
Driver Attention & Accident Prevention

Driver inattention and the effect on motor vehicle stopping distance

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The civil engineering design of roadways considers the vehicle driver's available sight distance and brake reaction time. Sight distance is one characteristic of the roadway that the engineer uses to determine the safe driving speed.

For a given sight distance, before the driver can initiate an action to stop their vehicle or perform an emergency maneuver, the driver has to observe a condition of potential hazard within their forward visual field.

Inattention will delay the driver from taking action. The time to observe a condition of hazard, make a decision to bring their vehicle to a stop and to execute that decision is called brake reaction time. Brake reaction time is the time following the recognition of a hazard to process the decision to stop and place this decision in motion - the amount of time that elapses between roadway hazard recognition and the application of the brakes.

For roadway design, the engineer commonly allows **2.5 seconds** of time for the driver to observe a hazard ahead, move their foot from the accelerator pedal to the brake pedal and to then depress the brake pedal and begin to slow their vehicle. This recommended criterion of 2.5 seconds for brake reaction time exceeds the 90th percentile of reaction time for all drivers.

In actual practice, the experienced attentive driver will likely perform this task in **1.5 seconds**. In fact, even under the best of circumstances a driver who is prepared and expecting to stop, with their foot ready and waiting over the brake pedal, the brake reaction time will likely reduce this stopping time to approximately **1.0 to 0.5 seconds**.

However, most drivers are not in such a prepared and expectant condition to stop and a 1.5 second brake reaction time is likely and expected for only the experienced attentive driver.

So, what does this mean to driving safety?

Numbers provide the best explanation.

Consider the driver traveling at a speed of 50 miles per hour. Their vehicle is moving at a rate of speed of 74 feet per second. Under this condition, for the driver taking 2.5 seconds to react, move their foot to the brake and depress the brake to initiate braking, the vehicle has traveled 185 feet before beginning to slow.



Similarly, for a 1.5 second brake reaction time this distance reduces to 111 feet before beginning to slow their vehicle. Clearly, the reaction time it takes to make the decision and initiate stopping (or take an evasive maneuver) is significant when considering vehicle velocity and the distance per second traveled.

When the driver looks away from the roadway, only for a second or two, to focus their attention to a cell phone, map or other distraction, a significant distance is traveled absent observation of the potentially changing environment. Remember, for only one second of distraction the vehicle traveling at a speed of 50 miles per hour has traveled 74 feet without driver attention.

Every second of distraction increases the distance to stop or maneuver the vehicle. While distracted, when another vehicle or pedestrian enters the roadway, necessary feet of stopping distance are lost. Reducing the time of inattention can save lives, reduce injuries and prevent injuries. The inattentive driver exposes themselves and the public to an unnecessary risk of harm.

During brake reaction time the vehicle has not yet begun to slow. Following brake reaction time, the additional time to bring a vehicle traveling 50 miles per hour to a complete stop on a clean dry roadway in reasonable repair is about 130 feet, assuming good brakes, a clean dry pavement and a drag factor of about 0.65.

Adding the distance traveled during brake reaction time and the stopping distance for a driving speed of 50 miles per hour the total distance to stop for a vehicle driver with a 2.5 second reaction time is 315 feet, and for a driver with a 1.5 second reaction time is 241 feet.

This example shows that reducing the stopping distance can make the difference between an accident and accident avoidance, injury and no injury, and between life and death.

Here are the numbers showing how only one second of distraction increases the stopping distance when considering vehicle velocity.

Velocity	Distance Traveled for 1.5 Second Brake Reaction Time	Vehicle Stopping Distance	Total Attentive Stopping Distance	Adding One Second of Distraction
MPH – Feet/Sec.	Feet	Feet	Feet	Feet
25 – 36.5	54.8	32.5	87.3	123.8
30 - 44	66	50	116	160
40 - 59	88.5	82	170.5	229.5
50 - 74	111	130	241	315
60 - 88	132	185	352	440
70 - 103	154.5	253	407.5	510.5

Assumes a clean dry pavement, 0.65 pavement drag factor and a reasonably maintained vehicle.

The Pennsylvania Driver's Manual states, "Driving requires constant awareness of everything around you, such as speed signs, and road conditions." In addition to driver attention, other factors relate to accident reduction.

- Reasonable vehicle maintenance enhances vehicle handling during emergency maneuvers.
- Also, weather and road conditions should initiate a change in vehicle operation.

Vehicle Safety Tips for Accident Reduction

• Tires

Tires are rated for tread wear, speed, temperature and traction and these rated characteristics should be appropriate for vehicle use. The tire speed rating should not be exceeded and should also be in compliance with the vehicle manufacturers recommendations. Temperature ratings should be satisfactory for vehicle travel use. Tires with higher traction ratings can reduce stopping distances for certain driving conditions or circumstances.

Tires should be replaced before tire tread depth reduces to a depth that stopping distance or tire safety is compromised. Independent from tread depth, feeling the tires slipping during wet weather stopping is an independent warning of the need for tire replacement.

Tire inflation should be checked regularly for compliance with the vehicle manufacturer's recommendations. Tires should also be properly balanced.

- **Braking and Suspension Systems**

The vehicle braking and suspension systems should be maintained to meet or exceed the vehicle manufacturer's specifications. Have a mechanic address squealing or scraping noises or a pulling sensation.

- **Other Systems**

Be certain that headlights, brake lights and turn signals are in working order.

- **Following Distances**

For wet, snow or ice conditions of the roadway following distances (behind the lead vehicle) should be increased to allow for greater stopping distances.

- **Speed Limits**

Do not exceed posted speed limits; the roadway design may not safely accommodate faster driving speeds.

- **Something Other than Driving**

Stop your vehicle at a safe location to use cell phones, GPS units or other interactive devices. Stop your vehicle at a safe location to read maps.

- **Headlights**

Turn on your headlights for all conditions of decreased illumination. Turn on your headlights when it is raining.

- **Other Influences**

Anger and aggression are not appropriate when driving and may influence your driving decisions. Of course, never drink and drive. Alcohol and drugs definitely will have a negative impact on your driving performance and judgment.

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