

Car lighting makeover impacts feel of safety and style

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Gone are the days of basic, glaring lights inside cars to help us find our seatbelts or scramble for a map. Taking cues from research in buildings and offices, today's car designers have started to incorporate gentle ambient interior lighting, potentially enhancing night driving safety as well as increasing the feel good factor about vehicle interiors, according to research appearing today in the journal *Lighting Research and Technology* published by SAGE.

Engineers based at BMW in Munich, Germany, led by Luca Caberletti, together with Christoph Schierz from the Lighting Engineering Group at Ilmenau University of Technology, also in Germany, decided to test different lighting set ups on drivers. The test took place in a driving simulation environment where 31 people 'drove' a real stationary vehicle on a virtual highway with the driving environment projected onto three screens around the front and sides of the car. The light levels on the simulated street were between 0.1 cd/m^2 and 1.5 cd/m^2 ." The researchers tested twelve different lighting scenarios, with varying light colour, luminance and position.

In the last decade the number of light sources in car interiors has drastically increased, up to a current maximum of about 25 light emitting diodes (LEDs), although this is likely to rise further. Ambient lighting has become a staple of cars in the mid to high market ranges, and comes in a number of colours. Previous studies have shown that the uncomfortable and distracting glare from interior lights, that can present [driver safety](#) issues, is eliminated when luminance is kept under 0.1

cd/m² Other studies show that drivers are less distracted when they are in control of ambient lighting levels in the car.

In this study drivers were questioned on space perception, perceived interior quality and attractiveness, perceived safety, functionality and alertness. The drivers' emotional states were also measured before and after the simulations, using a questionnaire.

The researchers found that the driver's whole perception of the car interior is improved through the use of ambient lighting while driving. It intensifies space perception, enhances the perceived quality of materials and design, helps them find controls and with their orientation in the car, and makes them feel safer.

However, less is more when it comes to ambient lighting: a sprinkling of ambient lights can be just as effective as larger numbers in giving an impression of space and quality. In fact increasing the brightness does nothing to enhance impressions of the interior or help the driver, but rather leads to driver complaints of distraction from discomfort or glare. Drivers perceive blue lighting as brighter than orange or red, and colour does seem to influence emotional responses. The researchers suggest colour is important for "brand identity and design compliance". Beyond this, the test did not come up with conclusive results for the effects of ambient lighting on the driver's emotional state.

Importantly, ambient lighting did not influence the driver's performance (although this was restricted to staying within a lane in this test). The authors suggest that further studies should look at more interior lighting colours, as well as a range of different car interior materials (because the effect of light on shiny leather is very different from, say, matt fabric). They also want to further investigate the extent to which ambient lighting helps with secondary driving tasks, such as finding controls or using a SatNav device.

Another future direction is interior lighting that responds dynamically to inputs from the car, the environment and the passengers. "The advantages and problems arising from such systems, as well as their acceptance by the drivers, have still to be tested and verified," says Caberletti. "Nevertheless, they offer a new, interesting, emotional and much more coloured way of understanding and developing vehicle interior lighting."

More information: "Influence of ambient lighting in a vehicle interior on the driver's perceptions" , L Caberletti Ing., K Elfmann Dipl-Ing, M Kummel Dr-Ing and C Schierz Prof Dr. Sc Nat , August 16th, in the *Journal Lighting Research and Technology*.

Provided by SAGE Publications UK

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