

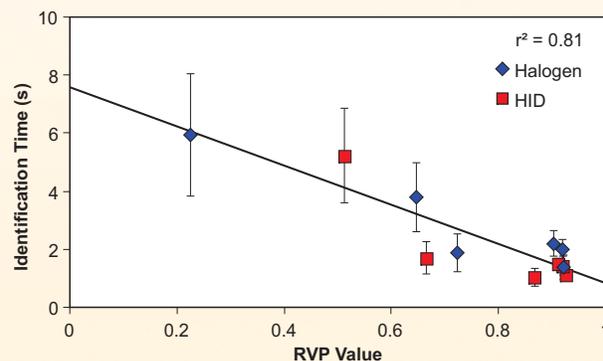
Pedestrian Safety in Roundabouts

LRC researchers compared pedestrian visibility in roundabouts under different lighting conditions in a two-part study.

Predicting Pedestrian Visibility

Photometric simulations were used to estimate the visibility of pedestrians by drivers in lighted and unlighted areas. Analyses included conventional static headlamp systems on most cars today, as well as advanced headlamp technologies that might be more common on cars of tomorrow. These included high-intensity discharge (HID) headlamps with wider patterns, and intelligent headlamps that could swivel toward pedestrians or other hazards to make them more visible.

Visibility was estimated using the relative visual performance (RVP) model. RVP predicts the speed and accuracy of seeing as a function of light level, target contrast, size, and driver age. Some combinations of headlamps and roadway lighting reduced the contrast between pedestrians and their backgrounds, making them harder to see, but HID and intelligent headlamps helped maintain high contrast and high visibility whether roadway lighting was present or not.



The measured pedestrian identification times were strongly correlated with predictions from the RVP model.

Sponsor

Transportation Lighting Alliance



Testing Visibility Predictions in a Nighttime Field Experiment

To validate the RVP calculations, the LRC researchers conducted a nighttime field experiment, re-creating the virtual environments they studied in a real-world setting. The experimental targets were plywood silhouettes of a toddler, named 'Teela' in honor of the Transportation Lighting Alliance (TLA). Study participants were asked to look along the outdoor scene for Teela and identify whether she was walking toward the left or right. Computers recorded the participants' response times.



'Teela'



As quickly as possible, subjects in the experiment recorded the walking direction of Teela, the pedestrian target.

Results

Response times were highly correlated with the calculated visibility values using the RVP model. The correlation suggests that photometric simulations can be used to assess the practical value of new forms of vehicle headlamps in combination with roadway lighting.

Bullough JD, Skinner NP. 2012. Benefits of intelligent headlamp technologies to pedestrian safety at roundabouts. Transportation Lighting Alliance. Troy, NY. Online at: www.lrc.rpi.edu/programs/transportation/TLA/pdf/TLA-2012-01.pdf.



Lighting Research Center