



International Commission on Illumination
Commission Internationale de l'Eclairage
Internationale Beleuchtungskommission

Introducing the 2024 CIE Position Statement on Integrative Lighting

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CIE President

Date: 2024-11-13

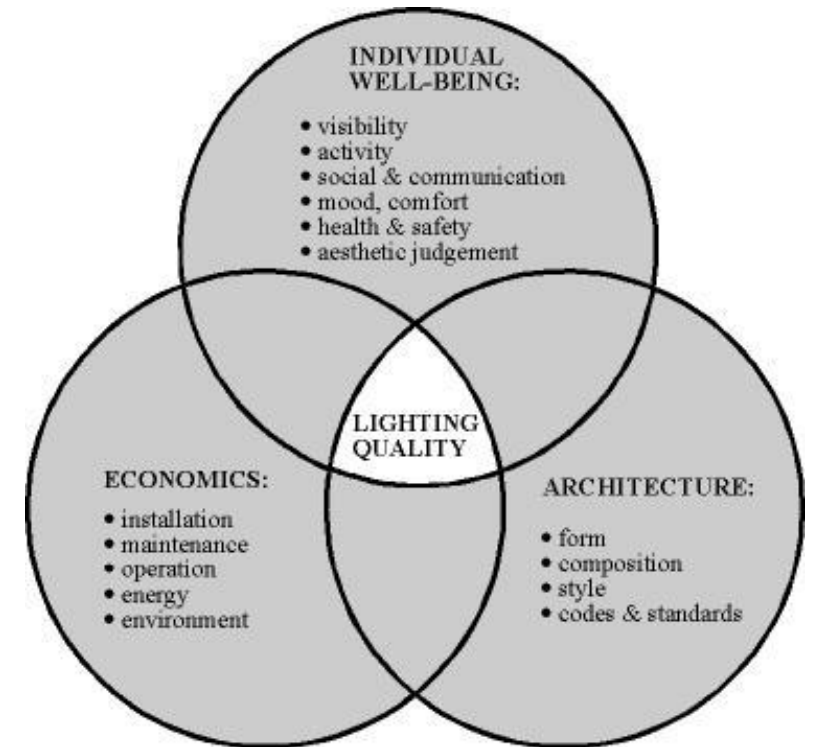


Our aim: lighting quality

lighting quality

degree of excellence to which the totality of lighting characteristics fulfils user needs and expectations or other applicable requirements

Note 1 to entry: The degree of excellence is not a quantitative measure but depends on the application area and covers individual end-user well-being, safety and public security, architecture and lit environment.



The proper light, at the proper time, in the proper place

Light detection basics

Cones

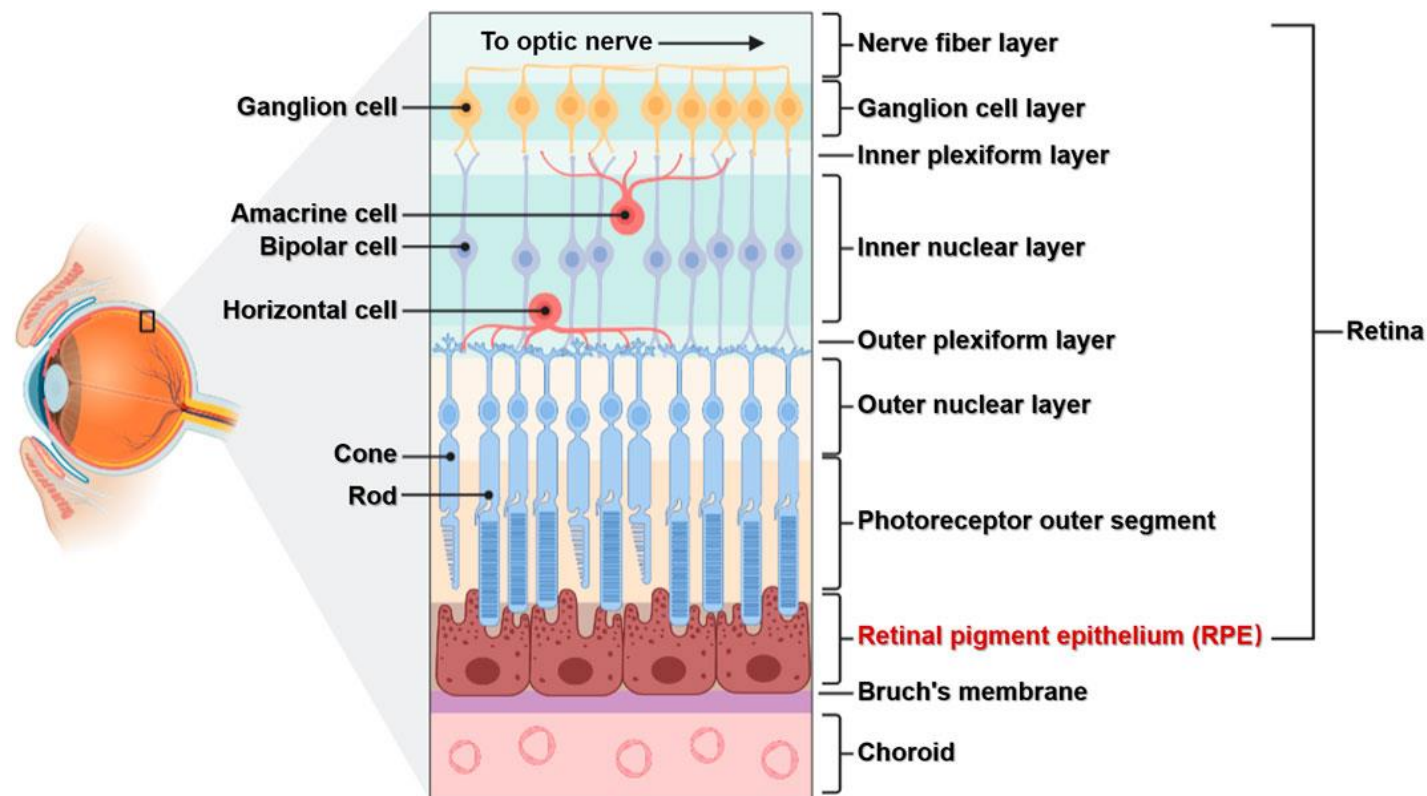
- concentrated in the fovea
- detailed vision at high luminance and colour detection

Rods

- dominate in the periphery
- image detection at low luminance

Intrinsically photoreceptive retinal ganglion cells (*ipRGCs*)

- located throughout the retina
- detect irradiance



Yang, S., Zhou, J., & Li, D. (2021). Functions and diseases of the retinal pigment epithelium. *Frontiers in Pharmacology*, 12, 727870. <https://doi.org/10.3389/fphar.2021.727870>.

Brain connections

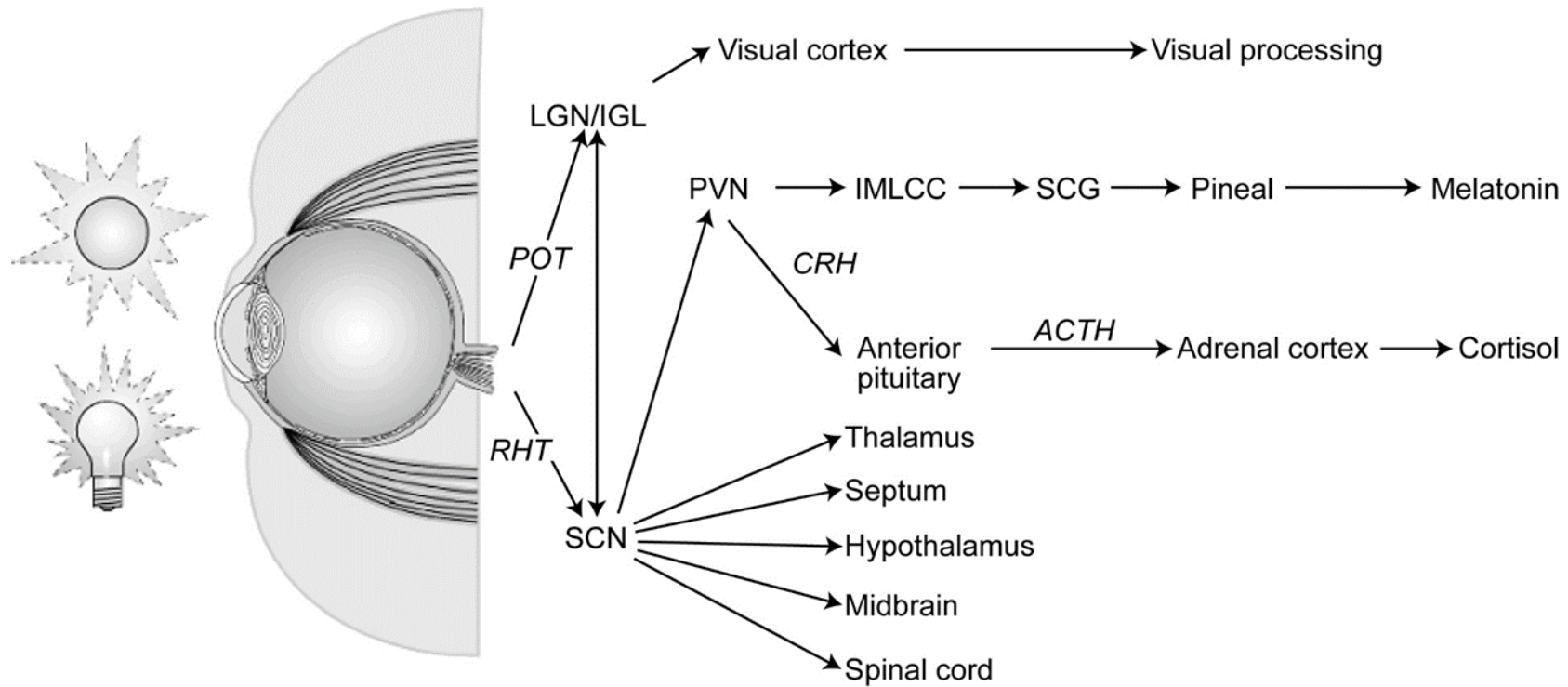
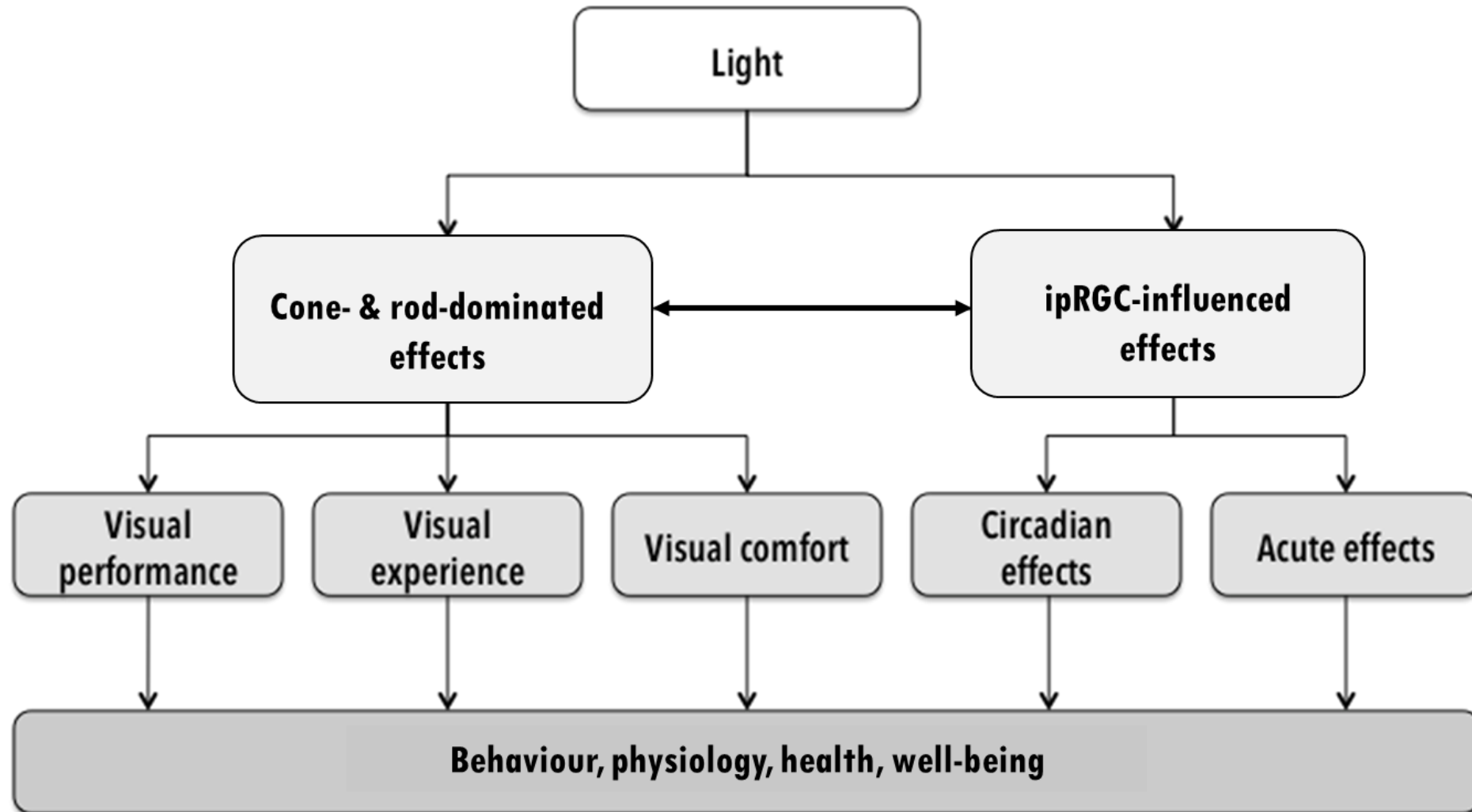


Figure 3 from Commission Internationale de l'Eclairage (CIE). (2004/2009). *Ocular lighting effects on human physiology and behaviour* (CIE 158:2009). Vienna, Austria: CIE.

Light influences everything all at once...



Integrative lighting for people



Integrative lighting: lighting integrating both visual and non-visual effects, and producing physiological and/or psychological benefits upon humans

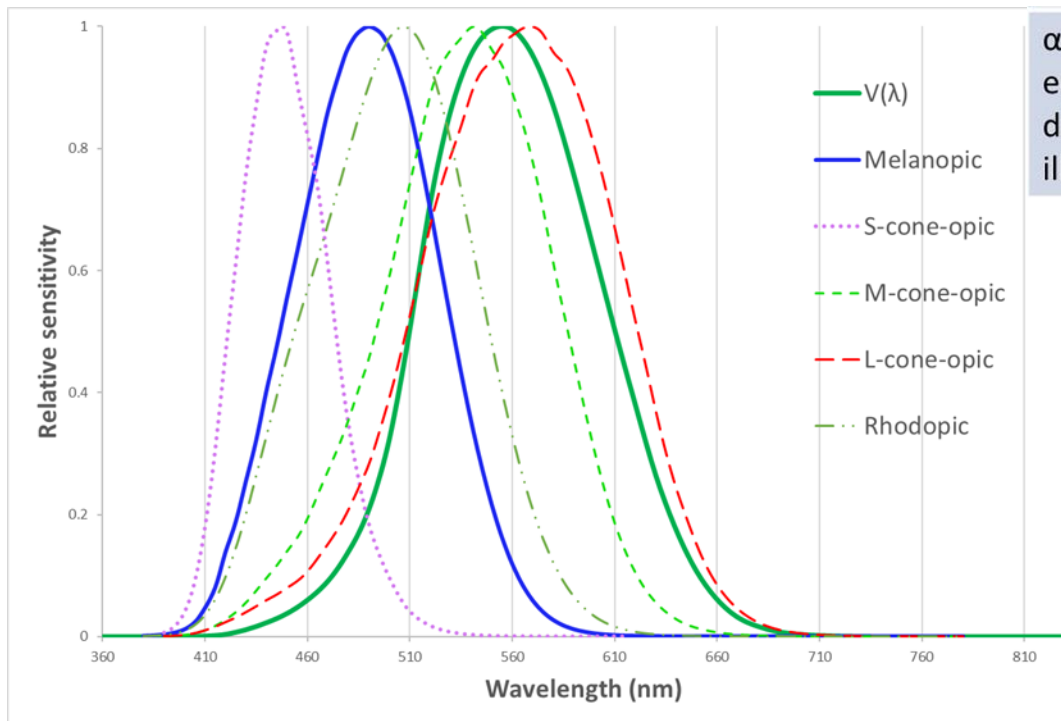
Full range of psychological and physiological effects of light and optical radiation

- Necessary daily light-dark pattern, intensity, spectrum, duration, timing
- Understand causes of visual discomfort and visual disability, and how to avoid both while delivering the light part of the daily pattern
- Beauty and its effects on well-being

Integrative lighting fundamentals

CIE S 026:2018 established SI-compliant quantities for assessing light exposures for the full range of physiological and psychological effects of light, especially those mediated by ipRGCs.

Use equivalent daylight illuminances (EDIs) to provide a common comparison, and melanopic EDI to describe the stimulus to the ipRGCs.

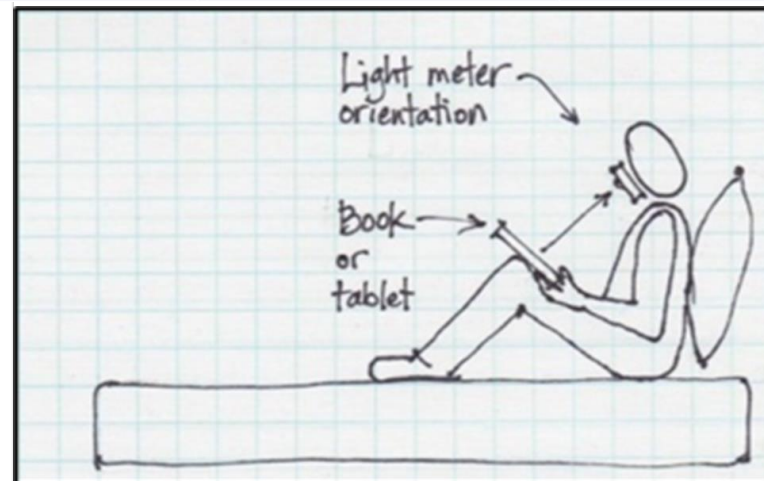


α-opic equivalent daylight (D65) illuminance

$$E_{V,\alpha}^{D65} = \frac{E_{\alpha}}{K_{\alpha,V}^{D65}}$$

Illuminance level of daylight D65, producing an equal α-opic irradiance as the test source

lx



Recommending the proper light at the proper time



The 2019 Manchester II workshop recommendations (Brown et al. 2022):

During the day:
min. 250 lx melanopic EDI at the eye



for 3 hours before bed:
max. 10 lx melanopic EDI at the eye



for 3 hours before bed:
< 1 lx melanopic EDI at the eye



Brown, T. M., Brainard, G. C., Cajochen, C., Czeisler, C. A., Hanifin, J. P., Lockley, S. W., Lucas, R. J., Münch, M., O'Hagan, J. B., Peirson, S. N., Price, L. L. A., Roenneberg, T., Schlangen, L. J. M., Skene, D. J., Spitschan, M., Vetter, C., Zee, P. C., & Wright, K. P., Jr. (2022). Recommendations for daytime, evening, and nighttime indoor light exposure to best support physiology, sleep, and wakefulness in healthy adults. *PLoS Biology*, 20(3), e3001571.

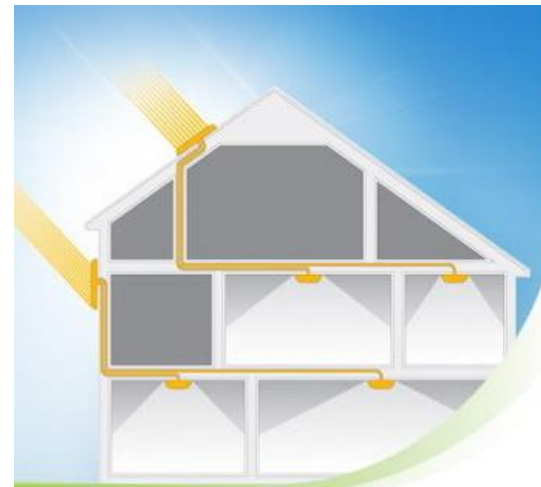
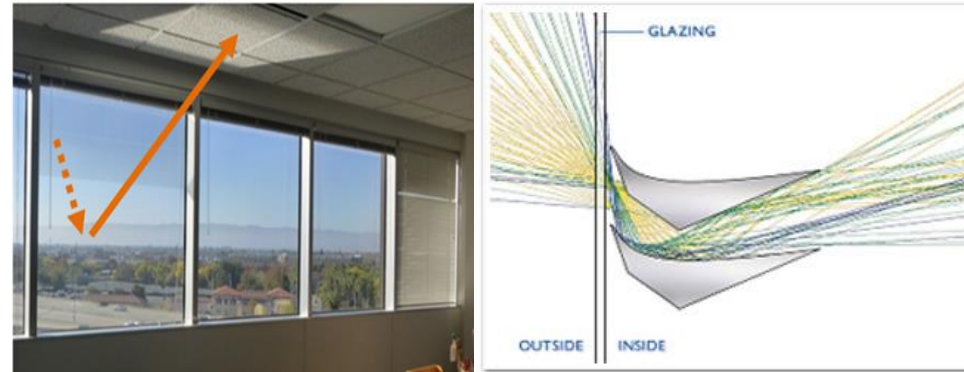
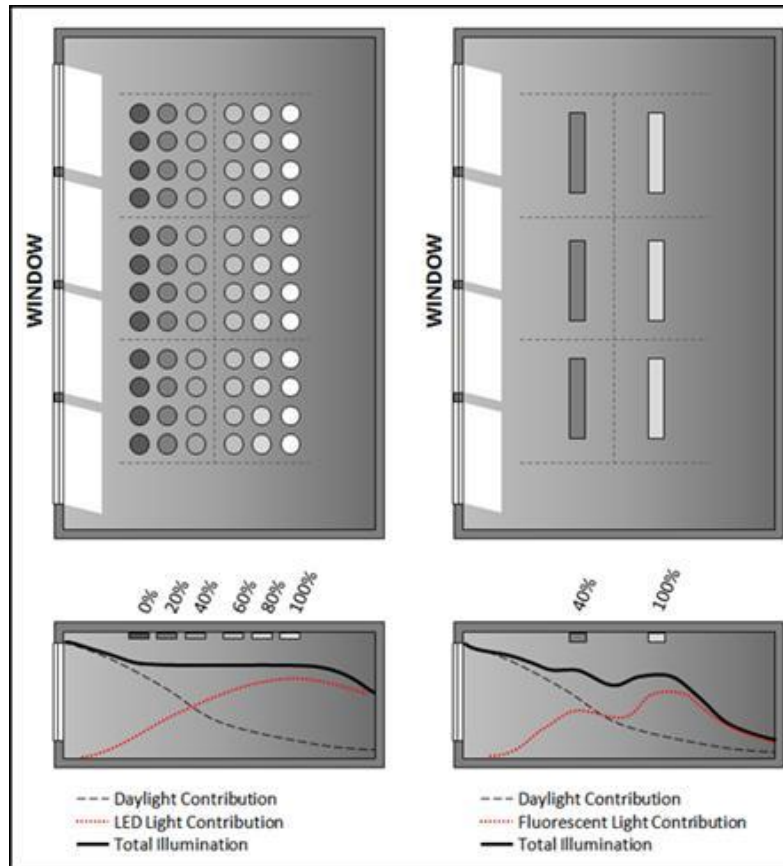
<https://doi.org/10.1371/journal.pbio.3001571>.

Commission Internationale de l'Éclairage (CIE). (2023). *Second International Workshop on Circadian and Neurophysiological Photoreception* (CIE TN 015:2023). Vienna, Austria: CIE. <https://doi.org/10.25039/TN.015.2023>.

Daytime integrative lighting challenges



Daytime integrative lighting – daylighting & controls



Evening and night-time



Other open challenges

We lack knowledge of people who are not young adults.

It would help to have better data about real daily light exposure patterns – this is an area of active research and CIE activity in JTC-20.

Applications guidance based on averages leaves out the extremes; we need to make recommendations that can be tailored to individual needs, for instance using controls.

Current guidance doesn't address special groups including overnight shift workers.

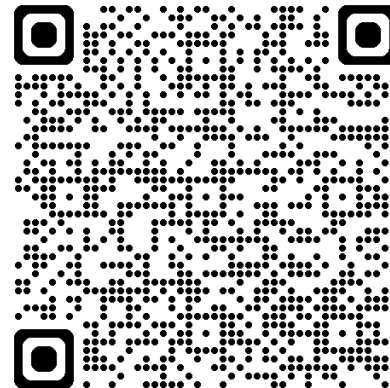
At the end of the day...

Details remain to be learned, but we know enough to increase public awareness about using light better with the message

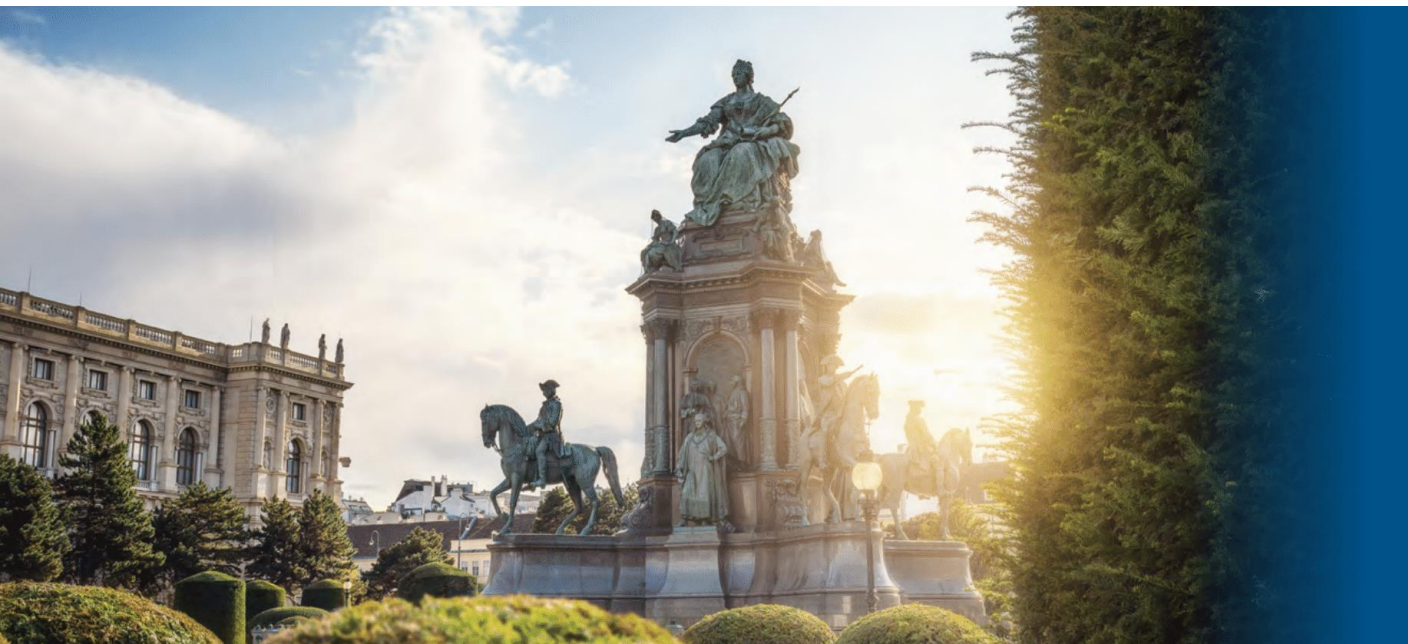
“very bright days – very dark nights”

Researchers, learn how to support our goals in this domain by reading the [CIE Research Strategy](#).

Access the Position Statement here:



Looking to the future



MIDTERM MEETING VIENNA, AUSTRIA

CIE2025 July 4–11, 2025

Submissions close December 10!



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