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Human Centric Lighting

Human centric lighting is a term used to describe lighting products and lighting designs that take into account both visual and non-visual effects of light.

Visual effects

Light that stimulates the rods and cones (photoreceptors) in our retina and allows us to see detail, contrast, colour and movement.

Non-visual circadian effects

Light that stimulates the intrinsically photoreceptive retinal ganglion cells (ipRGC) in our retina. This helps control our sleep-wake cycle.

Other non-visual effects

This includes visual discomfort in response to flicker, the effect of light on alertness, and emotional responses to light, for example, does the lighting make people "feel good"?

Non-visual effects of light have been described for many years. For example, Wilkins[1] has published a large body of research on visual discomfort in response to flicker, in 2001 Brainard and co-authors[2] showed that exposure to blue light can delay sleep onset by suppressing melatonin in the brain, and in 2002 Berson and co-authors[3] identified that ipRGC regulate circadian rhythms.

LED technology has helped the development of some human centric lighting products. Tunable lighting products allow us to easily manipulate lighting parameters such as illuminance, colour appearance and correlated colour temperature (CCT). For example it is possible to adjust the interior room lighting throughout the day to simulate daylight:

Light with a cool colour appearance and high CCT to simulate morning daylight.

Light with a warm colour appearance and low CCT to simulate late afternoon daylight.

The research community is cautious. Despite products labelled "human centric", there is a lot we don't understand about the non-visual effects of light. For example, what intensity, duration, timing and colour of light is required to affect circadian function and alertness? Is it better to provide a prescribed dose of light to an individual based on their circadian function instead of installing tunable lighting throughout an entire room?

The International Commission on Illumination (CIE) published a position statement on the non-visual effects of light in October 2019 (free download)[4]. The CIE acknowledge the importance of natural light for health and well-being, and are working with the International Standards Organisation (ISO) to develop evidence-based recommendations for new indoor workplace lighting standards that take into account both the visual and non-visual effects of light.

References: **1.** https://www.essex.ac.uk/people/wilki51608/arnold-wilkins **2.** J Neuroscience (2001) 21, 6405-6412. **3.** Science (2002) 295: 1070-1073 **4.** http://cie.co.at/publications/position-statement-non-visual-effects-light-recommending-proper-light-proper-time-2nd

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