Discussion on the Four Ways Speeding Impairs Drivers

Speeding creates specific physical and cognitive impairments that significantly increase the danger of driving. Understanding these effects helps drivers recognize why posted speed limits exist and why even "a little over" the limit can be risky.

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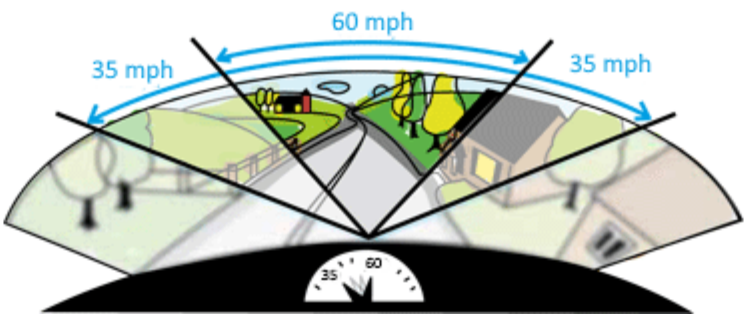
1. Drivers Have a Narrower Field of Vision

Explanation

As speed increases, a driver's **peripheral vision shrinks**. This is often called "speed-induced tunnel vision."

- At higher speeds, the brain focuses more on what's directly ahead.
- The ability to detect hazards on the sides, such as pedestrians, merging cars, animals, and bikes, drops sharply.



While a person's stationary field of vision is about 180 degrees, it can be reduced by up to **90 percent** at high speeds.

The field of vision narrows approximately at different speeds:

- **When stopped**: A driver's visual field is approximately 180 degrees.
- **At 35 mph (56 km/h)**: The field of vision narrows to approximately 104 degrees.
- **At 40 mph (65 km/h)**: The field of vision is reduced to about 70 degrees.
- **At 60 mph (100 km/h)**: The field of vision is approximately 42 degrees.
- **At 90 mph (150 km/h)**: The field of vision can shrink to a narrow 18 degrees.

https://annals.fih.upt.ro/pdf-full/2016/ANNALS-2016-3-28.pdf

Example

A driver going 30 mph in a neighborhood can clearly see a child approaching a crosswalk from the sidewalk.
At 55 mph, that child may not even register in the driver's peripheral vision until it's too late.

Discussion Questions

- Have you ever noticed your focus narrowing when driving fast?
- What kinds of hazards do drivers miss when their peripheral vision is reduced?
- How might this affect driving in areas like city streets, school zones, or heavy traffic?

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2. Drivers Have Less Reaction Time

Explanation

Reaction time while driving is not just one simple step. It is actually part of the total **Response Time**, which includes several stages of mental and physical processing.

Response Time = Perception Time + Decision Time + Reaction Time

- **Perception + Decision Time** is how long it takes a driver to *see* a hazard, *recognize* it as a threat, and *decide* what action to take.
- **Reaction Time** is the period after the decision is made. This identifies how long it takes the body to perform the necessary action (such as moving a foot to the brake or making an evasive maneuver).

Unlike instinctive reactions, such as quickly pulling your hand away from a hot surface, driving requires complex visual processing. This makes Response Time significantly longer because the brain must interpret what the eyes see, decide on a response, and then send signals to the muscles.

When driving, **Perception Time** is made up of multiple smaller delays:

- eye movement time
- fixation on the hazard
- recognition time delay
- muscle response delay

Research shows that for 85% of drivers, the combined delays average:

- eye movement delay: **0.09 seconds**
- fixation delay: **0.20 seconds**
- recognition delay: **0.50 seconds**
- decision time: **0.85 seconds**
- muscle response delay: **0.31 seconds**
- brake reaction time: **1.24 seconds**

This results in an average **total Response Time of 3.19 seconds**.

https://onlinepubs.trb.org/Onlinepubs/trr/1983/904/904-004.pdf

Example:
Imagine a hazard appearing suddenly in the roadway. Before a driver can respond, several steps must occur:

1. The eyes detect the object.
2. The optical signal is converted into a nerve impulse.
3. The signal travels to the brain's visual cortex.
4. The brain interprets the object as a hazard.
5. The brain decides what action to take.
6. A motor signal is sent to the leg muscles.
7. The foot moves to press the brake pedal.

When a driver is speeding, the time and distance available to complete these steps are drastically reduced. Even though the **Response Time stays the same**, the vehicle covers a far greater distance during that time. This leaves the driver with less margin for error and significantly raises the risk of a crash. **Also, this all depends on whether each of these seven steps is executed perfectly.** What if an error is made in any of those seven steps? Here are some common potential errors that could extend the response time.

- The eyes are delayed or distracted in seeing the object.
- The mind is wandering, thinking of something else (conversation, music, etc).
- The mind misinterprets the object as harmless rather than a hazard.
- The mind freezes while deciding between several choices regarding the safest action to take.
- The foot presses the brake with the wrong pressure, causing either a skid on the wrong surface, or too quick and the car in back rear ends you, or too little pressure and your car doesn't stop in time.

There could even be more opportunities for errors if the driver is impaired in any other way. Reduced speed allows the driver more time to overcome these common potential errors and still respond safely.

Discussion Questions

- What types of situations require fast reaction times while driving?
- Why is speeding especially dangerous in unfamiliar areas or during night-time driving?
- Can driving experience compensate for reduced reaction time at high speeds?

3. Vehicles Have Longer Braking Distances

Explanation

Stopping distance increases **exponentially**, not linearly, as speed rises.
Stopping distance = **Response distance + Braking distance**
Both increase with speed, but braking distance increases dramatically because kinetic energy grows with the square of speed. This means that if a car doubles its speed, it requires approximately three to four times the distance to come to a stop.

Example

To stop on dry pavement:

- At **30 mph**, total stopping distance is around 75 to 120 feet.
- At **60 mph**, total stopping distance is approximately **240 to 360 feet**, which is 3 to 4 times the distance needed at 30 mph. This is almost the length of a football field.

Discussion Questions

- What kinds of road conditions make braking distances even longer? (rain, gravel, ice) What other factors can increase braking distance combined with speed? (Tires, vehicle weight, quality of brakes, road incline/decline)
- How does tailgating, along with speeding, increase crash risk?
- Why is it especially dangerous to speed in areas with curves, hills, or limited visibility?

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4. Crashes Are More Forceful and More Likely to Be Fatal

Explanation

Higher speeds mean dramatically greater **crash forces**, because just as in braking distance, kinetic energy increases with the square of speed:

- Based on the underlying physics, doubling speed results in **four times** the crash energy.
- Safety features (airbags, crumple zones) have limits. At speeds beyond a certain point, these safety features can’t protect occupants.

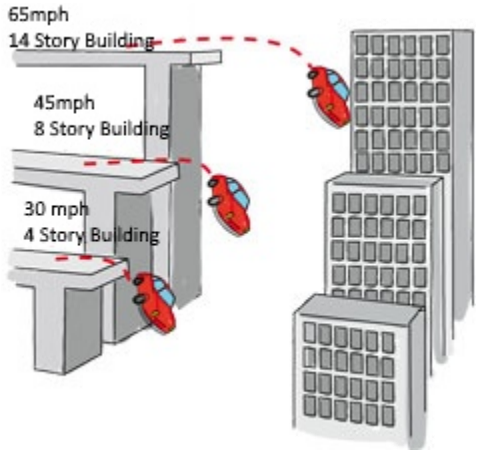
Example

A collision at **30 mph** might result in injuries, but survivable conditions.
A similar collision at **70 mph** can be unsurvivable, even with modern vehicle safety features.

Another analogy to explain the impact of these crash forces is:

An impact at:

- 30mph (50 km/h) is equal to a fall from the top of a 4-story building
- 45pmh (75 km/h) is equal to a fall from the top of an 8-story building
- 65mph (100 km/h) is equal to a fall from the top of a 14-story building



For information on your state's statistics on Speed-related fatalities, see here- https://explore.dot.gov/views/DV_FARS_SPD/Home?%3Aiid=1&%3AisGuestRedirectFromVizportal=y&%3Aembed=y

Discussion Questions

- Why does doubling your speed produce such a massive increase in crash force?
- How do higher speeds affect not just the driver but also passengers, pedestrians, and people in other vehicles?
- What role does road design (guardrails, curves, barriers) play in crash outcomes at high speeds?

Optional Group Activities

1. Hazard-perception video discussion

Show two short clips: one at normal speed and one sped up.
Ask participants to identify hazards and note how many they miss at the higher speed.

2. Reaction time demonstration

Have participants complete a timed "catch the ruler" or reflex test to demonstrate how even small delays can affect outcomes.

3. Stopping distance modeling

Use tape on the floor to mark how far a car travels at different speeds before stopping.