



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

1 Support for Tailored Lighting Recommendations

1.1 Description of research

Individuals differ widely in visual capabilities and needs. Lighting recommendations are based on average results, usually for able-bodied young adults. A concerted research effort is required to deliver knowledge that can support specific lighting recommendations for specific populations. Two groups of particular interest are the elderly (a demographic group known to be increasing as a proportion of the population in most countries) and those with visual impairments. Other groups of special interest are those susceptible to migraine headache, epilepsy, and depression. Research in this field could lead to modifications to recommendations to aid these populations. With better knowledge, modifiers could be applied to any lighting recommendation to provide for the needs of identified groups.

In a related vein, there is evidence that lighting recommendations could be made conditional in order to provide guidance that balances different concerns. For example, high colour fidelity may improve visual performance such that illuminance levels could be reduced. This could be of benefit to those with colour vision deficiencies, as well as offering the opportunity to reduce lighting energy use.

1.2 Key research questions

- What are the age-related changes in non-visual photoreceptors (ipRGC) and neural responses? How does this change lighting recommendations for the elderly?
- Which ageing effects of the visual system are most detrimental to the performance of workers, drivers and pedestrians and how could or should this be taken into account in lighting design and requirements?
- How do visual impairments or disabilities affect the performance of people and how should these be taken into account in lighting design?

1.3 Justification of the need for the proposed research topic

Globally, the proportion of older people is increasing, which brings into question the suitability of lighting recommendations based primarily on research with younger populations. Although there is good knowledge of the visual changes that occur with age, such as diminished visual acuity and increased susceptibility to disability glare, there is far less known about how to adapt lighting design and recommendations to the visual needs of those with specific visual impairments. The knowledge generated under this topic would lead to benefits for segments of society that are not well served by current recommendations, including the elderly, those with visual impairments, and those with special sensitivities. It would be expected to drive technological change by providing the evidence needed for the development of suitable lighting technologies or design practices to assist these populations.

The potential beneficiaries of this work are many. For example, there is some evidence that certain individuals are more susceptible to spatial and temporal patterns of light and are at risk of headache, eyestrain, and visual disturbance as a result, but there are no specific lighting design recommendations for these individuals and no validated method for identifying those who might need this assistance. However, any recommendations from the research should also consider the impact on the wider population who might not need this assistance.

1.4 Related current activities in CIE

TC 1-83	Visual Aspects of Time-Modulated Lighting Systems
TC 1-84	Definition of Visual Field for Conspicuity
TC 1-89	Enhancement of Images for Colour Defective Observers
TC 4-54	Road Lighting for Ageing Drivers
DR 1-66	The Effect of Dynamic and Stereo Visual Images on Human Health
DR 4-41	Lighting for the Elderly and Visually Impaired

1.5 Existing CIE publications

CIE 196:2011	CIE Guide to Increasing Accessibility in Light and Lighting
CIE 218:2016	Research Roadmap for Healthful Interior Lighting Applications
CIE 227:2017	Lighting for Older People and People with Visual Impairment in Buildings