

Alerting and vitalizing effects of color temperature during daytime: findings on subjective and objective indicators

K.C.H.J. Smolders¹ & Y. A. W. de Kort¹

¹ Eindhoven University of Technology, Human-Technology Interaction, Eindhoven, the Netherlands

We investigated the effects of correlated colour temperature on alertness, vitality and performance during daytime. Results of a within-groups experiment demonstrate time dependent effects on subjective indicators; objective measures are still being analysed.

Introduction

At work, people may experience fatigue and a depletion of mental resources. In this study, we investigate whether office lighting, and in particular the colour of white light, i.e. correlated colour temperature (CCT), can improve office employees' alertness, vitality and performance during daytime. Research has shown that CCT can influence alertness and performance. Some studies showed that exposure to a higher CCT improved alertness and performance (e.g. Chellappa, et al., 2011; Mills, et al., 2007), in line with studies showing wavelength dependent effects of light at night on alertness and melatonin suppression (Cajochen, 2007). Other studies, however, failed to demonstrate such effects (Veitch & McColl, 2001), so overall the literature is still inconclusive.

Method

In this study, we explored the alerting and vitalizing effects of CCT during daytime in a within-groups design (N = 26). On two separate visits to the lab, scheduled at the same time of the day, participants were first exposed to a baseline condition (500 lux and 4000K at work plane) for 30 minutes. Subsequently, they were exposed to either 2700K or 6000K (500 lux at work plane) for one hour. In three repeated blocks of 20 minutes, subjective (self-report scales) and objective measures (task performance, skin conductance and heart rate recordings) were employed to assess the alerting and vitalizing effects. Performance tasks probed alertness,

ability to focus attention, self-regulation and executive functioning.

Results and discussion

Data analysis of the objective measures is ongoing, but results of the subjective measures already showed effects of CCT. These effects are dependent on time of day: Participants felt less sleepy and more energetic in the high versus the low CCT condition in the morning. In addition, participants experienced a higher self-control capacity at the end of the experiment in the 6000K condition in the morning. No differences were found in the afternoon.

These results suggest that the effect of CCT on subjective alertness, vitality and depletion of mental resources is dependent on time of day. The psycho-physiological data and performance tasks will indicate whether CCT also has an influence on physiological arousal and objective measures of alertness and resource depletion.

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