



High levels of natural light at Smythe Library helped the building achieve a BREEAM Excellent rating

Health service

'Wellbeing' and 'human centric' have entered the lighting lexicon, as well as academic study. **Stephen Cannon-Brookes** suggests the medical mantra 'do no harm' might be more appropriate

More mention of the phrase 'human-centric lighting' unleashes a torrent of opinions and frustration. Given that lighting employs the only non-fundamental derived SI unit, the lumen – based on human visual performance – the idea that it may not be human centric is illogical. For the argumentative, it raises the interesting question: what in recent practice was not human centric?

Controversy does, at least, encourage discourse. The definition of the lumen is based on humans' photopic response to visible light within a narrow field of vision. This had the virtue of being measurable in the early 20th century, and has led to the quest for optimising task performance.

The latter has been enshrined in successive editions of recommendations by professional bodies that were largely subsisting on the sale of lighting equipment, and which needed to reassure their clients of how much was needed.

Critics, such as author and educator Kit Cattle, have urged us to set aside this dogma, but it is difficult to substitute – as he suggests – a perception-derived system, treating the environment as the luminaire/light source, for comfortable and simply determined methods of direct-beam illumination, which can be calculated easily and verified in the field.

It remains to be seen whether anyone will be bold enough to speculate on whether the lighting energy numerical indicator (Leni) will serve to buttress this photopic status quo, particularly if adopted in legislation.

The debate is still being conducted in a single dimension – that is, photopic vision – while new dimensions present themselves. These include the growing interest in the cultural/experiential dimensions of vision – look out for biophilia – and the relatively recent discovery of previously unknown photoreceptors, retinal ganglion cells, with pathways outside the visual cortex to the hormonal system and only indirectly to the visual system. Such dimensions are being swiftly adopted within new criteria to meet the latest objective – namely wellbeing – and have a cheerleader in the form of the International Well Building Institute.

With Pandora's box well (excuse the pun) and truly opened, we have discovered its contents are not finite.

The key question now is should the photopic basis for lighting be reconsidered? This has such enormous consequences that most shy away from even speculating as to what could succeed the system on which we have constructed our current understanding of light. In truth, it is probably too early to do so; we need to reach a fresh plateau in our understanding of vision to be able to share universally a new system for its quantification.

This said, we need to reconcile ourselves with an increasing divergence between day-to-day practice and our orthodox description of vision – a gap that will not be sustainable in the long term. The cracks are already there and, through these, we are seeing the arrival of metrics that will compete with existing ones, leading to confusion for lighting

professionals and the wider audience.

A good example is the promulgation of equivalent melanopic lux (EML), now quoted in the Well Building Standard for offices. The EML metric encompasses a substantially wider range of the visual light spectrum, including the blues associated with wavelengths that excite retinal ganglion cells and generate melatonin – hence the title for this recently minted light definition. Blue-rich light has long been known to be more stimulating – now we know why, and use of EML encourages its employment.

Should offices be lit with cool-colour light sources – of a high colour quality – to ensure staff operate with maximum alertness? Maybe at 8.30am, but perhaps not at 5.30pm. But this depends on the people, as well as the function of the workplace, and begs rather more complex questions about how lighting systems are optimised for building occupants.

At present, the Well Building Standard



BDP's Smythe Library, Tonbridge School, Kent

"The idea that any lighting may not be human centric is illogical. For the argumentative, it raises the question: what in recent practice was not human centric?"

does not engage with this issue, but infers the benefits of blue-rich light sources by comparing current warmer sources and computing their relative efficiency using EML. Unsurprisingly, red-rich sources – and most of all incandescents – fair worst on the comparison, and one can easily see the consequences of this in the hands of those for whom efficiency is the only measure. Perhaps it is fortuitous that the most ubiquitous light source now available is blue.

Today's lighting manufacturers are asking themselves what sort of spectrum is best to sell to their clients, and whether this should be variable. Increasingly, the answer is yes – a timely innovation given that selling light sources with life expectancies in many multiples of previous types is going to reduce demand. But to which criteria should we design and build? Is this a matter of belief or legislation?

Now that the pursuit of wellbeing is becoming central to the way we consider our use and design of buildings, we need to engage lighting from a range of different perspectives. These are clearly 'human centric', and we already have a few, such as task performance and comfort – the latter relating largely to the avoidance of glare.

Beyond these, we are wrestling with a wide range of factors, most of which are being drawn from current research and the significance of which is not yet fully established. Few have tried to encompass these, and perhaps it is time to draw upon ethical analogies.

Given the responsibilities of the lighting industry within the building field –



Aecom's London offices illustrate more fluid ways of working





Smythe Library (left and below), and award-winning lighting for New York-based ad agency RGA, by Tillotson Design Associates, which allows adjustment of both colour temperature (time of day) and colour (for events)

» which includes architecture – might we now acknowledge our impact on people’s lives by adopting the medical mantra ‘do no harm’, and even aspire to improve health through good building design? This is a route to becoming truly human centric. It requires us to consider ourselves first, however, and to determine our needs in achieving wellbeing – now a catch-all for health without mentioning the word.

Recent research into vision has served as a reminder of how daylight plays an integral role in our evolutionary state and so will remain the benchmark for vision – as well as other pathways – for a considerable time.

Our skin tone, vision and other characteristics are clearly evolved for an outside lifestyle. Looking from this perspective, daytime occupation of buildings – and perhaps vehicles too – can be measured in terms of isolation from our evolutionary state. For example, in reduced levels of illumination and its inherent variability; partial exposure to the UV spectrum; reduced views; light exposure outside the ‘natural’ hours; and exposure to light sources with unnatural spectra and



flicker. This list is steadily getting longer. We simply don’t know what the effect is of such isolation. When we see this in the context of environmental pollution and other factors, it is apparent that we are conducting a massive multifactorial experiment on ourselves, in which it will be extremely difficult to separate the effect of light use.

Despite this, the ‘do no harm’ principal could be more widely applied. If the lighting industry is going to show some form of example in the lighting of buildings, it needs to become truly human centric.

It is time to relearn what was understood in the pre-lumen era about the relationship between health and building design. We need to support cultural and societal pressure to ensure this is enshrined in protective legislation that works from a long-term, sustainable perspective. **C**

DR STEPHEN CANNON-BROOKES is a lighting consultant, and lecturer at The Bartlett Institute of Environmental Design and Engineering. He is working on a new module on light, lighting and healthy buildings as part of the MSc in health, wellbeing and sustainable buildings

“Most shy away from even speculating as to what could succeed the system on which we have constructed our current understanding of light”

