[1]Investigating the effect of personalized dynamic light scenarios on the desk and on the eye – A field study

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Research issue

Research on non-image forming effects of light have indicated that optimal light settings are crucial not only for vision, but also for a healthy entrainment of the biological clock and momentary alertness and vitality. This means that in future we should be formulating lighting standards not only for horizontal levels on the desk, but also for vertical levels on the eye. The current study presents a field study testing the effects of such optimized light settings on visual appraisals, wellbeing and performance in real life.

State of science/technology

For years we have heard the promise of LED offering unlimited opportunities to deliver dynamic and individually tailored light conditions throughout the day, but its implementation in realistic settings still poses numerous challenges. The PILCS project uniquely addressed three of these challenges. First, optimal levels of light received on the desk and on the eye as a function of time of day and personal characteristics were determined based on the available scientific literature. Second, state of the art office luminaires were redesigned so that they were able to independently deliver light on the desk and on the eye, tuneable in level as well as colour temperature. Third, an intelligent lighting infrastructure (hard- and software) was developed that enabled us to deliver personalized lighting in realistic office environments, individually tuned for Chronotype, SAD-sensitivity and age. We will present the first analysis of the effects of such an intelligent light system.

Research hypothesis

Light exposure patterns on eye and desk, optimized for time of day and tailored to person characteristics should improve alertness, vitality, and cognition in real-life office conditions.

Experimental setup

Office employees (N=25) experienced two weeks of standard lighting and two weeks of a personally optimized scenario (counterbalanced) in their own offices. During these phases, we employed ecological momentary assessment to track vitality, alertness, appraisals and cognitive performance throughout the day. Also, sleep diaries, actigraphy and ambulatory light measurements were utilized to track sleep and to control for actual light exposure.

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[1] Untersuchung der Auswirkung von personalisierten dynamischen Lichtszenarien auf dem Schreibtisch und auf dem Auge - Eine Feldstudie. Presentation at LICHT2016, 25-28 September, Karlsruhe. PILCS project: www.pilcs.eu

Results in comparison with previous findings

Data collection is currently in progress (phase two). At the conference, we will report on the effects of the personalized light scenarios on employees' vitality, alertness and cognitive performance employing hierarchical modelling. In addition, we analyze and report on user experiences of such dynamic and personalized lighting in their office environment.