



Sleep and fatigue

By Alberto Iovino

Many studies agree on the fact that an adult human would normally need 7 to 9 hours sleep a day; moreover, such sleep should be of a “good quality”, which means uninterrupted and including both deep and REM phases.



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centage of their lifetime can be truly assessed as being more fun than a good nap.

(Modern) life goes on though, and never mind your circadian rhythms, you have to cope with the necessity of being awake when, and for as long as, your multiple engagements require. We as humans passed through many centuries harmonising our internal

fun or work, necessity or pleasure, we squeeze our sleeping time like an extra tank to exploit when the rest runs empty. In my day I used to go out; now, we have just had our second daughter, and the authoritative newcomer loudly fills with her sweet, drilling voice most of the intervals between each feed and the next, so we split our night time duties. Though I am not an operational controller any more, my



I somehow always felt my biological needs to be much higher, just to find myself struggling every morning since schooldays to achieve what our ancestors did over thousands of years, i.e. to (re)gain an upright position.

Troubles of that kind are evidently obscure to people (there’s my wife) who wake up ahead of their alarm clock. I honestly never envied them, and to those who believe that sleeping is wasted time I would suggest stopping for a second to reconsider what per-

clocks with the rising and dawning of the sun above us, and even getting your tenth child under way couldn’t do much to keep you up all night; then electricity, the most dramatic change in history, allowed the colonisation of the night (by far the greatest of its kind, with no offence to Columbus or James Cook), and since then things have never been the same.

So we stay up. And we feel maybe a little tired, but happy, because our conscious life gets longer. Be it for

wife still is and, once her leave of absence is over, we will have to rearrange our schedule.

And here we come to the point: what happens to those seven-to-nine sleeping hours, and what happens to us, once they are gone? The answer is composite, and somehow subjective, but possibly less than one would think.

There is a wide range of literature on the subject, variously addressed using a scientific, medical, sociological, eco-

conomic, labour-relational and sometimes commercial (people selling mattresses and sleeping pills) approach. A nice publication by EUROCONTROL¹, fifty-two ATC-oriented pages on fatigue and sleep management, is easy to read, useful and definitely recommended.

The general idea is that setting our life rhythms to match our internal circadian clock would be good for our health and best for our performance; so far, so obvious. By the way, the so-called circadian clock in humans is a function of the hypothalamus, which controls the secretion of melatonin and the body temperature. That means, and do forgive me for making it so simple (please refer to better

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experienced when trying to recover from jet lag after a long east-west or west-east journey. So, while you can stay awake by keeping yourself busy and uncomfortable (rule number one of the perfect sentry), in a well lighted environment, your clock still tends to encourage you to sleep when it believes it is time to do so.

tent manner. This is an important concern, and it should not be sacrificed too lightheartedly to other needs.

Apart from any considerations about personal health, the fact is that fatigued people are often very poor judges of their own alertness levels. This is not about generically feeling tired, rather on failing to respond to information, losing short-term memory and situational awareness, and so on, up to experiencing microsleeps, i.e. “episodes of total perceptual disengagement from the environment”. Self determining whether you are too tired to work is a complex task, with consequences which also shift into ethics (as you are asked to consider elsewhere in this issue of Hindsight); neglecting



sources for something much more accurate), that every day we anaesthetise ourselves to get the rest without which, in the long run, we could not survive.

The word “circadian” comes from Latin, meaning “approximately one day” – in fact, a complete cycle of the circadian clock lasts approximately 24 hours. The clock can be influenced by external factors such as light, but, being rhythmic, it also tends to be resistant to change, as many will have

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Air traffic controllers work shifts, so they have to give up their sleeping regularity for their entire operational life; we will not discuss this here, but it is undeniably a significant personal price that every controller pays in his/her job. Nevertheless, there are ways to counteract such a situation, and in any event provide oneself with enough good sleep in a fairly consis-

to avoid habits which would make it most likely to happen hardly makes sense.

Back to trivialities and, just as a domestic example, one night after a few weeks of systematic sleep deprivation, I was preparing some extra milk for the baby, in addition to that provided by her mother. As those who have children may know, it is a quite simple sequence of actions: take a feeding bottle from the steriliser; pour some water into the feeding bottle, determining

¹–“Fatigue and Sleep Management – Personal strategies for decreasing the effects of fatigue in air traffic control”, DAS/HUM Euro-control 2005



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the exact quantity from the graded scale; pour the water into a milk pan, warm it up and pour it back into the feeding bottle; add the powdered infant milk, close the bottle, shake it up and cool it down. After duly complying with steps one and two, I found myself anticipating step four, thus dropping the milk powder into 40 ml of cold water. While dumping the unusable stinky mud into the sink and taking another bottle from the steriliser, I started fancying about what the proper amount would be in case of no availability of any mother's milk, just to realise a moment later that I was warming up an unreasonable 120 ml of water. From that point I got back on track, but the idea of an

equivalent experience in an ops room, when handling traffic in a couple of combined sectors, is one that does not make you feel at ease.

Some more instances, why not in the transport field?

In June 1995, early in the morning, the Danish-owned vessel Svendborg Guardian ran aground on sand off the north Queensland coast. Among the Australian Transport Safety Bureau (ATSB) findings regarding the contributory factors, it was noted that "there was nobody on the bridge for a period of almost five hours with the ship effectively out of control. The bridge was unmanned because the Second Mate left the bridge shortly after 0105 and failed to return because he fell asleep. The Second Mate was suffering from extreme fatigue as



Fatigue management is for wimps!



a result of poor quality sleep from 18 June to 23 June and his decision not to sleep after the ship left Townsville. This decision [was allegedly] prompted by his desire to watch a rugby league match".

Up in the air, and once more from the ATSB, a pilot on a single-crew night freight flight carrying newspapers put his aircraft on a wrong track on departure and, after levelling off at the cruising altitude, fell asleep. When he realised it was time for descent, he started setting frequencies of the (supposedly) relevant navigation aids, but could not get any directional information. After wandering for a while, he landed the aircraft on a dry salt lake, luckily with minor damage and no injury, and was subsequently located through the ELT, about 200 miles off his destination. The pilot "... had had three full days off prior to signing on late in the evening of the day before the accident. He stated that he normally tried to sleep in on the morning before the night shift, and then get a couple of hours sleep in the afternoon. However, on the morning before he signed on for the night flight he was unable to sleep in and was then also unable to sleep in the afternoon. Consequently, by the time he signed on for the flight, the pilot had been awake for approximately 13.5 hours. It is probable that the pilot's lack of sleep prior to signing on for the flight resulted in an increased level of fatigue".

Now, let's not think this is an Australian issue only. As a fact, records of pilots and air traffic controllers experiencing sleep-and-fatigue problems exist in many other countries, and you can probably think of your own examples. While pilots often refer to sleeping problems linked to travelling through time zones and sleeping in noisy and poorly air conditioned hotel rooms, both pilots and air traffic controllers sometimes blame the way shifts are organised and managed.

In ATC, besides the extreme stage of actually falling asleep (and beware of microsleeps), the various stages of performance impairment are probably the real concern. An approach controller reported to the NASA Aviation Safety Reporting System that two aircraft had passed about one mile from each other after he misinterpreted the briefing from the colleague he had just relieved, as involving a procedure turn whereas a straight-in was expected. The reporter said that he had been having sleep difficulties linked to a period of shift changes and that "I was on about the third day of 4 or less hours of sleep".

If rostering does not take into account the physiological need for rest, that's a subject to keep on addressing. But personal behaviours in the framework of the existing roster indeed rest in everybody's own hands. So wake up folks, and don't give up on either hope or sleep. **S**