Pedestrian Safety and Vehicle Design

Updating NCAP to make cars safer for people inside & out

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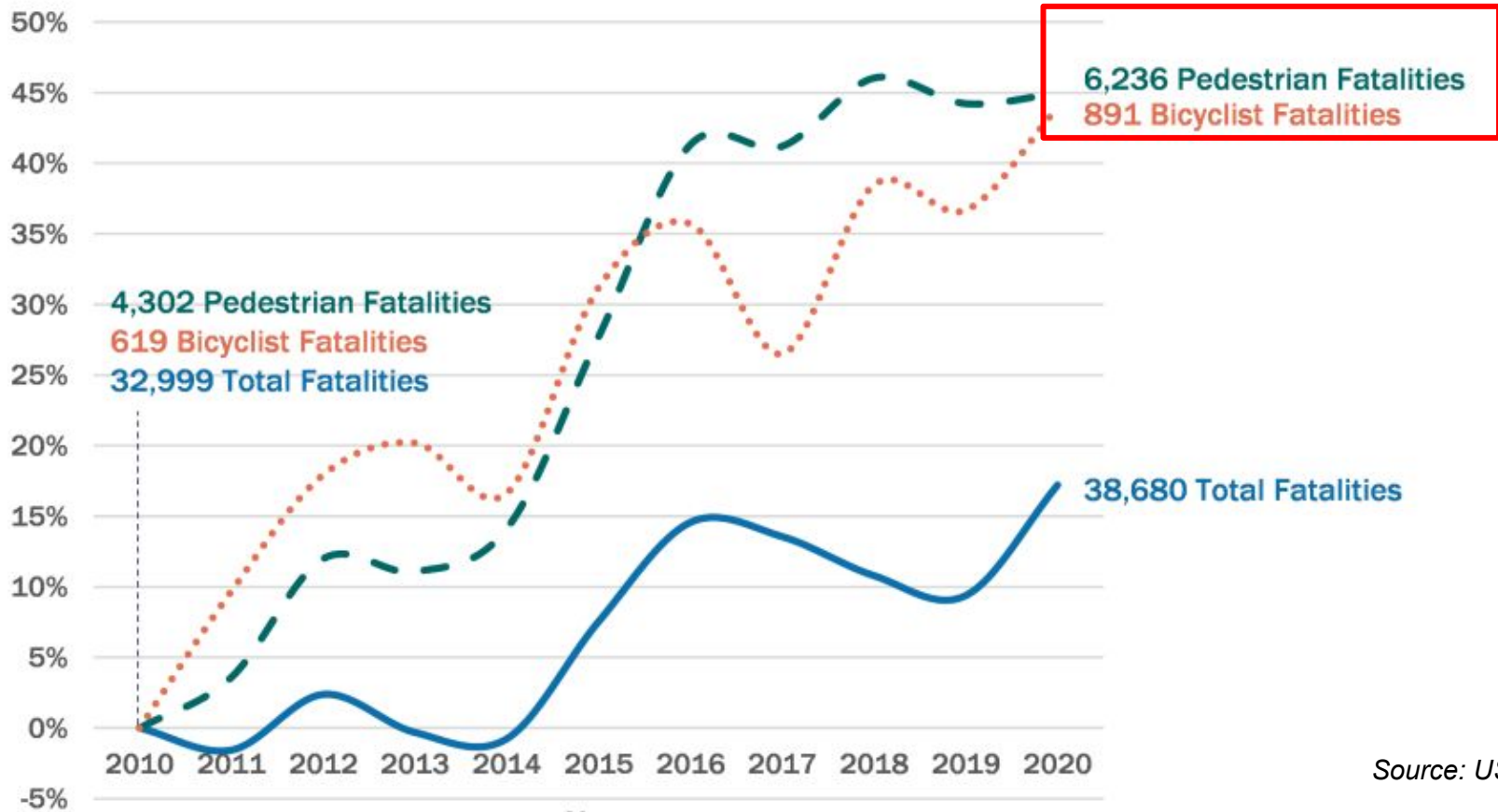
NCAP must take the safety of people outside vehicles into account.

Ped/bike fatalities are growing at a faster rate than fatalities overall.

Source: USDOT

NHTSA plans to use ADAS technologies to protect vulnerable road users.

- Pedestrian automated emergency braking (PAEB)

- Lane keeping support (LKS)

- Blind spot warning and detection (BSW)

- Forward collision warning (FCW)

● Some pedestrians such as the following may not be detected by the radar sensor and front camera, preventing the system from operating properly:

- Pedestrians shorter than approximately 3.2 ft. (1 m) or taller than approximately 6.5 ft. (2 m)
- Pedestrians wearing oversized clothing (a rain coat, long skirt, etc.), making their silhouette obscure
- Pedestrians who are carrying large baggage, holding an umbrella, etc., hiding part of their body
- Pedestrians who are bending forward or squatting
- Pedestrians who are pushing a stroller, wheelchair, bicycle or other vehicle
- Groups of pedestrians which are close together
- Pedestrians who are wearing white and look extremely bright
- Pedestrians in the dark, such as at night or while in a tunnel
- Pedestrians whose clothing appears to be nearly the same color or brightness as their surroundings
- Pedestrians near walls, fences, guardrails, or large objects
- Pedestrians who are on a metal object (manhole cover, steel plate, etc.) on the road
- Pedestrians who are walking fast
- Pedestrians who are changing speed abruptly
- Pedestrians running out from behind a vehicle or a large object
- Pedestrians who are extremely close to the side of the vehicle (outside rear view mirror, etc.)

PAEB can struggle to "see" people of color.

Study: AVs may struggle to detect pedestrians with dark skin

STREETSBLOG USA

Bicycling / Walking / Transit / Car Culture / Micromobility / Mobility Justice / COVID-19

Study: AVs May Not Detect Darker-Skinned Pedestrians As Often As Lighter Ones

A new study finds a potential risk with self-driving cars: failure to detect dark-skinned pedestrians

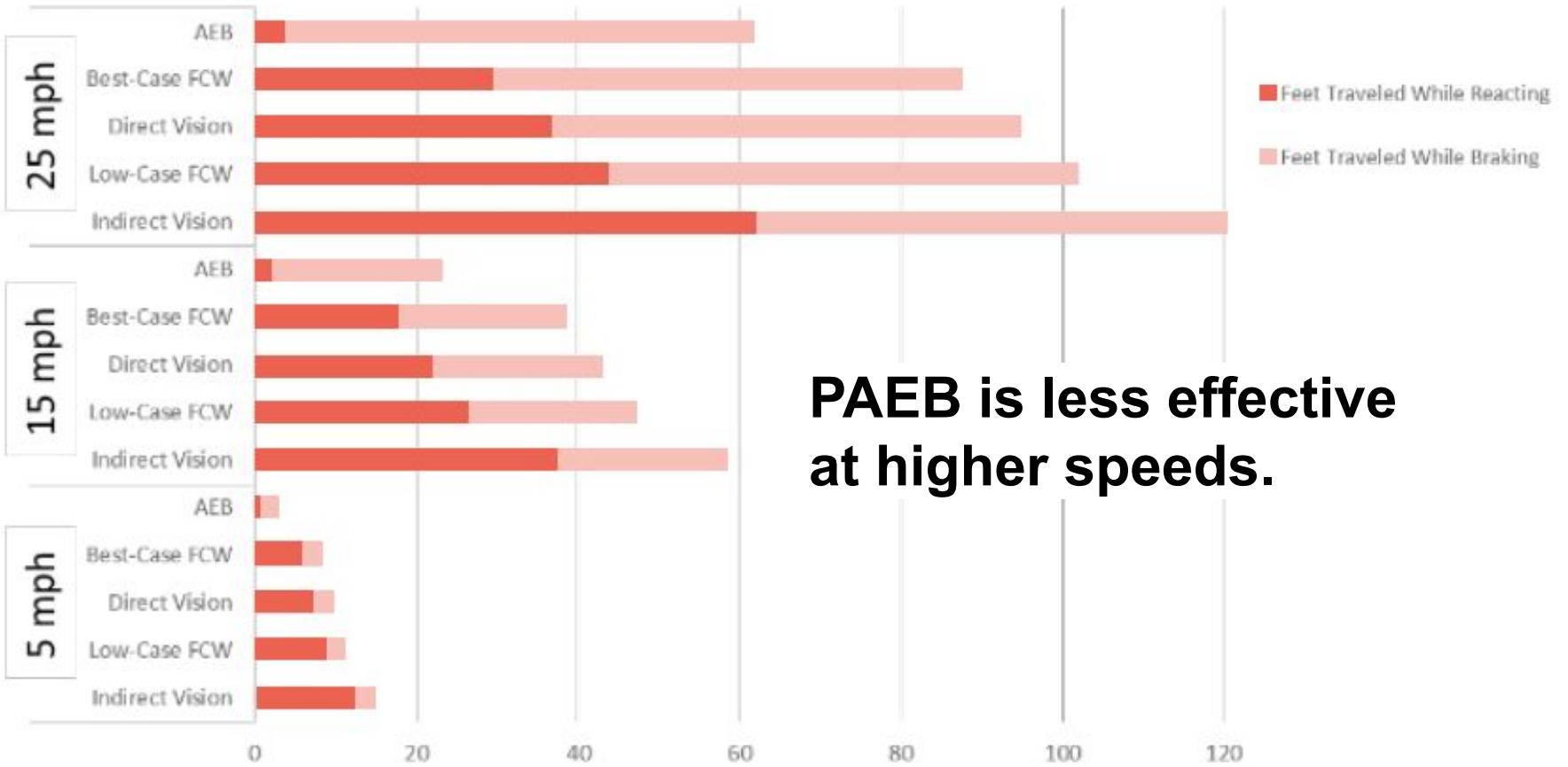PAEB can struggle to detect people in low light or poor weather.

PAEB is less effective at higher speeds.

Cyclists are missing from this update.

ADAS alone will not reduce pedestrian fatalities

May not recognize **people on bikes** or **carrying things**

May not recognize **people in groups**, **moving quickly or slowly**, or in other commonplace situations

May not recognize **kids**

May not work in **bad weather** or **low light**

May not recognize **people with darker skin**

Less effective at **high speeds**

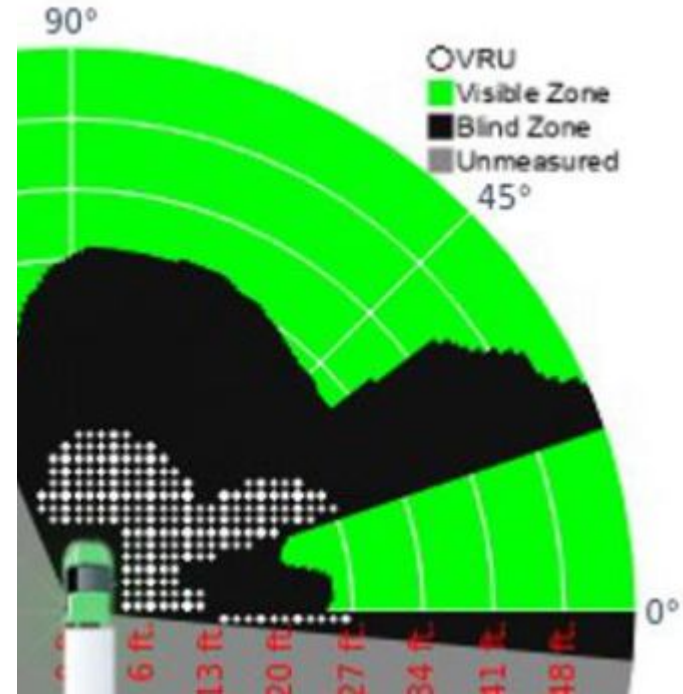**NHTSA needs a multi-layered design approach to keep people safe from vehicles**

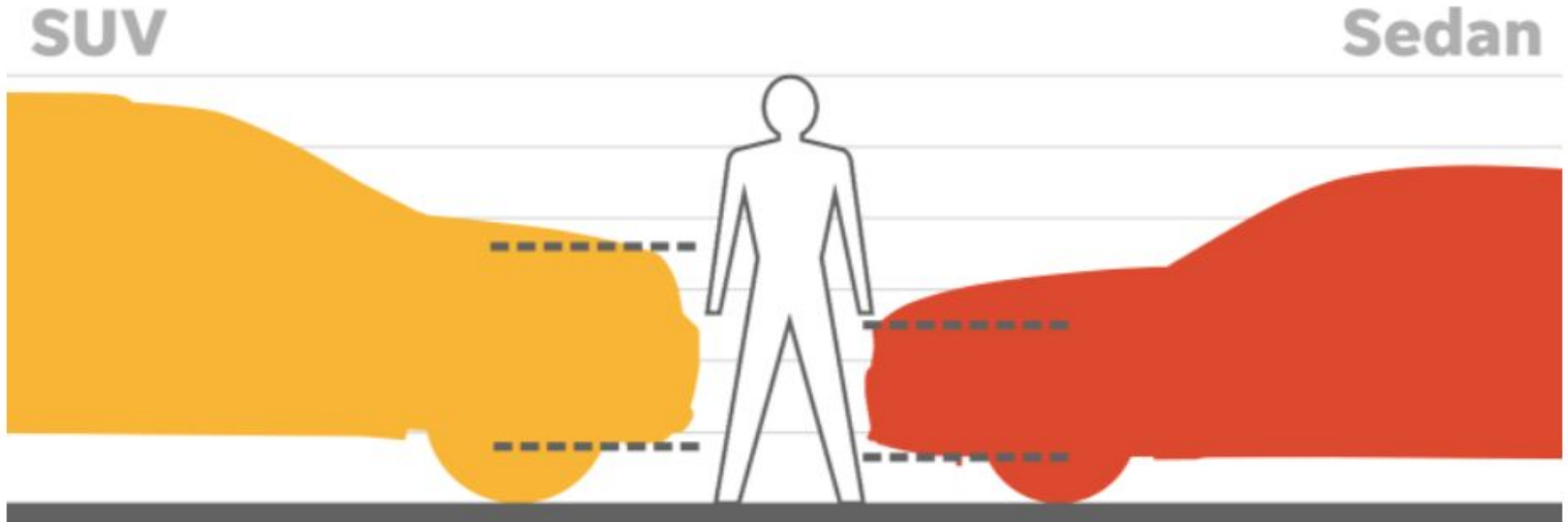# What makes vehicles dangerous to people walking and biking?

Speed

Source: Smart Growth America

Size/Weight

○ VRU
■ Visible Zone
■ Blind Zone
■ Unmeasured

90°
45°
0°

Visibility

Death on foot: America's love of SUVs is killing pedestrians

Larger vehicles are 2-3x more likely to cause pedestrian deaths.

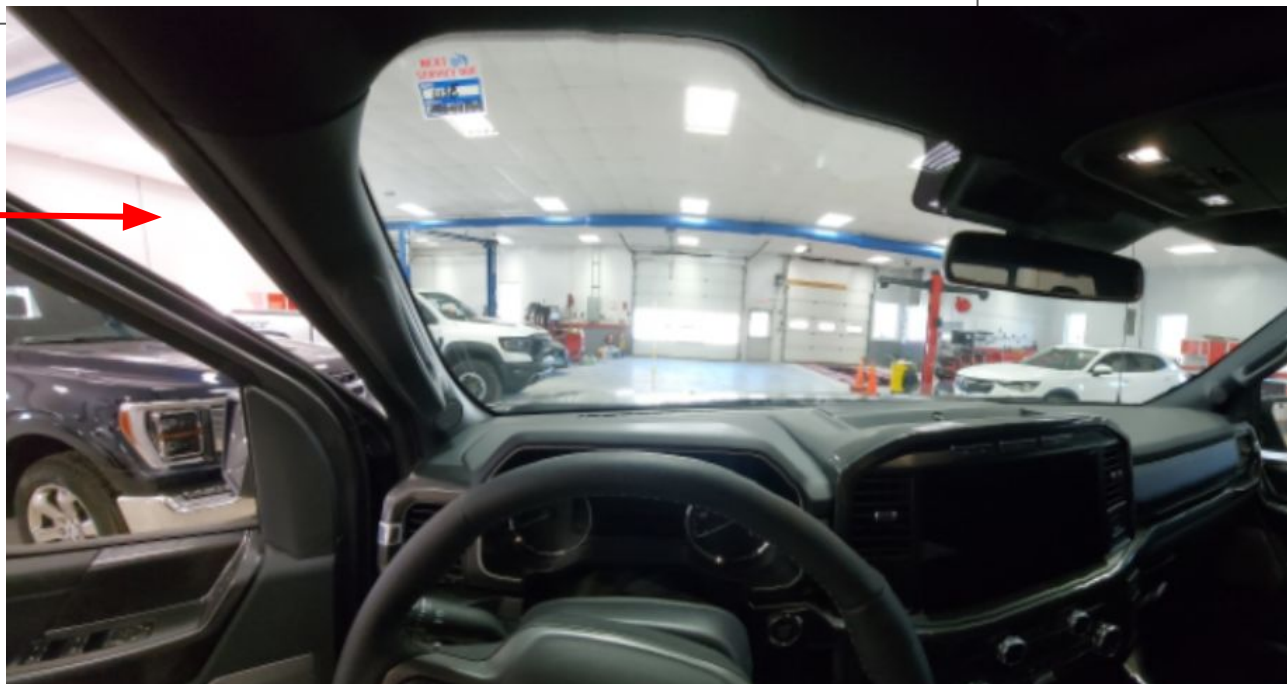# SUVs, other large vehicles often hit pedestrians while turning

March 17, 2022

Big blind spot

Cameras and sensors are not a replacement for direct vision.

Even when distracted, drivers of High Vision cabs hit pedestrians less often.

% of operators who struck pedestrians

60%
50%
40%
30%
20%
10%
0%

High-vision cab   Traditional cab

Undistracted operator   Distracted operator
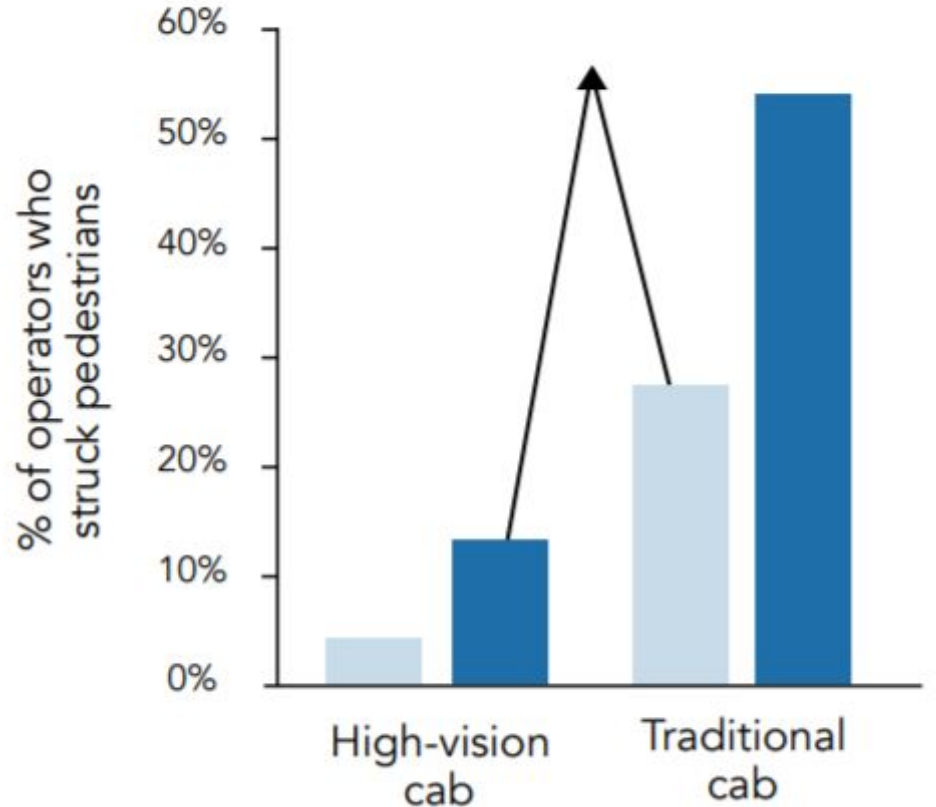
Take a "Targeted Universalism" approach to safety:
Designing vehicles that are safe for children will also keep everyone else safe.

Designing for her makes him safer but designing for him doesn't help her.

Tools to evaluate vehicle visibility are already available.

Front Blind Zone extends out by 19 adults in wheelchairs (41' 2")
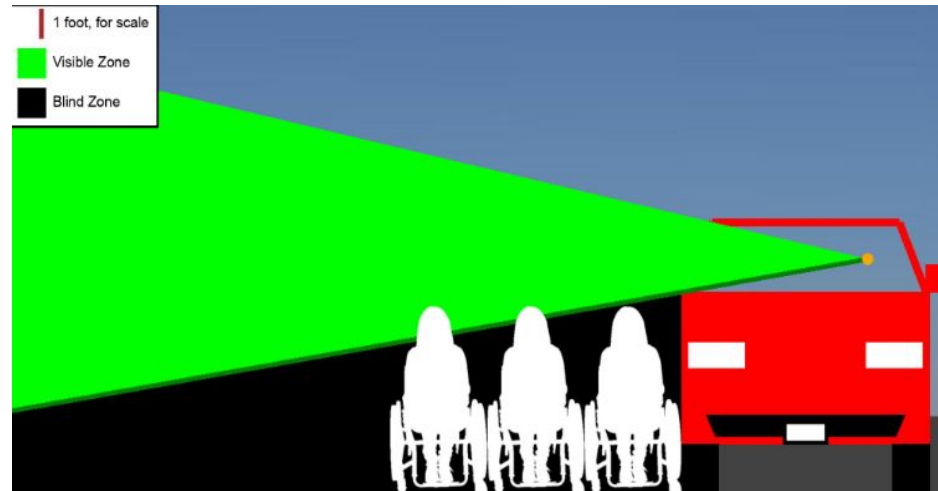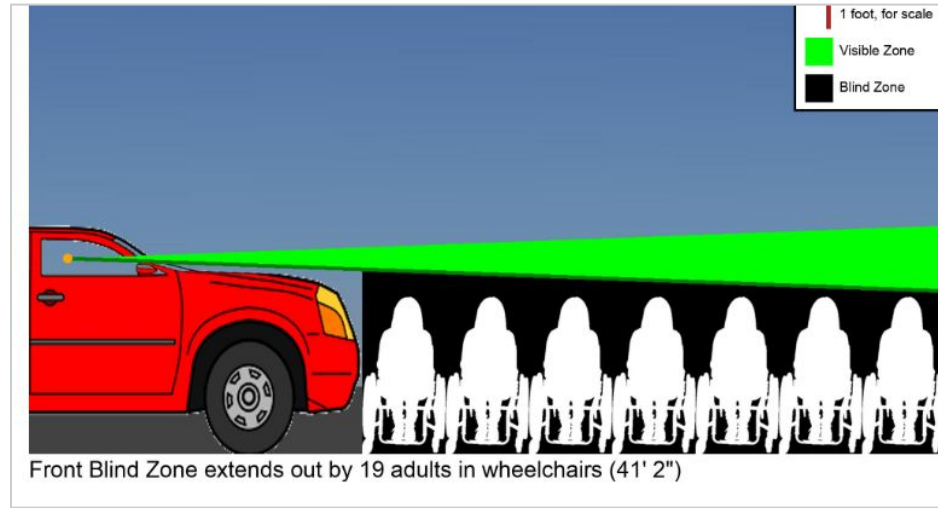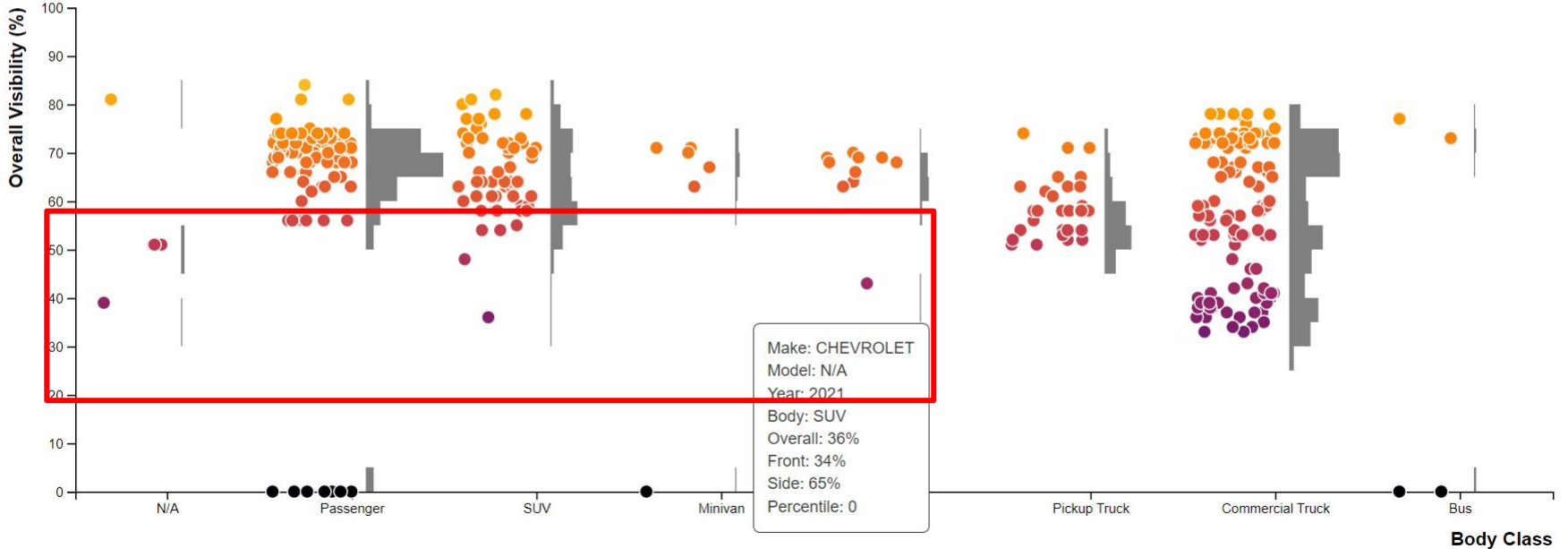
blindzonecalculator.herokuapp.com

Direct Vision Comparison Tool

The plot below displays vehicle entries grouped by body class, which are also reflected in the table below. The plot and table will update based on inputs to the search bar and the range filter. Hover over individual points on the plot to find more information about that particular vehicle.

Y-Axis Variable [Overall Visibility ▼]

Add/Remove Duplicate Entries

Make: CHEVROLET
Model: N/A
Year: 2021
Body: SUV
Overall: 36%
Front: 34%
Side: 65%
Percentile: 0

Body Class

To receive an 5-star NCAP rating, cars should receive high scores in these categories:

1. ADAS features capable of sensing and protecting people outside vehicles.
2. Crashworthiness/survivability for people outside the vehicle.
3. Direct visibility from the driver's seat