

Pop-up science outreach activity: are you an early bird or a night owl?

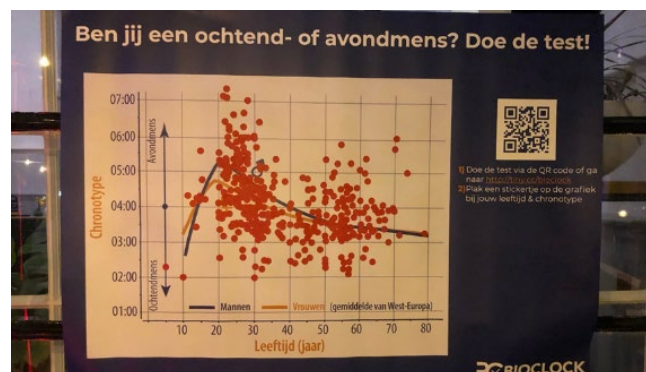
The great thing about chronobiology is that it's an easy topic to talk about with other people, as it directly impacts everyone's daily lives and most people are naturally interested in how their own body works, making it an ideal topic for public science events and festivals. This document briefly explains an easy but fun chronobiology activity that you can use during such events.

Description

In this activity, participants will determine their own chronotype using [an app](#) that's based on the short version of the Munich Chronotype Questionnaire (μ MCTQ, see [Ghotbi et al., 2020](#)). Note: I have always used this activity for purely educational/outreach purposes, not for research. The app also doesn't store any input.

Based on five short questions, the app will show someone's chronotype (a clock time), an classification (i.e. whether they are an early, intermediate, or late chronotype), and the amount of social jetlag they experience each week. Next, they will take a sticker and put it on the poster (see photo) at the intersection of their age on the x-axis and their chronotype of the y-axis. By the end of the day, you'll see whether your attendees roughly follow the expected relationship between age and chronotype or not.

In principle it's a very short activity; people don't need a lot of time to complete the questionnaire and add their sticker to the poster. However, it's of course up to you to talk to the participants about their result and what it means and address any of their questions. The activity is meant to spark people's interest in chronobiology and at the same time also help to improve their graph literacy, as they put their results as a data point in a graph and learn about the relationship between age and chronotype.



Set-up & result of the pop-up activity at the Night of Discoveries festival in Leiden (~250 participants).

What to bring with you

- 2-3 colleagues/students to help you, depending on the size of the event
- A large print-out of [this poster](#) (Dutch). I have used A0 size (84 x 118 cm) before. The graph is redrawn from [this publication](#). Make sure the QR code works before getting it printed. The QR code refers to the Dutch version of the app (see below).
- Small colored stickers (round).
- Optional: [this banner](#) (in Dutch).
- Optional: a tablet or another device that can be used to access the chronotype app ([Dutch version](#) or [English version](#)) Alternatively, people can use their own smartphone to go to the app (this is what I usually do).

How to interpret the questions & results from the app

This is what the app looks like:

Are you an early bird or night owl?

Normally, I go to work or school
☐ 0 days/week ☐ 1 days/week ☐ 2 days/week ☐ 3 days/week ☐ 4 days/week
☒ 5 days/week ☐ 6 days/week ☐ 7 days/week

On school or work days, I normally fall asleep at:

19:00 21:00 23:00 00:00 03:00 05:00 07:00 09:00 11:00 13:00 14:00

On school or work days, I normally wake up at:

19:00 21:00 23:00 01:00 03:00 05:00 07:00 08:00 09:00 11:00 13:00 14:00

On free days, I normally fall asleep at:

19:00 21:00 23:00 00:50 03:00 05:00 07:00 09:00 11:00 13:00 14:00

On free days, when I don't use an alarm clock, I normally wake up at:

19:00 21:00 23:00 01:00 03:00 05:00 07:00 08:30 09:00 11:00 13:00 14:00

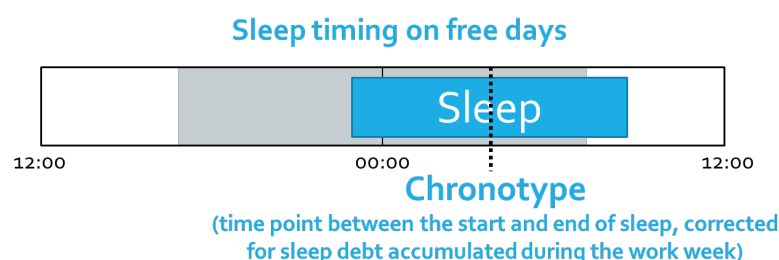
Your chronotype is 04:40. This means you are a slightly late type. Each week you have a social jetlag of 0 hours and 40 minutes.

The app asks five questions that are relatively straightforward. The most important thing to tell people is that the questions on sleep timing on free days refer to days that people are at home, by themselves and have no social activities scheduled. What time would they go to sleep and what time would they wake up if they are not disturbed by an alarm clock or anyone else? This may be quite a hypothetical situation for people with young kids and it's important to emphasize this, else the results will be skewed.

The result is shown at the bottom. The app doesn't give a lot of explanation about the results, so people need some guidance on how to interpret the results, where to put the sticker, and what this all means, but that's why you're there.

The result that the app provides consists of three parts:

- **Chronotype** (a clock time, e.g., 04:17): chronotype is an expression of the timing of an individual's circadian rhythms and tells one to what extent they are a morning type (early bird) or an evening type (night owl). In the app, chronotype is expressed as a clock time (e.g., 04:17), which refers to the mid-point of sleep on free days, corrected for sleep debt accumulated during the work week (see figure below). This number is calculated based on the questions in the app.



- **Classification** (e.g., “This means you are a slightly early type”): This should be interpreted with caution, since it very much depends on age. A 20-year old (who typically have a tendency to be late chronotypes) with a chronotype of 04:00 could be considered an early type, while a 70-year old with the same chronotype is rather late compared to other people with the same age. The poster provides insight into this relationship.
- **Social jetlag** (e.g., “Each week you have a social jetlag of 1 hours and 55 minutes”): Social jetlag refers to the misalignment between an individual's internal biological clock (circadian rhythms) and their social obligations, such as work, school, or other scheduled activities. Social jetlag refers to the shift in sleep timing that occurs weekly when individuals adhere to their internal biological rhythms during free days but must adjust to external schedules on workdays, equivalent to the shift in sleep timing as a result of travelling between time zones (as in a jetlag). 70% of the population experiences a social jetlag of at least 1 hour every week. While social jetlag can have significant negative impacts on health and well-being, adopting strategies to manage sleep schedules, light exposure, and lifestyle habits can help mitigate these effects.

Frequently asked questions from participants

- Q: *Also on free days I have commitments or kids that cause me to wake up early. How to fill out the questions about free days?*
A: Imagine a hypothetical day with no commitments in the evening or morning. E.g. you're at home, alone, watching a movie or reading a book. What time do you go to sleep by yourself? What time do you wake up by yourself, without an alarm clock or anyone else disturbing you?
- Q: *Is it bad to be an evening chronotype?*
A: Chronotype is a biological property that is influenced by genetics, age, sex, and environmental factors. It is not inherently 'bad' to be a morning or evening type: it's rather the misalignment between social timing (e.g. work or school schedules) and biological timing (chronotype) that might make it challenging.
- Q: *Can you change your chronotype, e.g. train yourself to become a morning person?*
A: No, chronotype is a biological property that changes naturally with age. However, there are some strategies you can adopt to shift your sleep timing, e.g. using light exposure. Increase exposure to natural light in the morning to help advance your biological clock. Conversely, reduce exposure to bright screens and artificial light in the evening to promote earlier sleep.

Feel free to use this activity or adapt it for your own outreach event. Please let me know how it went at L.Kervezee@lumc.nl.

Further (popular scientific) background reading

- <https://theconversation.com/whats-your-chronotype-knowing-whether-youre-a-night-owl-or-an-early-bird-could-help-you-do-better-on-tests-and-avoid-scams-216058>
- <https://theconversation.com/your-body-has-an-internal-clock-that-dictates-when-you-eat-sleep-and-might-have-a-heart-attack-all-based-on-time-of-day-178601>

References

Roenneberg T, Kuehnle T, Juda M, Kantermann T, Allebrandt K, Gordijn M, Mellow M. (2007): Epidemiology of the human circadian clock. *Sleep Med Rev.*;11(6):429-38.
Ghotbi N, Pilz LK, Winnebeck EC, Vetter C, Zerbini G, Lenssen D, Frighetto G, Salamanca M, Costa R, Montagnese S, Roenneberg T (2020): The μ MCTQ: An Ultra-Short Version of the Munich ChronoType Questionnaire. *J Biol Rhythms*;35(1):98-110.