

Impact of light pollution on human health

Non-visual impact of light on human physiology & behavior

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Endogenous rest-activity rhythms

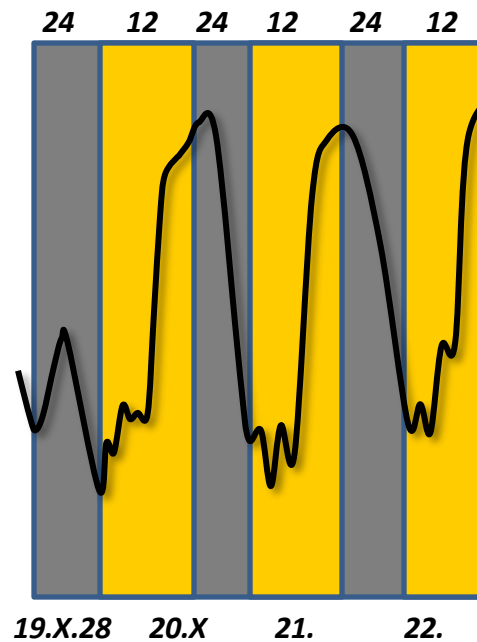
Night

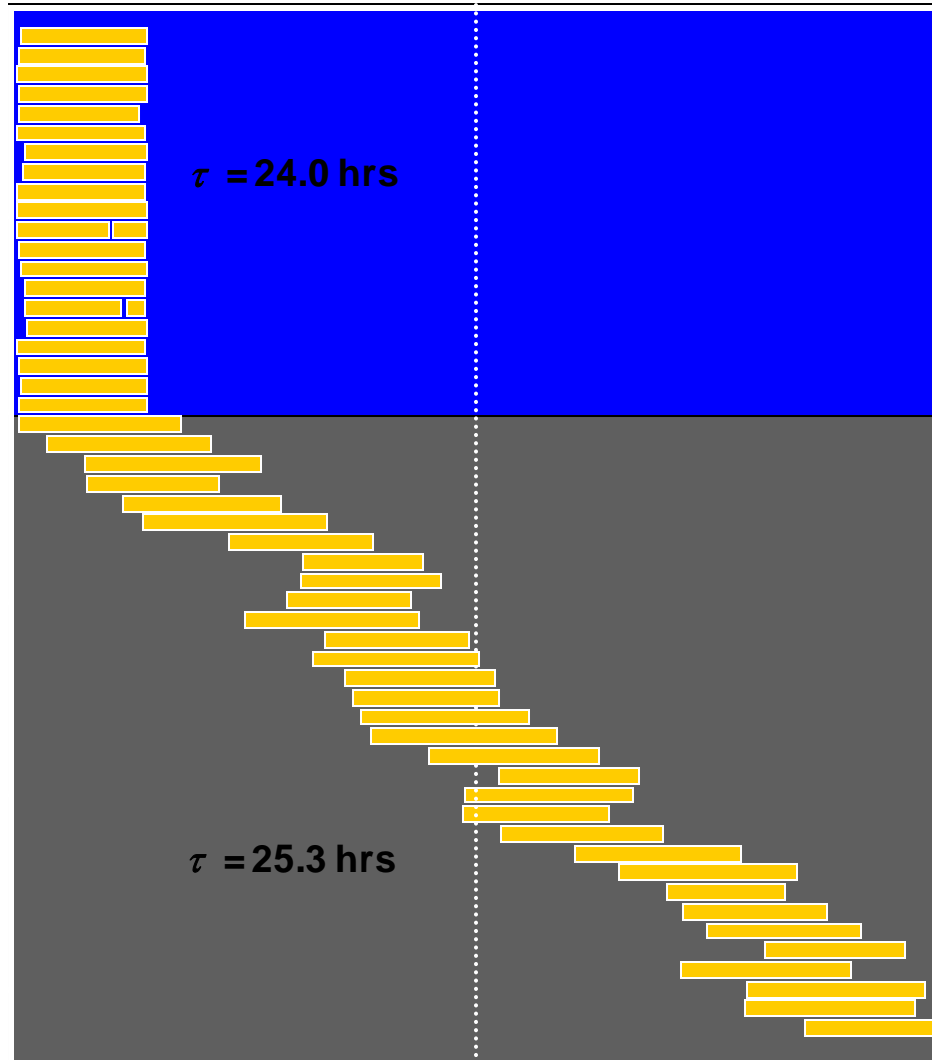
Day



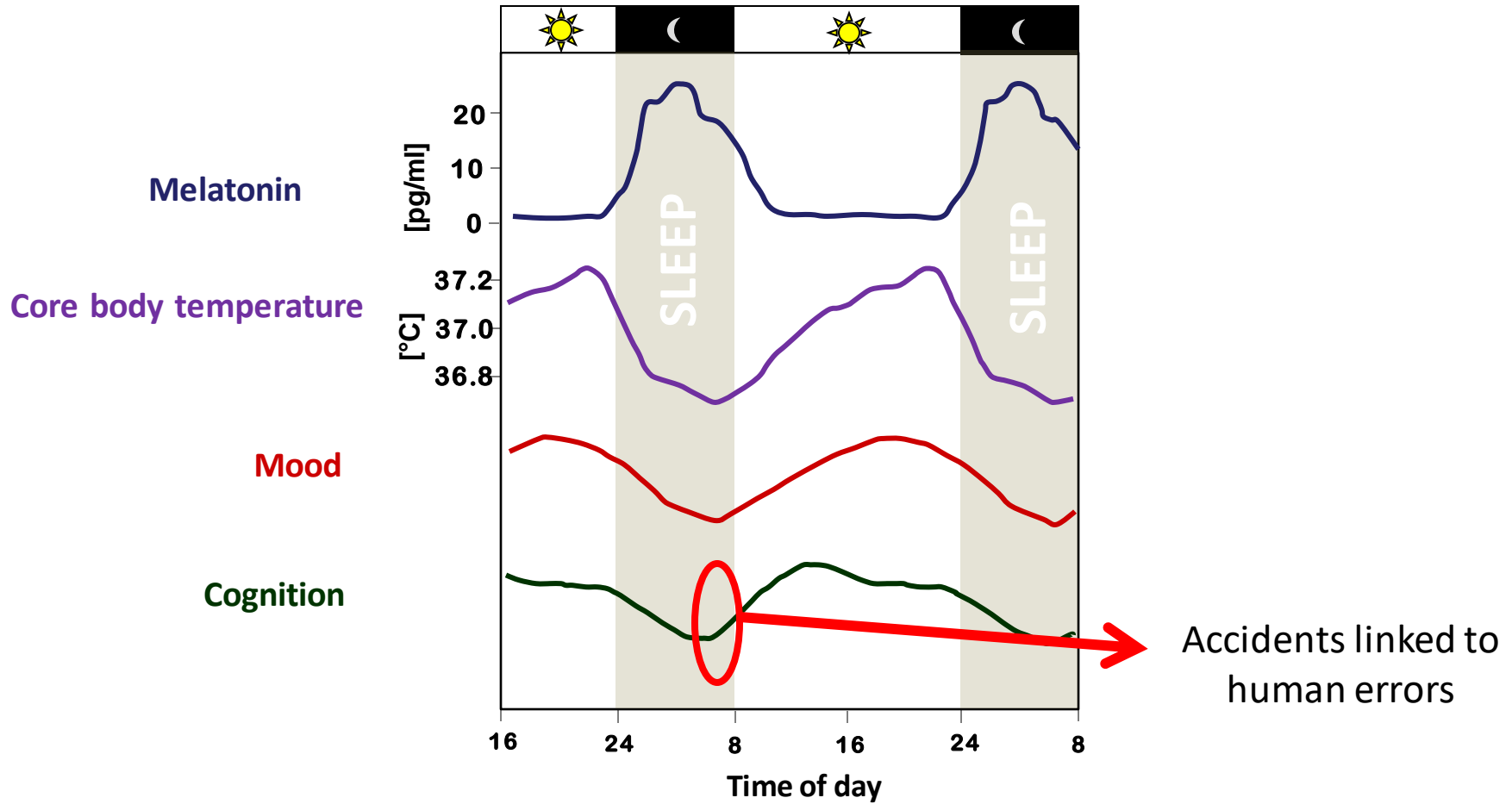
Phaseolus coccineus

After De Mairan 1729



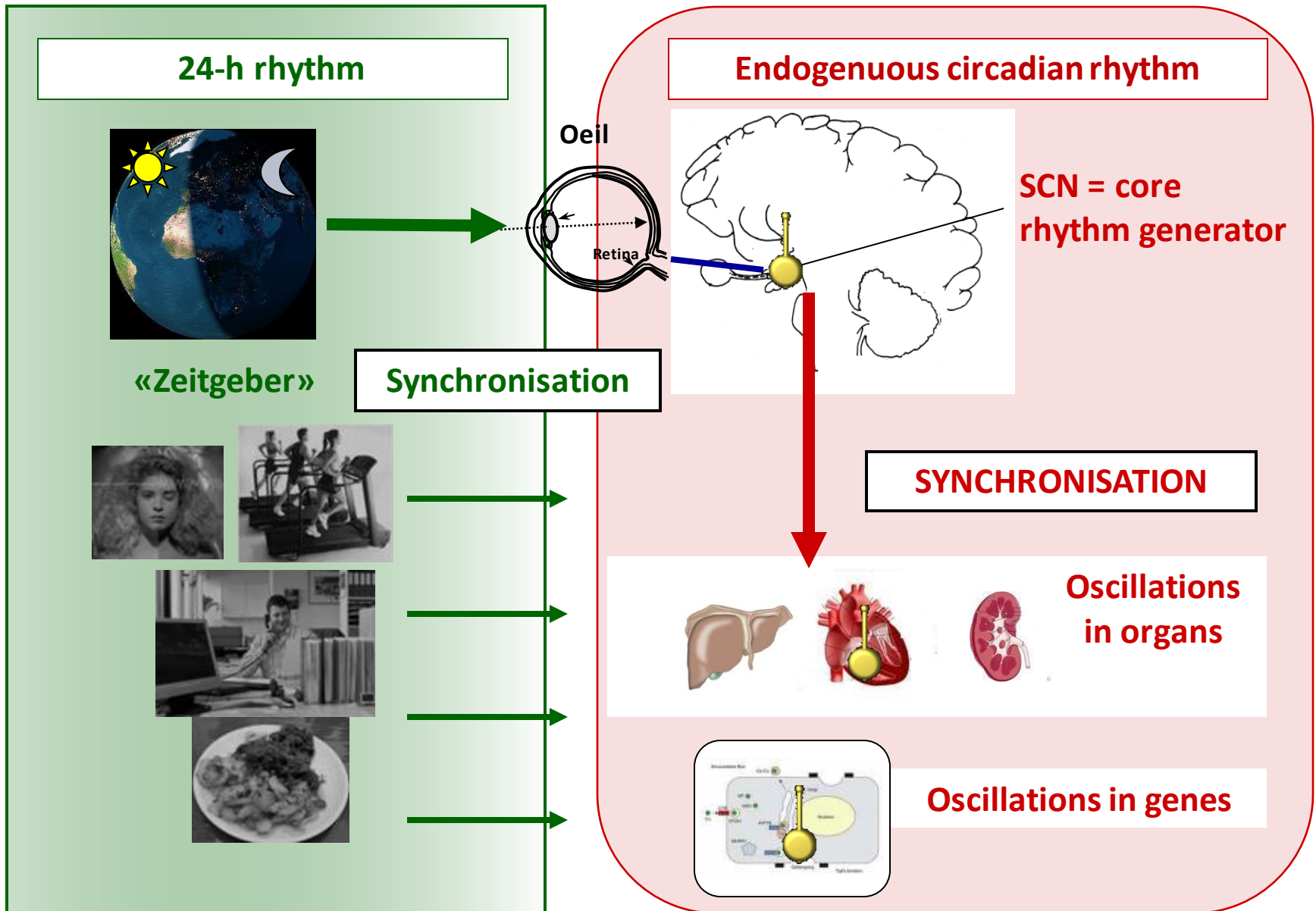


Circadian rhythms at different levels





External clocks– Endogenous Clock(s)



Our biological clock is synchronized through the alternation of LIGHT and OBSCURITY

External Time

Alternation light-obscurity
(earth rotation – 24 hours)

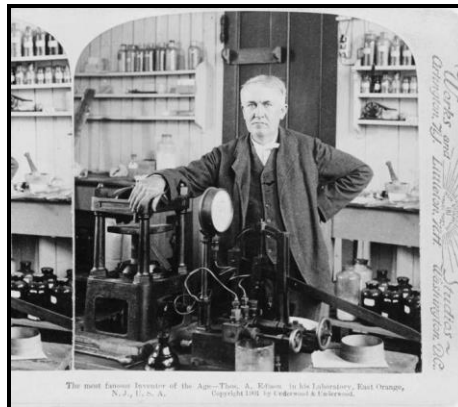


Internal time

Circadian clock
(~24 heures)



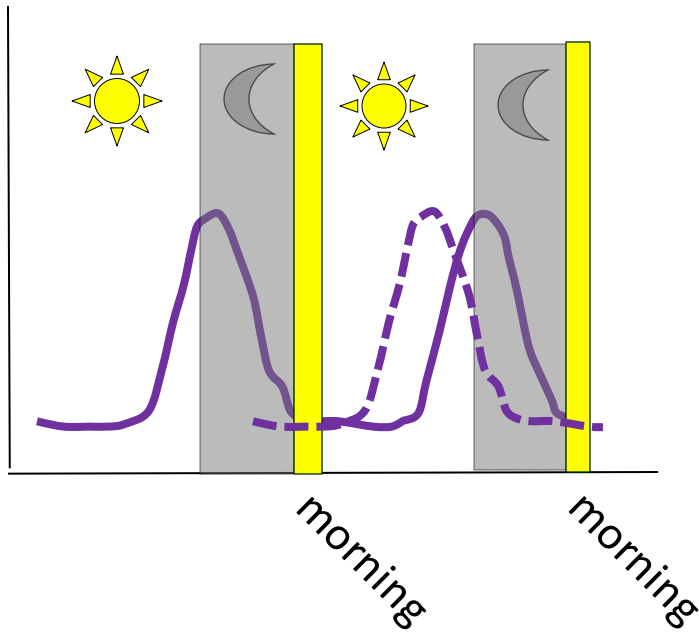
Invention de l'ampoule
Thomas Alva Edison, 1879



11 pm - 7 am
Sleep during the day and wakefulness during the night

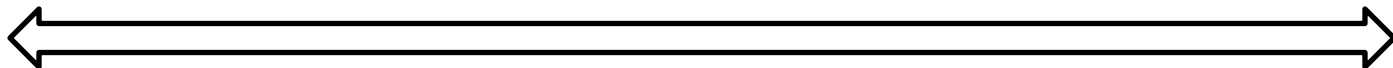
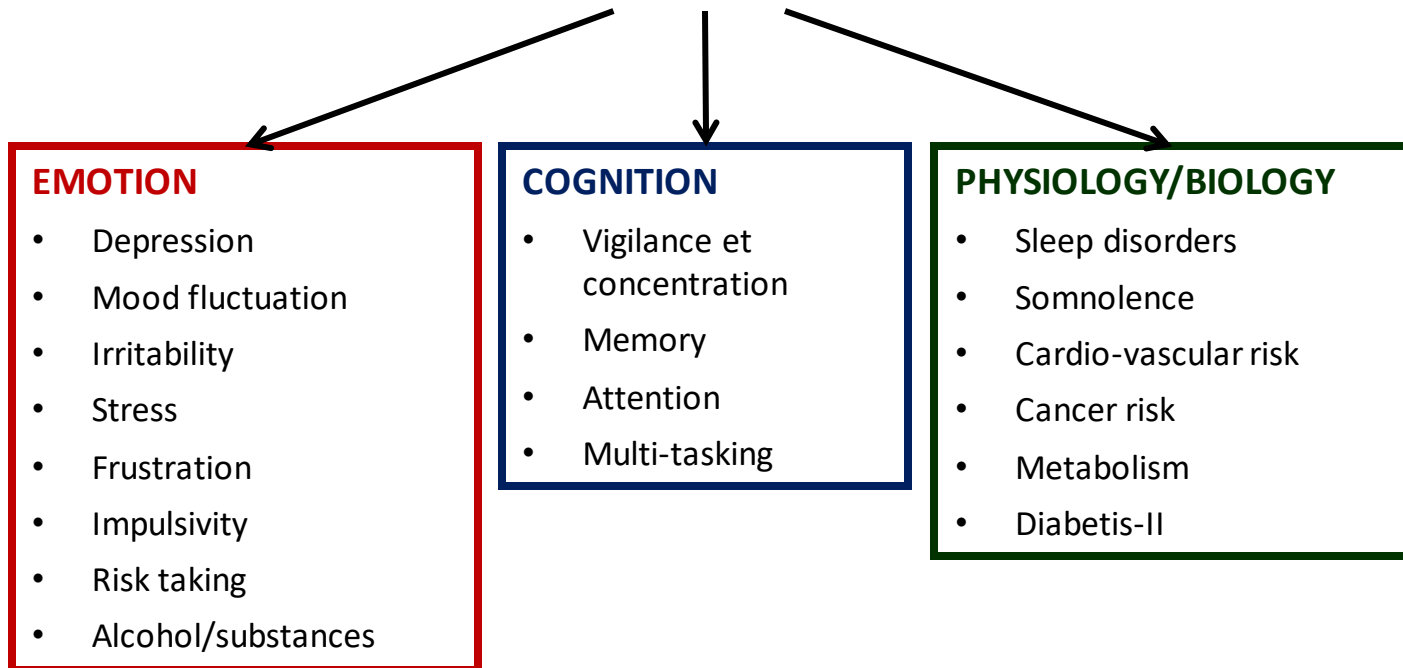
Light affects circadian rhythms: different effects, depending on time of day

Light = most important time giver of the circadian clock



Example: Screen exposure in the evening in adolescents

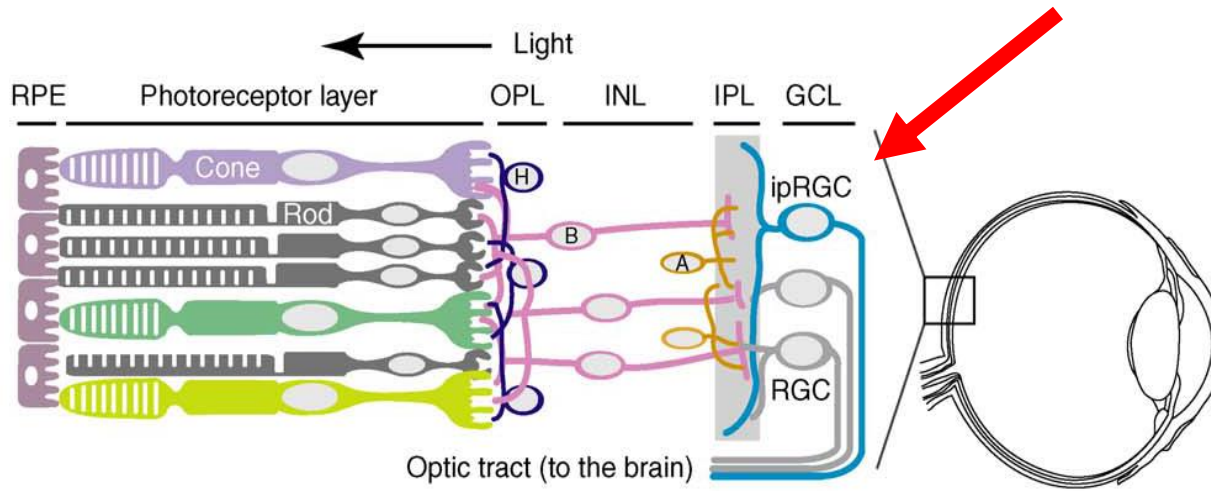
Desynchronisation between clocks (including light at night) potential consequences



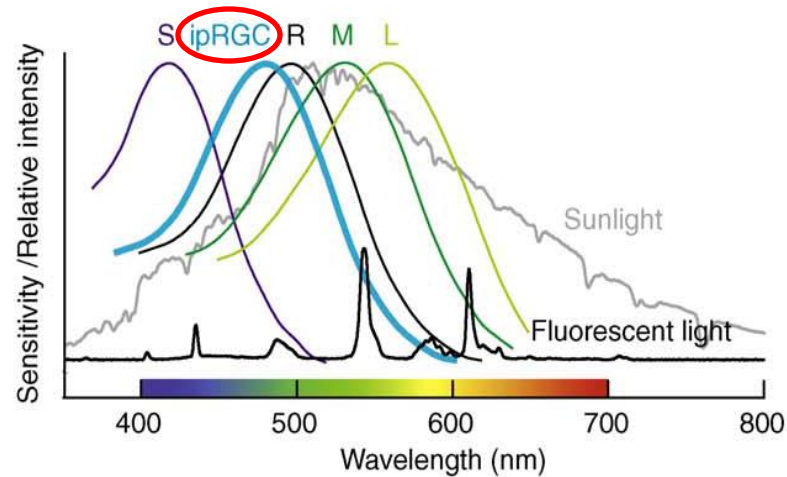
Effects through the circadian system/sleep-wake cycle

Direct « **activating** » and anti-depressant effects

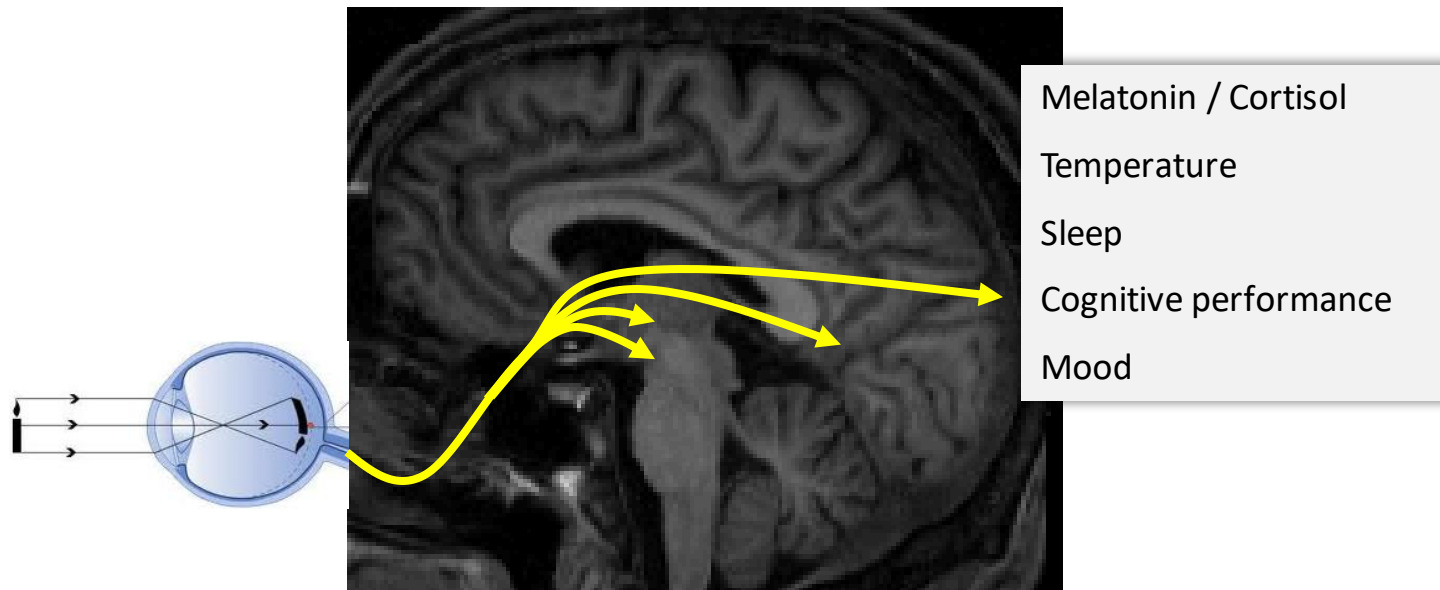
Acute non-visual responses of light (and particularly blue-enriched light)



New photoreceptor discovered in 2002: retinal neurons expressing the photopigment melanopsin

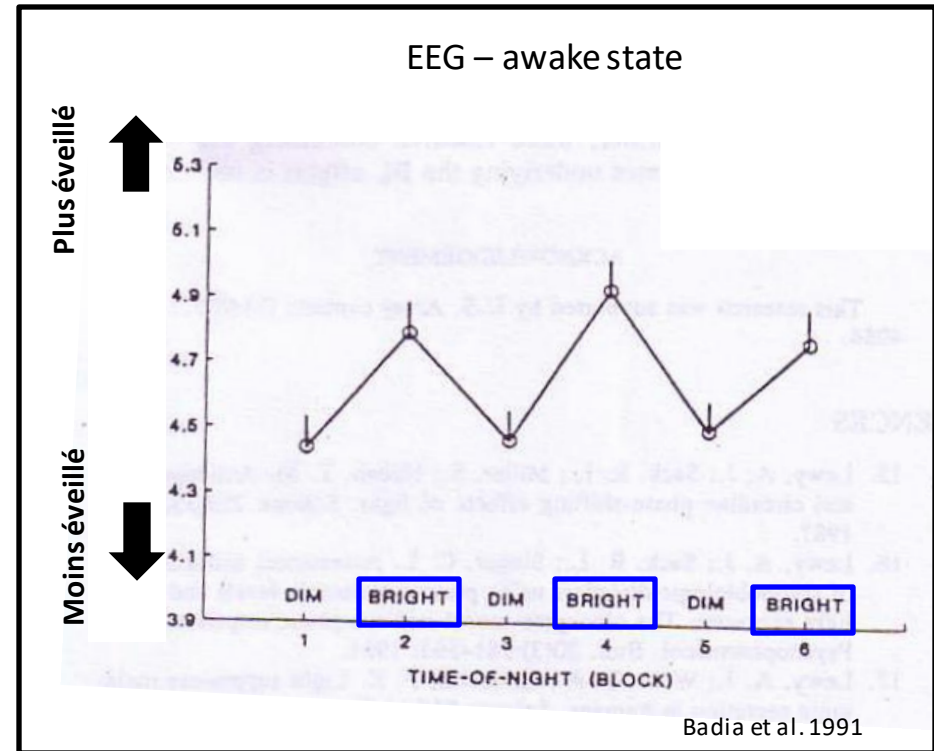
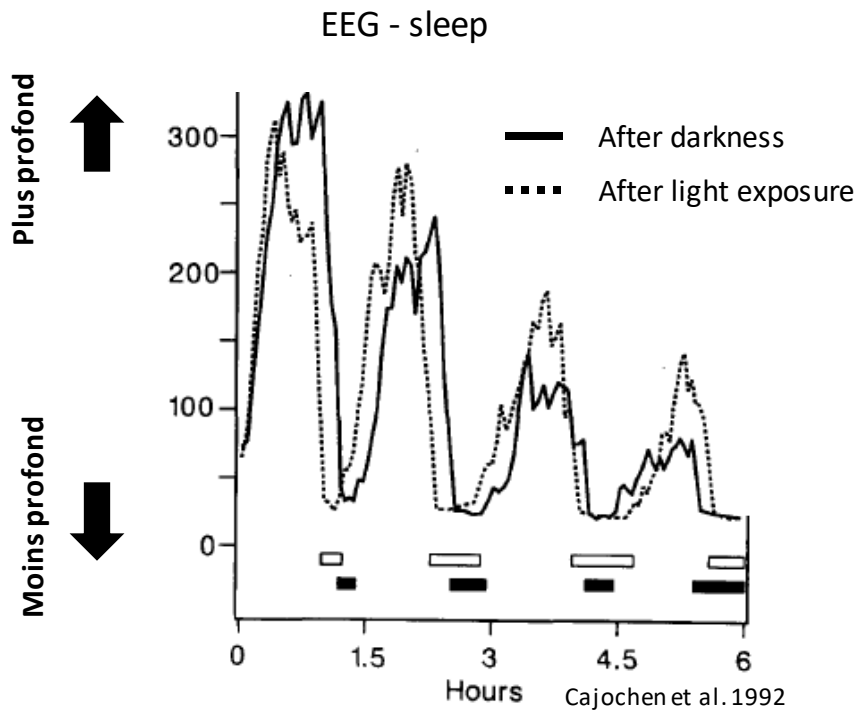


Light regulates a series of non-visual functions, also in humans

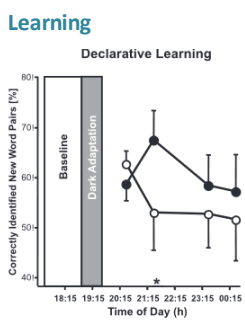
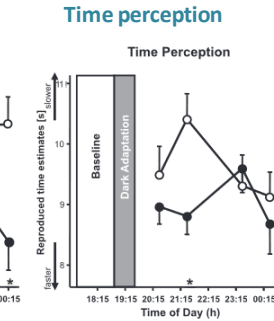
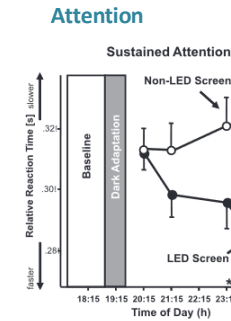
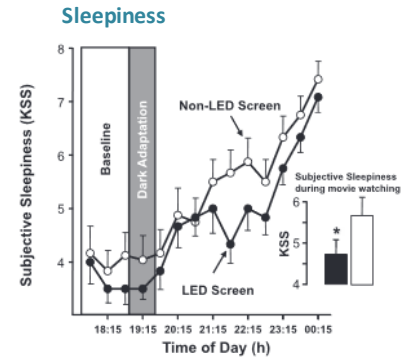
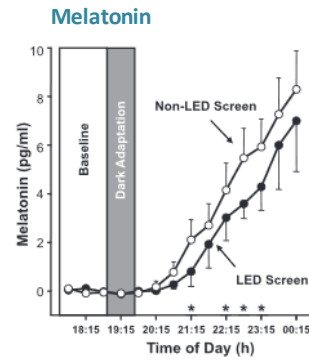
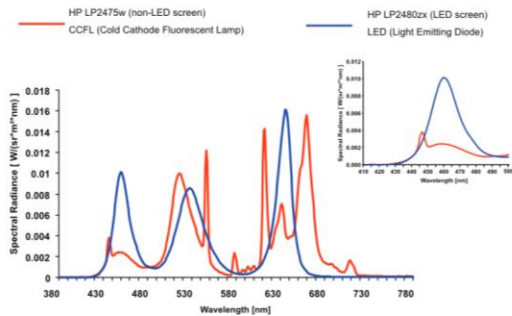


Non-visual effect of light

Immediate effects on sleep & vigilance



COGNITION: activating effects



Exposure to LED screens before sleep affects :

- Melatonin
- Sleepiness
- Performances
 - Attention
 - Time perception
 - Learning

The activating effect of light depends on:

- Light intensity
- Duration of light exposure
- Time of light exposure
- The wavelength of the light (color)

An aerial photograph of the British Isles, including Great Britain, Ireland, and the surrounding waters. The land is shown in shades of green and brown, while the water is a deep blue. The text "Thank you for your attention" is overlaid in white, bold font across the center of the image.

Thank you for your attention

Nombreux effets non-visuels positifs de la lumière (bleue) le jour

- + Réduction déclin cognitif chez residents de maison de repos**
- + Amélioration des conditions de travail avec de la lumière enrichie de bleu**
- + La luminothérapie améliore l'humeur de patients atteints de dépression saisonnière**
- + Amélioration des séjours hospitaliers**
- + Amélioration des performances scolaires**

Nombreux effets non-visuels négatifs de la lumière (bleue) le soir (écrans - adolescents)

- Retard endormissement**
- Sommeil plus léger**
- Décalage horloge interne**