

12. What happens in jet lag?

In jet lag, there is a mismatch between one's biological clock and the new time zone. When we travel across several time zones in a short period of time, our internal clock cannot adjust itself to the speed at which we travel across zones. This is why we have a "lag" between our biological clock and the new local time zone. This jet lag may result in reduced alertness and performance difficulties, which might have serious consequences when safety may be compromised by our reduced vigilance.

13. What is the non-24-hour sleep-wake disorder?

This disorder is mainly suffered by totally blind people with no conscious light perception. In the absence of functional ocular processing, people with this disorder exhibit free running circadian rhythms that oscillate at their own endogenous period (mostly greater than 24 h). This leads to a daily cumulative delay of their sleep and wake time. This sleep disorder is cyclic, in that the patients have periods of good sleep when their biological clock is in phase with their sleep/wake behaviour and periods of poor sleep and daytime napping when their biological clock is in antiphase with their sleep/wake behaviour. In rare cases sighted individuals may also exhibit non-24-hour sleep-wake disorder.

14. What is social jet lag?

This concept represents the discrepancy (lag) between one's biological timing system (internal time) and social time, such as school times and/or work schedules.

15. How can these circadian rhythm sleep disorders be treated?

Treatment of these disorders may involve changes in daily sleep habits and behaviours, light treatment and/or melatonin at specific times to selectively advance or delay circadian timing according to the disorder. For example, in phase delay sleep disorder, melatonin should be taken in the evening and light should be administered in the morning to optimally advance the circadian timing system. Melatonin or light if taken at the "wrong time" may have an unwanted opposite effect.

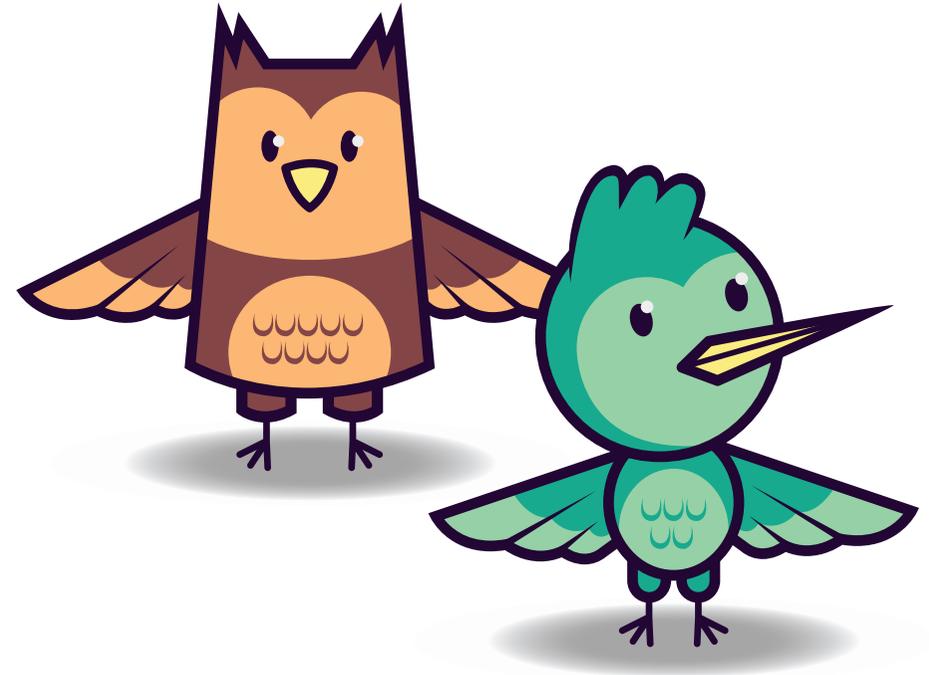
Authors:

Marta Gonçalves

Sleep Medicine Center - Hospital Cuf Porto, Portugal

Debra Skene

Chronobiology, Faculty of Health and Medical Sciences, University of Surrey, UK



OWLS and LARKS

15 questions and answers about this theme

CUF Porto Hospital

1. What are our circadian rhythms?

They are intrinsic biological rhythms which fluctuate for periods of around 24 hours and are driven by an oscillator situated in the hypothalamus in the brain - the suprachiasmatic nuclei (SCN). The sleep-wake rhythm, body temperature and hormonal production of melatonin and cortisol are good examples of circadian rhythms. Even though they are internal rhythms generated from within the body, they are synchronized by external factors. The light/dark cycle is the major synchronizer of the human circadian timing system to the 24 h day, along with meal times and physical activities, among others. Without these synchronising time cues, we would become desynchronised from the 24 h day and "free-run" at our own intrinsic period that is not exactly 24 h.

2. Are we all the same?

Human beings show great differences in their diurnal preference, which is reflected in different sleep and different wake times. The length of our intrinsic period, which is genetically determined, partly determines our diurnal preference and chronotype. The light/dark environment in our daily lives also contributes to the distribution of the different chronotypes in a population varying from extreme morning types to extreme evening types. However, some people lie in between these two extremes, and are neither a morning nor an evening type, being what is called an intermediate type. The length of our endogenous period determines our diurnal preference and entrained circadian phase (chronotype).

3. What is it like to be a Lark?



Being a lark (morning type) is having a biological preference to waking up early and go to sleep early, being very active and energetic upon waking, and also having better performance in the morning. Larks have advanced circadian rhythms, showing a peak in melatonin and a temperature minimum that occurs earlier than usual.

4. What is it like to be an Owl?



Owls (evening type) have a preference to go to sleep late and to wake up late, performing better in the afternoon and at night. Owls are more active towards the end of the day and at night, and have difficulty waking up in the morning. In this case there is a delay in the time of the melatonin peak and of the temperature minimum.

5. What is it like to be neither an Owl or a Lark?

Intermediate types can sometimes stay up late if they wish. They can also get up early if needed or sleep a little longer if they wish. The time of the melatonin peak and temperature minimum would be normal, i.e. not be advanced or delayed.

6. What is the influence of the circadian system on the time we go to sleep?

The time we go to sleep at is determined by an interaction between two processes: a homeostatic and a circadian process. The homeostatic process (S) involves the increase in sleep pressure that builds up the longer we are awake. The circadian process (C) regulates the timing of sleep and wake. The interaction of these two processes will determine when we sleep and when we wake up.

7. How does chronotype vary during a lifetime?

In childhood we are larks, but from adolescence to the beginning of adulthood, we become more and more evening types, delaying the time of falling asleep and of waking up. From then onwards, we gradually become more morning types, with an advance of our wake up and of our sleep times, which continues to advance as we grow older.

8. Which are the circadian rhythms sleep disorders?

Phase delay, phase advance, shift work, jet lag, non-24-hour sleep-wake disorder.

9. What happens in phase delay?

Phase delay sleep disorder is characterized by the inability to fall asleep and to wake up at conventional times. Patients with phase delay only manage to fall asleep very late and have severe difficulty in waking up in the morning (extreme eveningness). They have delayed circadian rhythms compared to the normal population. This condition is more frequent in adolescents and young adults.

10. What happens in phase advance?

In phase advance sleep disorder there is an advance of circadian timing with early falling asleep and early waking up times in relation to the conventional times (extreme morningness). The patient falls asleep very early and also wakes up very early. This may be the case in older people with complaints of insomnia.

11. What happens in shift work?

In night shift work there is a mismatch between the workers' circadian timing system and their work schedule. On the one hand, they work when biologically they are supposed to be sleeping. On the other hand, these shift workers try to sleep in the daytime when their biological clock signals that they should be awake. This desynchrony results in reduced alertness and performance during night work and in less sleep and poorer sleep quality during the day.