to identify potential participants for deeper investigation.
Interview Case Studies can be created as part of a general method, or as a specific follow up to questionnaire responses, for identified and willing respondents. Though the interview method suffers from participant's incomplete conscious recall, as with the diary or questionnaire method, what can be recalled allows the interviewer a degree of freedom to investigate further.
For this investigation a questionnaire and interview case study approach was adopted. An 80% response rate was achieved, providing a sample group of 34 active designers, comprising of 3 females and 31 males. The respondents came from a mixture of design areas including product, graphics, multimedia and fashion, having an age range between 20 and 62 with a mean of 32 and a mode of 28 years. The questionnaires were treated as confidential and the responses were given further anonymity by coding on receipt.
The intent was to identify common sleep and dream experiences among designers in order to compare them with the requirements and norms quoted above [Empson 1993, and Maas 1998]. In addition to this, particular interest was placed on the potential use of pre-and-post-sleep experiences (hypnagogic and hypnopompic experiences), dreaming and lucid dreaming experiences to solve design problems. Those designers who claimed in their questionnaire to have had such experiences were asked for permission to be interviewed.

3. Results

Sleep periods were questioned on two levels: sleep on workdays and sleep on weekends, see Figure 1. All of the respondent reports showed that on workdays they regularly had less than the recommended 10 hours of sleep. 8 regularly slept the population average of 7.5 hours, but none regularly slept longer than eight hours. 6 reported regularly sleeping 6.5 hours or less on working days. On weekends 7 regularly slept the recommended 10 hours, 3 slept in excess of the 10 hours, but 7 continued to sleep below the population average of 7.5 hours.

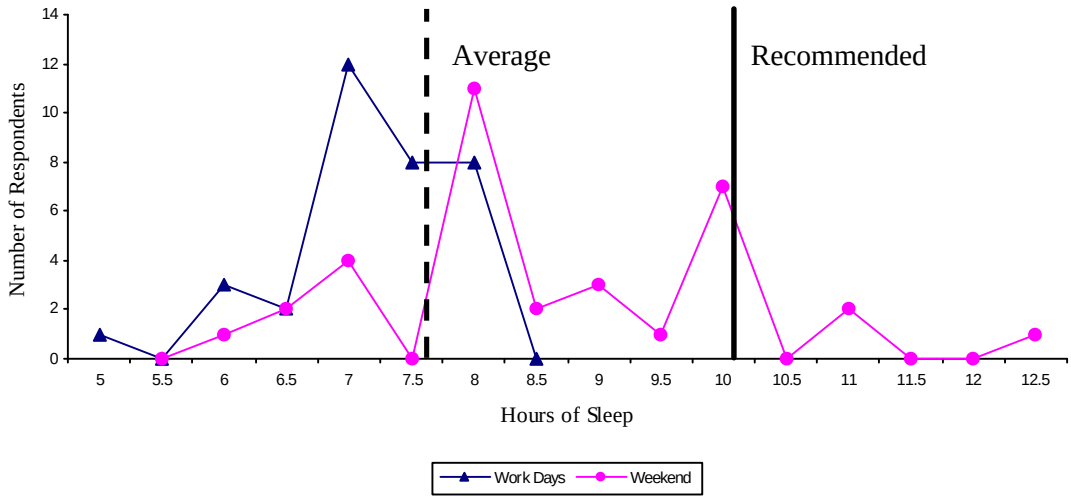

Figure 1. Respondent Frequency of Sleep Periods

28 reported sleeping longer on weekends. However, none of the 3 who slept in excess of 10 hours on weekends were among the 6 sleeping 6.5 hours or less on working days. Also, 6 of respondents reported no change in sleep periods between work days and weekends Though these individuals potentially had insufficient sleep, possibly due to work and family commitments, this is likely an example of individual preferences or physiological differences in sleep pattern.
Figure 2 shows 22 of respondents reported an awareness of performance deficits, possibly attributable to sleep-debt, including a lack of concentration, tiredness, irritability, clumsiness and drowsiness during the day. There were 8 designers who reported feeling refreshed on waking in the morning.

However, those designers did not also report longer sleep periods, and all but two of them felt drowsy later in the day. 23 reported some degree of sleep fragmentation, which was put down to noise, needing the toilet, needing a drink, partner's movement, nightmares and stress, exacerbating problems caused by sleep deprivation in some cases.

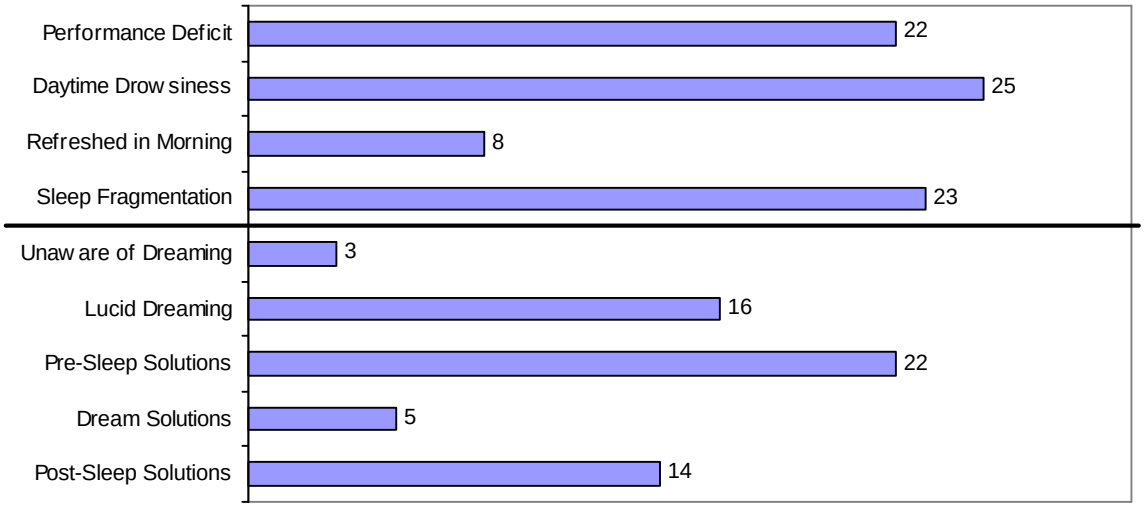

Figure 2. Number of Respondents Identifying with Sleep/Dream Related Issues

3 reported being unaware of dreaming. It should be understood that a self-report of no dreams does not actually mean that they did not dream but that they could not recall having dreamed.

16 of the respondents reported being conscious during some of their dreams. This ability to achieve lucidity was further questioned, and 20 reported having tried to take control of their dreams, which means that 3 of those who attempted lucidity have so far failed. Only 5 reported dreams had helped them solve problems and none of them claimed any success in lucid control, initiating and directing dreams for problem solving.

18 reported pre-sleep dream experiences of some form, yet 22 reported having some solutions to problems come to them just prior to sleep. 2 of them also reported having some solutions while dreaming. 14 reported that solutions to problems had occurred to them on waking.

Of the 17 lucid dreamers identified, 2 reported having solved design problems within their dreams, and consented to be interviewed:

- P1 dreamed lucidly once or twice a week. At the time of the interview P1 had not known of any method to prepare to go lucid. P1 described having a sense that control, once lucid, might not always be an option, but when control had been taken there was a definite sense of effort involved. Content was typically reality based, rather than fantasy, but there was never the intent to introduce problems to solve in the dream state. P1 thought that if any potential solution had occurred during dreaming it would have been treated as any wakefully generated solution, and checked critically. P1 concluded by saying that there was no sense of expectancy towards lucid dreaming at present, because there was no great sense of control of the lucid dreams, which were not yet consciously initiated.
- P2 dreamed lucidly about twice a month, and similar to P1, P2 made no preparations to dream lucidly, so they deemed in this state by chance not by choice. P2 described a sense of being an observer of the dream content rather than attempting to take control and become a participant. Content was also typically reality based, rather than fantasy. Problem content was not introduced consciously, rather it was thought to be triggered by the immersion in previous events. P2 recalled a sense of confidence about dreamed solutions whilst dreaming which reduced upon waking. P2 drew a comparison with alcohol induced confidence. P2 also concluded that there was no sense of expectancy of dreaming lucidly, it just happened.

4. Discussion

> *'Recent findings with clinically-oriented neuropsychological tests suggest that one night without sleep causes particular impairment to tasks requiring flexible thinking and the updating of plans in the light of new information. This relatively little investigated field of sleep deprivation research has real-world implications for decision makers having lost a night's sleep.'*
>
> *[Harrison and Horne 1999]*

Within this investigation, sleep-debt has been experienced by all the respondents and 22 of them reported reduced capacity to think creatively, to make quality decisions, and to interact effectively with other team members. This supported the more general findings of Harrison and Horne [1999]. The results were also found to be indicative of individual differences and fluctuation in arousal level, possibly influenced by additional factors such as low protein or high carbohydrate breakfasts and lunches which can cause drowsiness.

Insufficient sleep can also contribute to ineffective dreaming through disrupted sleep patterns and dream cycles. Though there were no positive accounts of conscious control of dream states for problem solving within this investigation, other researchers have indicated a degree of success in this field. However,

> *'On the whole, only solutions consisting in one-step procedures, preferably of a visual-spatial nature, seem likely to be discovered in dreams.'*
>
> *[Montangero 1993]*

Barrett [1993] described some experiments and results concerning problem solving in dreams. However, the level of problems attempted tended to be rather simplistic, and of the nature of making personal decisions. Although such results were indicative of a human potential, they cannot be compared to success in solving complex design problems in dreams. See Table 1.

Table 1. Problem Level Definitions

Level.	Description of Problem Requirements.
1.	The *recall* of missing data, in order to complete a solution.
2.	Simple *evaluation* of options, in order to make a 'least compromise' decision.
3.	*Calculation* and/or *mental modelling* to create and/or evaluate options, in order to make a 'least compromise' decision.
4.	Calculation and/or mental modelling to create and/or evaluate options which are in a state of *motion* or *flux*, in order to make a 'least compromise' decision.
5.	A problem requiring calculation and/or mental modelling to create and/or evaluate options which are in a state of motion or flux, within a constantly changing *system*, in order to make a 'least compromise' decision.

> *'The role of the dream is then not to elaborate solutions, but to permit the subject to become aware of the importance of an already imagined solution.*
>
> *[Montangero 1993]*

If we consider the creative merit of dream experiences in total, we may talk in terms of level of problem, see Table 1. The related studies of this programme of research did not identify a capacity for higher than level 3 problem solving occurring within dream states. Barrett [1993] described level 2 personal problem solving, while LaBerge and Rheingold [1990] described a degree of level 3 calculation and mental modelling taking place.

It can be argued that the case studies mentioned by Barrett [1993] equate with colour and form aesthetic decisions, level 2, and LaBerge and Rheingold [1990] described level 3 problems that could be equated with common mechanical design problems. However, concrete evidence is still required, in

addition to which, it should be understood that there may be a number of variables involved in the capacity to successfully dream design solutions. For example the discrepancies between pre and post sleep inspiration and the occurrence of hypnagogic/hypnopompic experiences could indicate that a reduced level of arousal might have influenced the inspirations, rather than the content of the dream-like experiences.

5. Conclusion

Variations in length of sleep periods are likely to be attributable to personal preference and habits, as well as working culture. It is therefore seen to be the individual's responsibility to resist any peer group pressure or force of habit. In support of the proposed individual behavioural change aiming to improve performance, it is suggested that management's role would be to discourage counter productive perceptions and activities, as accounted for by Maier [2001] among others.

Dreams, according to related studies into hypnagogic and hypnopompic experiences, lucid dreaming and day dreaming, provide a degree of participative control over these experiences, often of an observational nature. However, though present research into conscious control of dream content has suggested the potential to resolve various levels of problems, sufficient evidence is still lacking.

It is therefore concluded in answer to the first question, that in order to improve one's creative thinking, decision-making and interpersonal communications, which are key to the designer's role, individual sleep need should be respected. Also, in answer to the second question, whilst dreams and daydreams may provide idea association opportunities for some individuals, any perception of dreams as an exploitable resource for design solutions, even with sufficient immersion in project related information, was concluded to be generally unrealistic.

References

Barrett, D., "The "Committee of Sleep": A Study of Dream Incubation for Problem Solving." Dreaming. Vol. 3, No. 2. 1993. pp 115-122.

Empson, J., "Sleep and Dreaming." 2nd Edition. London Harvester Wheatsheaf. 1993.

Harrison, Y. and Horne, J.A., "One Night of sleep Loss Impairs Innovative Thinking and Flexible Decision Making. Organisational Behaviour and Human Decision Processes. 78, No.2. 1999. pp 128-145.

LaBerge, S and Rheingold, H. "Exploring the World of Lucid Dreaming." New York Ballantine Books. 1990.

Maas, J. B. "Miracle sleep cure. Key to a long life of peak performance." London HarperCollins. 1998.

Maier, T. W., "Sleep Sickness." Insight on the News. May 28. 2001

Matthews, G., Davies, D. R., Westerman, S. J. and Stammers, R. B., "Human Performance. Cognition, Stress and Individual Differences." Psychology Press. 2000.

Montangero, J., "Dream, Problem-Solving, and Creativity." In C. Cavallero and D. Foulkes (Eds.). Dreaming as Cognition. Harvester Wheatsheaf. 1993. pp 93-113.

*Parkinson, B., Totterdell, P., Briner, R. B. and Reynolds, S.***, "***Changing Moods. The Psychology of Mood & Mood Regulation." London Longman. 1996.*

Thayer, R. E., "The Origin of Everyday Moods. Managing Energy, Tension, and Stress." New York Oxford University Press. 1996.

Dr. Kev Hilton.
The Centre for Design Research
School of Design, Squires Building
Northumbria University, Sandyford Road
Newcastle upon Tyne, NE1 8ST, United Kingdom.
Tel.: 0191 227 3274
Fax.: 0191 227 3148.
Email: k.hilton@unn.ac.uk