



'Safety, Emotion & Communication through Good Lighting'

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Shammika Wickramasinghe
Contributors – Simon Baker



Agenda

- 01 Full Width Signatures
- 02 R1T / R1S Safety, Emotion & Communication
- 03 Emotion
- 04 Safety, with Emotion & Communication
- 05 – Safety, NHSTA, IIHS data
- 06 – Summary & Closeout

Why are full width signatures important for EV's?



How do vehicle Manufacturers Owners demonstrate their Emotion and Passion with their products

ICE – Exhaust Note / Engine noise

EV – Noise is replaced by Light
The Majority of EV's have a full width Front and Rear Signature

This not only helps with visibility (Safety) but increases vehicle presence to demonstrates emotion

Full Width Signatures for Safety, Emotion & Communication



RIVIAN

Safety, Emotion & Communication through good lighting

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Emotion & Communication – Approach & Charging

Daytime Welcome Lighting

Zone not to scale

EDV Signatures for Safety, Emotion & Communication



EDV's Head Lamp signature is 'friendly and welcoming' while the proportions of the Signal Functions reinforce Safety

EDV Signatures for Safety, Emotion & Communication



EDV's Rear Lamp signature reinforces Safety to reduce rear end collisions when parked

Rear End Collisions Impact of Lighting

- *What we can do to improve Safety*



A recent National Highway Traffic Safety Administration study concluded that, in the real world, cars with red turn signals are, on average, **22 percent more likely to be hit from behind** than cars with amber indicators during a turn-signal-relevant manoeuvre such as turning, changing lanes, or parking.

This number has grown since, and one of the studies show that the main contributors is the lack of distinction between slowing, changing lanes and turning.

The following year, NHTSA did a second analysis to eliminate any inherent biases due to buyer characteristics, lens type, or even physical separation between red and amber elements. This time it limited the crash data to cars whose rear blinkers had switched colour (from red to orange or vice-versa) in a midcycle face-lift, i.e. without changes to the body or the size and shape of the taillight housing itself. Conclusion: A change from red to orange accounts for a 5.3 percent reduction in rear-end collisions.

Your Turn Signals Are Putting You in Danger – ***according to an article published by BY JASON CAMMISA IN ROAD TRACK - PUBLISHED: JUL 27, 2020***

With a simple change, we could reduce the number of rear-end collisions, turning incidents, and parking lot bumps. by 22% based on the study conducted.

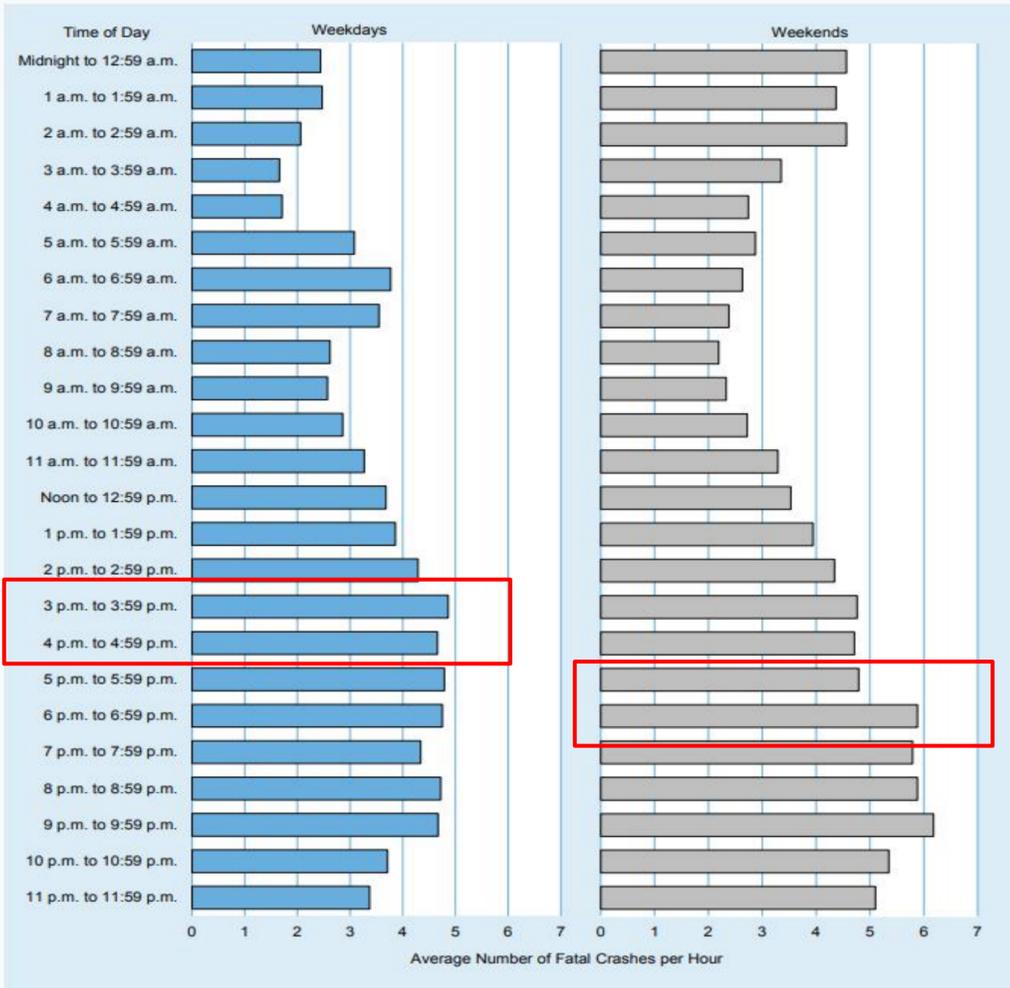
Statistics from NHTSA:



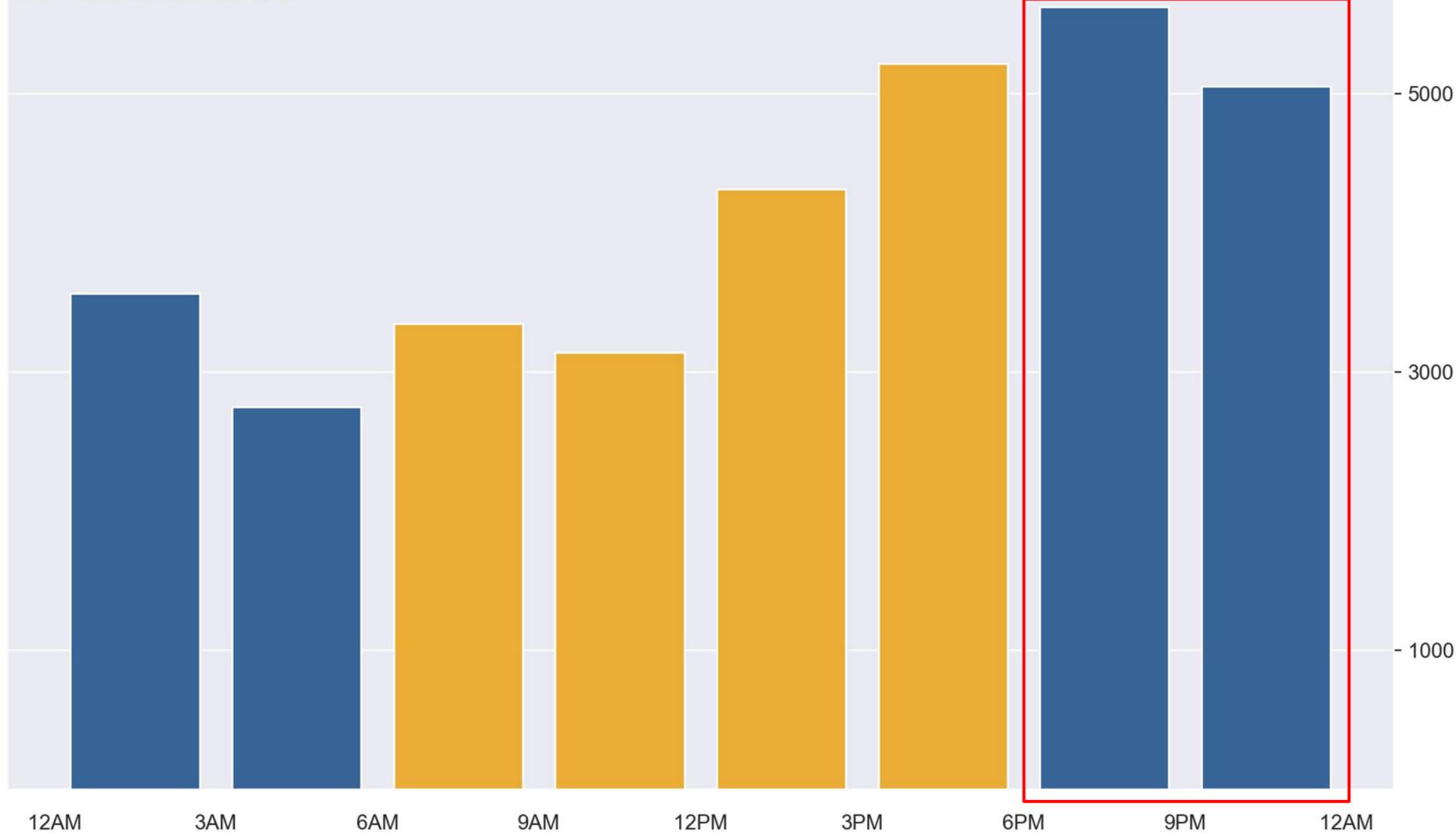
- In the United States, it is estimated that vehicle travel between 7:00 p.m. and 6:00 a.m. accounts for around 22% of miles travelled (Environmental Protection Agency, 2020) but 46% of the fatalities caused by traffic crashes (Insurance Institute for Highway Safety [IIHS], 2020c)
- This implies the crash fatality rate per mile travelled at night is around 3 times the rate during the day
- 9 p.m. to midnight and 6 p.m. to 8:59 p.m. on Saturdays proved to be the deadliest 3-hour periods throughout 2019, with 1,005 and 980 fatal crashes, respectively (NHTSA Traffic Safety Facts 2019)
- What are the main contributors?

Statistics from NHTSA:

- Total fatal crashes by time of day (NHTSA Traffic Safety Facts 2019)
- Total pedestrian fatalities by time of day (NHTSA Traffic Safety Facts 2019)



car crash fatalities



pedestrian fatalities



Statistics from IIHS:



Good-rated headlights



Poor-rated headlights

Nighttime crash reductions associated with good, acceptable and marginal headlights



According to IIHS – Night-time crash rates per mile are nearly 20 percent lower between headlights that earn a good compared to those with poor-rated headlights according to IIHS Senior Research Engineer Matthew Brumbelow.

Difference in Night Driving Experience

- What would you rather drive behind?
- How many hours of driving before you feel fatigued?
- How can we reduce the fatigue?



- Improve the beam pattern, Homogeneity and range
- Think about where the light is needed and how much light is needed?
- Design for Comfort, Safety and Performance

IIHS Field Test

Headlights

Trim level(s)

▶ All trims

Low-beam headlight type

LED projector

High-beam headlight type

LED projector

Curve-adaptive?

No

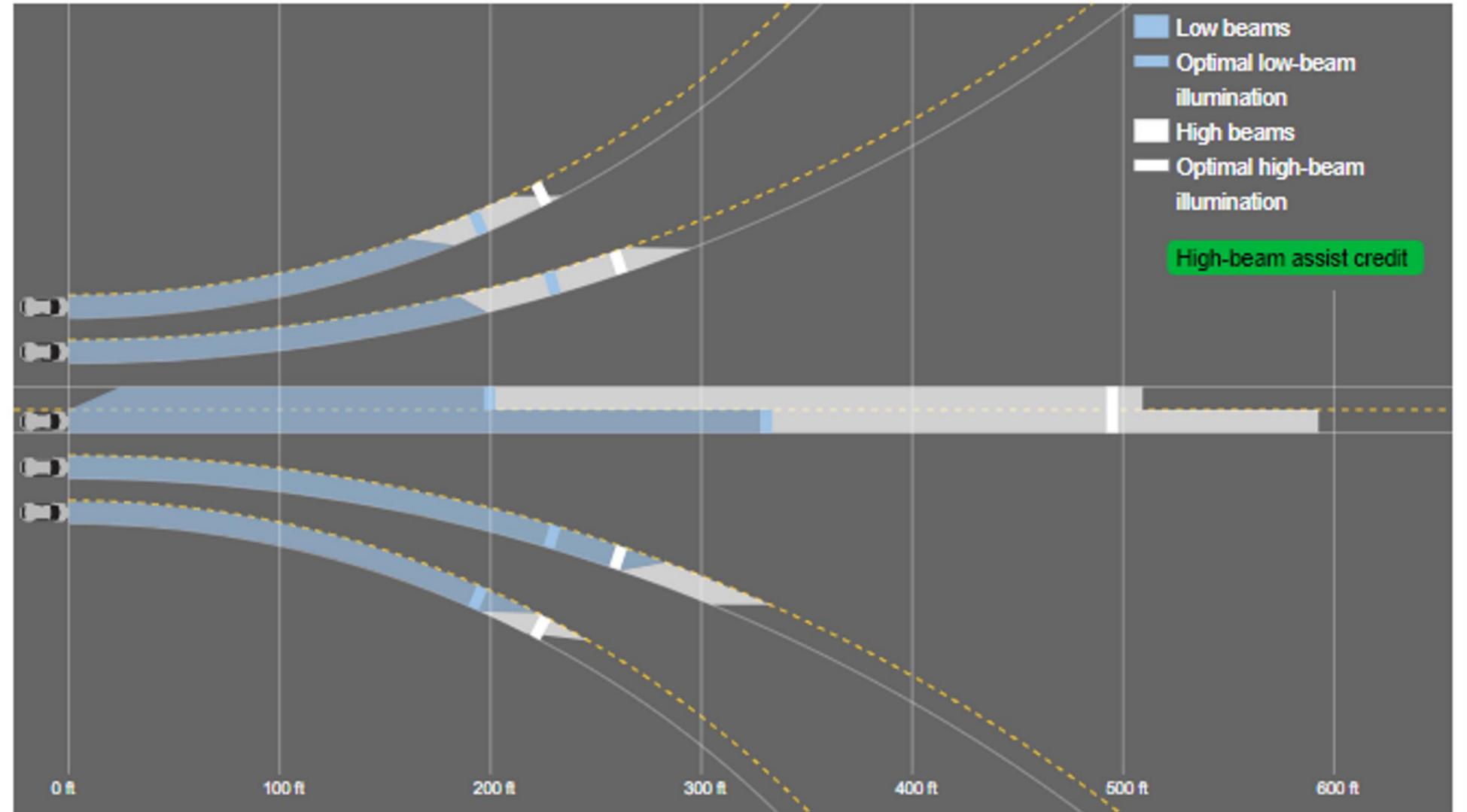
High-beam assist?

Yes

Overall rating

G

Distance at which headlights provide at least 5 lux illumination:



Low beams

On the straightaway, visibility was good on both sides of the road. On curves, visibility was good on both right curves and fair on both left curves.

The low beams never exceeded glare limits.

High beams

On the straightaway, visibility was good on both sides of the road. On curves, visibility was good in all 4 tests.

High-beam assist compensates for some limitations of this vehicle's low beams on the straightaway and on both left curves.

<https://www.iihs.org/ratings/vehicle/rivian/r1t-crew-cab-pickup/2023#headlights>

Difference in Night Driving Experience

Comparison Between R1T and Competitor Vehicles



Comparison Between All Vehicles



IIHS Field Test

- IIHS field test performed on 10/24/22 at Ruckerville, VA
- R1S and R1T used for test
- Test result 'Good' with and without High Beam Assist



IIHS Field Test



2022 criteria

2022 TOP SAFETY PICK+

G Good ratings in the driver-side small overlap front, passenger-side small overlap front, moderate overlap front, original side, roof strength and head restraint tests

≡ ≡ Advanced or superior rating for available front crash prevention — vehicle-to-vehicle and vehicle-to-pedestrian evaluations

A G Acceptable or good headlights standard

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A G Acceptable or good headlights available

Headlight testing

Until we launched our headlight ratings in 2016, consumers were in the dark about headlight performance.

But headlights are an important piece of crash avoidance equipment. About half of all fatal crashes occur at night.

For the ratings, IIHS engineers measure the reach of a vehicle's headlights as the vehicle travels straight and on curves. Both low beams and high beams are measured on five approaches: straightaway, gradual (800-foot radius) left curve, gradual right curve, sharp (500-foot radius) left curve and sharp right curve.

Glare for oncoming vehicles is also measured from low beams in each scenario. Points are deducted for too much glare.

A vehicle may be eligible for extra credit if it has high-beam assist, a feature that automatically switches between low and high beams, depending on the presence of other vehicles.

! Vehicles with good-rated headlights have 19% fewer nighttime single-vehicle crashes than vehicles with poor-rated headlights.

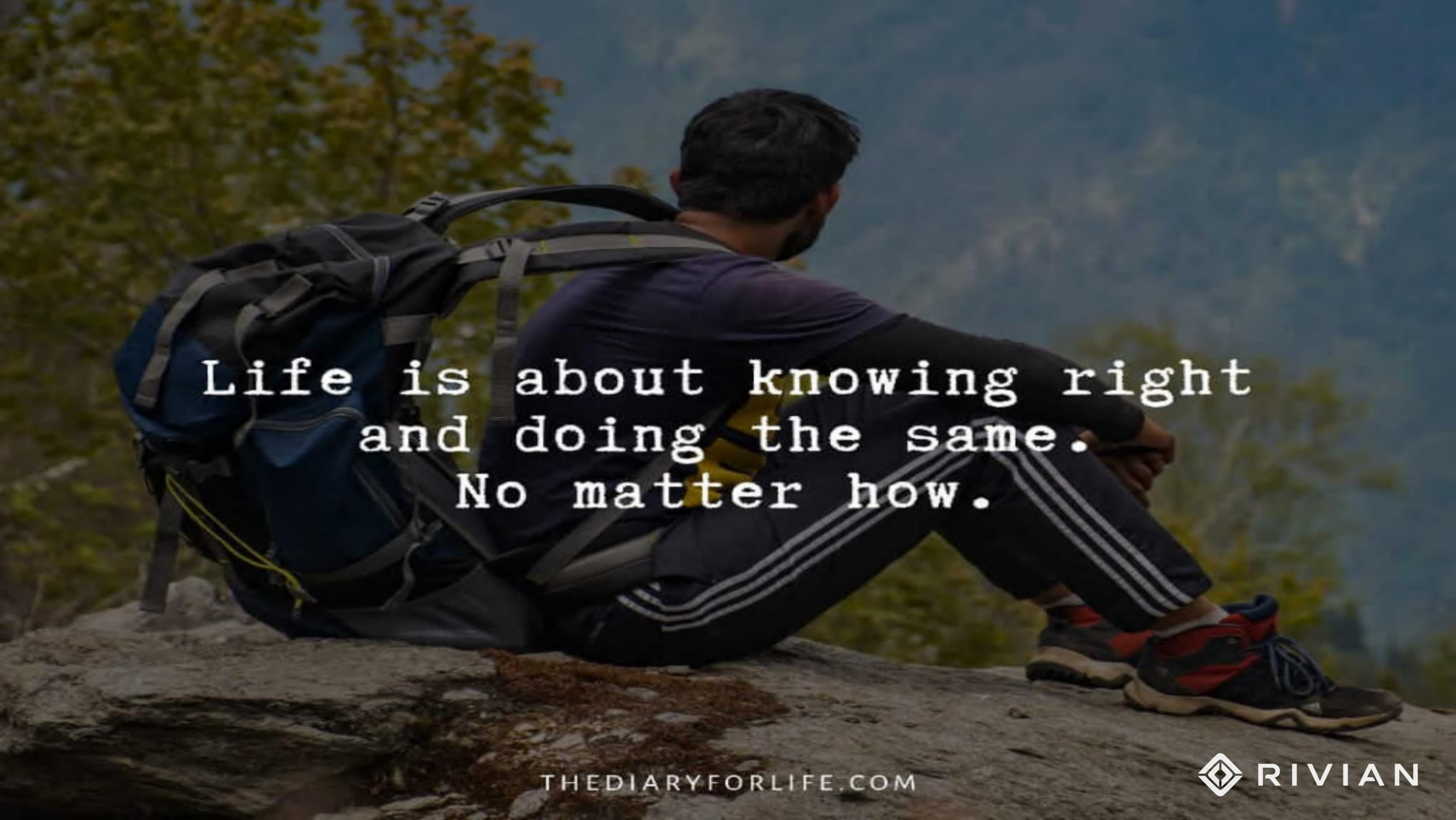
Good vs. poor headlights; pedestrian target at 140 feet, deer target at 220 feet

Vehicles with 'Good' rated Headlights have 19% fewer night-time single-vehicle crashes than vehicles with poor rated headlights

As the Lighting community what should our priorities be?

- Provide our customers with emotion through lighting
- Deliver homogeneous lighting solutions that reduce distractions while driving
- Develop lighting solution to Improve all weather comfort safety and visibility
- Reduce Co2 footprint through efficient lighting by developing new materials and reducing the energy consumption while working on regulations to support this.



A man with a large backpack is sitting on a rock, looking out over a valley. The scene is captured from a side profile, showing the man's dark hair and beard. He is wearing a dark purple long-sleeved shirt and dark athletic pants with three white stripes down the side. His backpack is a large, dark-colored pack with multiple compartments and straps. The background features a clear blue sky and green trees in the distance. The overall mood is contemplative and serene.

Life is about knowing right
and doing the same.
No matter how.



Thank you

