

Influence of Headlight Aim on Vehicle Safety Ratings

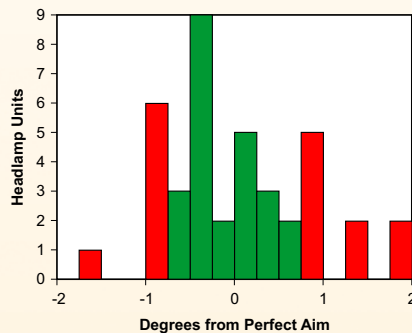
With the proliferation of new lighting technologies for vehicle headlighting, there is increased interest in providing consumers with information about the potential for improved safety from automotive headlights. Several organizations, including the Insurance Institute for Highway Safety (IIHS), Consumers Union (publisher of *Consumer Reports*), and the National Highway Traffic Safety Administration (NHTSA) are all developing safety ratings for headlights to help guide vehicle purchasing decisions.

In particular, the IIHS ratings have received significant attention in the press in the past year, because of their reports that many headlight systems tested by IIHS performed relatively poorly, with few receiving ratings of "Acceptable" or "Good." Fortunately, IIHS has made their test protocols as well as the results of their tests publicly available. Reviewing their protocol revealed that headlights on the vehicles tested were not necessarily properly aimed in the vertical direction. Rather, IIHS tested vehicles with their headlights aimed "as is."

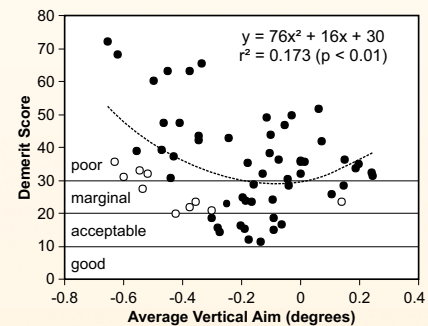


This is reasonable since consumers are unlikely to aim or check the aim of their headlights when buying a new car. But headlights on many new cars are misaimed too high (resulting in glare to oncoming drivers) or too low (resulting in poor forward visibility), and aim is variable even for vehicles of the same make and model. So IIHS's ratings may not reflect what a new car owner will experience.

LRC tests revealed that many headlights on new cars are aimed too high or too low, as indicated by the red bars.



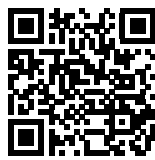
Headlights that were misaimed were rated by IIHS as poorer than those that were aimed properly. Open circles indicate headlights that might have received a rating of "good" or "acceptable" if they were properly aimed.



The LRC re-analyzed rating data from IIHS as a function of the vertical aim of the headlights they tested and found a modest, but statistically significant ($p < 0.01$) relationship between IIHS's demerit score (higher is worse) and the vertical aim of the headlights: better scores were achieved when headlights were properly aimed. Based on this relationship, about twice as many vehicles' headlights could have been rated "Acceptable" or "Good" if they were first properly aimed. And, the relationship underscores the importance of frequently checking headlight aim on all vehicles.

Citation

Bullough JD. 2016. Vehicle headlights: Aiming for better driving safety. *Leukos, J. of the IESNA*. <http://dx.doi.org/10.1080/15502724.2016.1204798>.



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