

Dynamic Road Lighting and Perceived Personal Safety of Pedestrians

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Introduction

Road lighting accounts for a large proportion of the energy consumption of Dutch municipalities. This includes the lighting of roads at times when no street users are present, thus leading to energy waste and unnecessary light pollution. Intelligent dynamic road lighting, which continuously adapts to the presence and behavior of users, can light the street only when and where it is needed. As such, it offers a solution to the energy waste and luminous pollution associated with conventional road lighting (e.g., de Kort et al., 2010). With this innovation, however, new questions emerge about the effect of lighting on perceived safety. We need to consider not only how much lighting pedestrians need to feel safe, but also where it should strike. When and where, for example, do pedestrians benefit most from street lighting: in their action or vista space?

In the present study, we investigated how different distributions of the same amount of illumination affect pedestrians' sense of safety in a dynamic situation. Additionally, we investigated whether these effects can be accounted for by changes in people's perception of street characteristics, such as perceived prospect and escape possibilities (Fisher & Nasar, 1992).

Method

Three different distributions of the light (spot-light, darkspot, and a combination of both) were tested in a within-subject experiment conducted at testbed the Zaale (see Fig. 1). Testbed the Zaale is a section of a road on the university campus with 12 lampposts equipped with LED luminaries that can be controlled through power line communication. Fifty participants walked through the street three times. After each walk they completed a questionnaire.

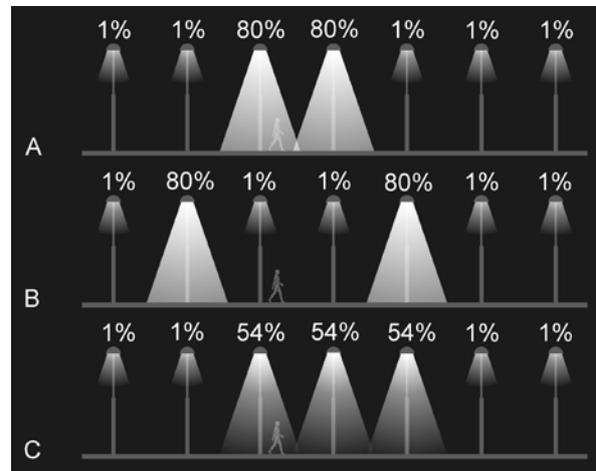


Fig. 1: The spotlight condition (A), dark spot condition (B), and the combination condition (C). Percentages represent illuminance output respective to maximum power.

Results and Discussion

Participants experienced the lowest perceived personal safety in the dark spot condition as compared to the other two conditions (with $p < 0.01$), indicating that people prefer situations in which their immediate action space is illuminated. Mediation analyses revealed that this could best be explained by reduced prospect. Strangely, prospect was poorest in the dark spot condition where there was more light in people's vistas.

Acknowledgements

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References

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