

# Driver Readiness

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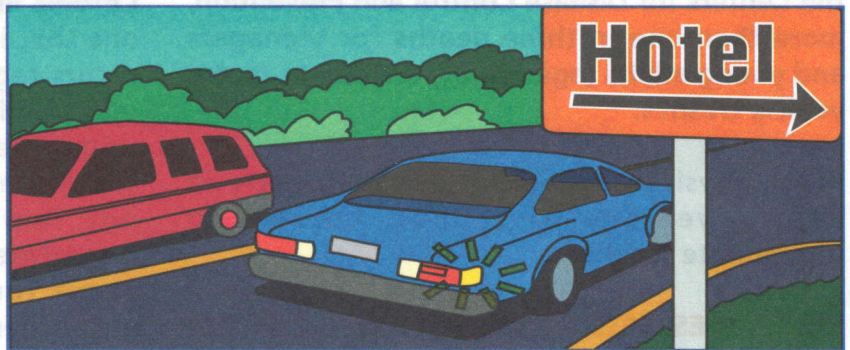
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Road conditions, the driver, and the vehicle are all elements in the safe and proper operation of the Highway Transportation System. Despite the many administrative rules and controls, the corner-stone of traffic safety is the driver. The physical and mental fitness of the driver who will sit behind the steering wheel will be the final determination of the efficient and safe use of the HTS.

Medication, physical impairments, alcohol, drugs, fatigue, vision, and visual skills are some of the factors that can affect the driver's degree of attention, alertness, and ability to drive. In this chapter, we will examine these factors in detail. Module 9 will deal with the problem of alcohol and other drugs as they relate to the driving task.



**AFTER COMPLETING THIS CHAPTER, THE STUDENT MUST BE ABLE TO DEMONSTRATE COMPETENCE IN HIS/HER KNOWLEDGE OF:**

- physical health factors affecting driving skills.
- the physical factors affecting driving and how to prevent drowsy driving.
- how a driver's emotions affect driving and how to control them.
- the attributes of human vision and the other senses.

13-A

## Physical Health

The driving task is not simply a robotic execution of maneuvers. Though not seemingly physically demanding, driving requires attention, decision making, coordination, and proper action. Many factors may have a profound influence on a driver's ability to perform.

Your nervous and muscular systems combine to provide the coordination necessary to drive. Different people have different levels of ability. The key is to adapt your driving to the level of your personal skills. As well, it is important to drive when your condition is at its best, and to refrain from driving whenever it is not. Know your own limits.





### AGE

Age affects coordination and vision. Young drivers have the advantage, and yet, statistics demonstrate that younger drivers have more accidents. Older drivers, having slower reflexes and reduced hearing and vision, have less accidents because they adapt by driving more slowly. They depend on their experience to avoid critical situations.

### YOUNG NOVICE DRIVERS

Young novice drivers with quick reflexes and excellent vision have to learn to control their impulsiveness, develop their judgment, and build up their experience, thus avoiding the mistakes that produce collisions. **According to the Centers for Disease Control and Prevention, more than one in three deaths for teenagers and young adults (ages 15-24) are due to motor vehicle crashes.**

Some physical disabilities are temporary in nature, yet the driver must be able to compensate for them.

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**SOMETIMES DECIDING NOT TO DRIVE IS THE ONLY INTELLIGENT CHOICE.**

### ALCOHOL AND OTHER DRUGS

Driving is very much a mental activity, involving seeing and thinking. Therefore, anything that affects your ability to see and think will make driving more challenging. You can't be as attentive to the driving task when your brain has been dulled by alcohol or other drugs.

#### ALCOHOL (See Chapter 19)

The effects of alcohol on driving has become a matter of great social concern. Accident statistics demonstrate a drastic toll in deaths and injuries where alcohol was a major factor (in almost half of all fatal collisions). This

includes both drivers and pedestrians. This is especially the case when teenage drivers are involved, even though they may not be of drinking age.

#### OTHER DRUGS (See Chapter 19)

Many temporary illnesses require medication. Whether "prescription" type - prescribed by a doctor or "over the counter" type - purchased at a pharmacy, **ALL DRUGS MAY HAVE SIDE EFFECTS THAT MAY AFFECT YOUR ABILITY TO DRIVE.** Care should be taken to check labels, inquire from your pharmacist or ask your doctor to ensure that you will be capable of driving after taking this particular medication.

### CHRONIC ILLNESS AND DISABLED

**Chronic illness** (diabetes, heart disease, etc.) is one that last a long period of time or one that recurs regularly. People suffering from them may be licensed provided their condition is under medical control and the medication, which they must take to maintain control, will not impair their ability to drive. The Department of Licensing (DOL) may require proof (on special forms filed out by the department of public safety, Medical Advisory Board) of their status.

**The physically disabled** can also drive provided they have special controls (joysticks, steering wheel knobs, voice-activated controls, modified pedals, etc.) to compensate for their particular disability. These drivers must learn to adapt their driving habits and procedures. Usually, they are required to undergo a full medical and driving assessment to prove they are competent behind the wheel.

**People with hearing loss** may compensate with hearing aids. Some cannot. They are still able to drive by relying more on their vision, searching the roadway and in their mirrors more frequently.

### Statistics

*Teen/young adult drivers (age 16-20) represented less than 6 percent of the licensed drivers in the United States in 2013. Yet they were involved in 29 percent of all crashes involving drinking drivers and 13 percent of all fatal crashes. (NHTSA DOT HS 812 169).*







## Fatigue / Staying Alert

**D**riving is very much a mental activity, mainly involving seeing and thinking. Anything that affects your ability to see and think will make driving more challenging. Young drivers have a harder time maintaining accurate situation awareness. Also, situation awareness is affected by a person's goals and expectations, which will influence how attention is directed, how information is perceived, and how it is interpreted.

All of these elements can be impaired, either individually or in combination, by fatigue. It makes it harder for you to perceive, process, interpret, judge, and choose. If you suddenly face a hazard, and do manage to overcome the vision and decision deficits and choose a course of action, your reduced muscular coordination may let you down anyway.

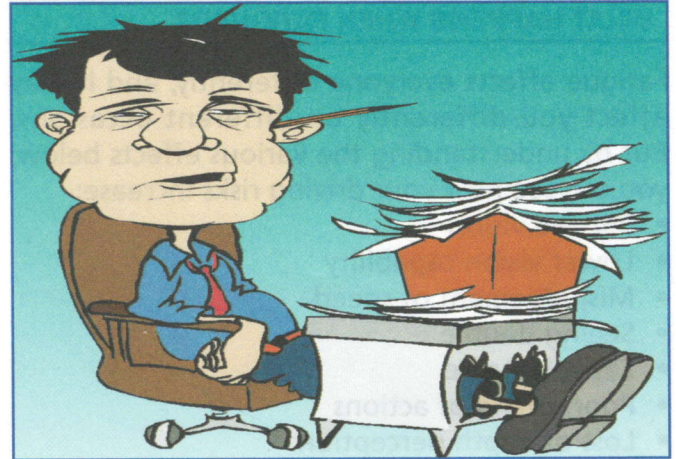
The result is that thousands of Americans are injured or killed each year by drivers who fall asleep at the wheel. About half of the victims of these crashes are under the age of 25. And because it is difficult to determine whether drowsiness was a cause, fatigue may play a role in many other crashes that are attributed to other factors. Even during day-to-day driving, such as to work or school, fatigue can fairly quickly lead to a driver dozing off.

A tired driver may not actually cause a crash, but may have less than adequate reaction times when an incident does occur. These events may not make the news headlines, but they are occurring with alarming frequency.

### CAUSES OF FATIGUE

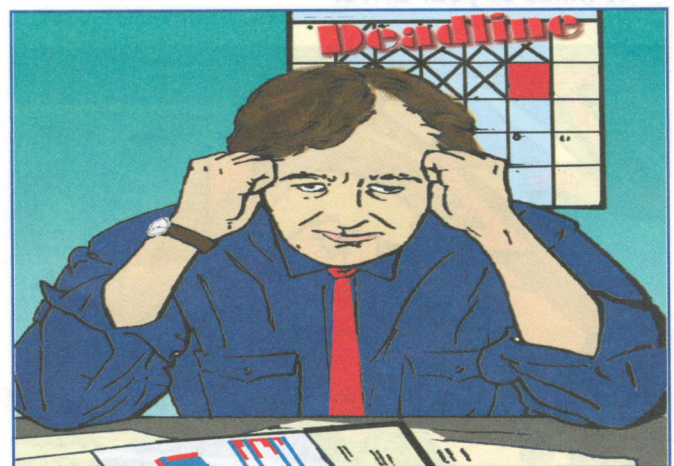
Fatigue is both mental and physical, and indicates a need for rest or sleep. If you must drive, plan ahead to avoid or minimize as many of the following factors as you can:

- Lack of sleep (**sleep debt**)
- Boredom or monotony (long trips)
- Stress (mental strain)



- Alcohol or drugs
- Illness
- Overeating (heavy or fatty foods)
- Sun glare
- Prolonged, uninterrupted driving (**highway hypnosis**)
- Fixating on a single thing such as the hum of the tires or engine
- Driving during normal sleeping hours (body's **circadian rhythm - biological clock**)
- A long day at school or work
- Time of day, especially between 2:00 and 5:00 p.m. and early morning hours
- A day of hard exercise, such as swimming or snowboarding
- An overheated vehicle interior.

You may not be able to avoid one or more of the above factors, but by being aware that each





factor may contribute to or intensify fatigue, you can take steps to counteract the enhanced risk.

**WHAT HAPPENS WHEN FATIGUED?**

Fatigue affects everyone differently, and it may affect you differently on different occasions. But by understanding the various effects below, you can see how your driving risks increase:

- Blurred vision
- Lower vision capability
- Misjudgement of speed
- Seeing double
- Easily irritable
- Poor timing of actions
- Loss of depth perception
- Taking unusual risks
- Drowsiness
- Loss of control or falling asleep (micro-sleep).

Note that drowsiness is just one of the 10 factors listed. **When you first notice any of the warning signs of drowsiness, take them seriously, find a safe place to pull off the road, and rest.** Sleep is the only way to pay off accumulated "sleep debt."

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**WARNING SIGNS OF DROWSINESS**

- Trouble keeping your eyes open.
- Difficulty maintaining a constant speed.
- Trouble keeping your head up.
- Your vehicle keeps drifting into other lanes (rumble strips at the side of road).
- Wandering, disconnected thoughts.
- You cannot remember the last few minutes or miles of your drive.

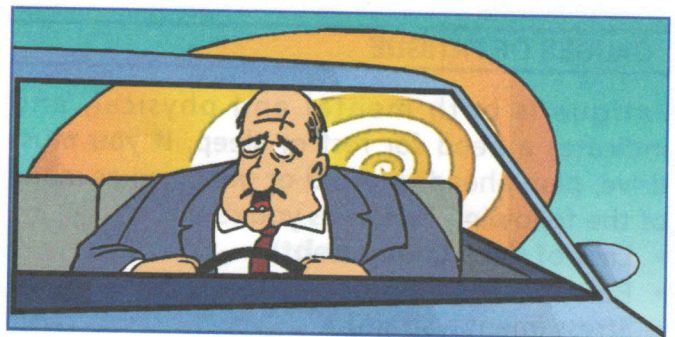


**DRIVERS MOST AT RISK**

Nearly everyone experiences fatigue, tired sore muscles, or mild headache from time to time. The body's natural rhythms (circadian rhythm - the pattern of energy during a 24-hour period) cause you to be less alert between midnight and 6 a.m. (you would normally be sleeping), and again between 2 and 5 in the afternoon.

**Drivers at increased risk:**

- **Sleep deprived** - those who regularly sleep less than eight hours per night accumulate a "sleep debt" which can only be "paid off" by catching up on their sleep. Studies show that the risk of a crash can double when you miss as little as one or two hours, and would be four to five times higher if you miss three or more hours per night.
- **Driving long distances** - those who are frequent travelers (business travelers) may drive long distances without breaks over "boring" roads and may attempt to drive through the night (when they normally sleep) all by themselves. Each of these factors increase the risk of drowsy driving.
- **Untreated sleep disorders** - those with sleep apnea (breathing stops while asleep due to soft-tissue blocking the airway), narcolepsy (excessive daytime sleepiness), or other sleep disorders are liable to fall asleep at the wheel.
- **Young drivers** - sleep-related crashes are most common among young people who tend to stay up late, sleep too little and drive at night. **Studies show that the most dangerous time of day for young driver fatal crashes is the three-hour period (2:00 p.m. to 5:00 p.m.) after school.**





- **Shift workers** - those working rotating shifts are more prone to drowsy driving especially while driving home after the late-night or early-morning shifts. They are six times more likely to have a sleep-related crash.
- **Commercial drivers** - are especially susceptible to sleep-related crashes due to the high mileage driven each year, regularly driving during the night, as well as the stress of trying to meet delivery schedules.

**HOW TO PREVENT/COUNTERACT FATIGUE**

Because fatigue is such a significant threat, it makes sense to do all we can to overcome its effects.

**BEFORE DRIVING:**

- Get plenty of rest.
- Don't drink alcohol, use drugs, or take any medication that may cause drowsiness.
- Avoid heavy, fatty foods.

**WHILE DRIVING:**

- Take a break from driving at least every two hours.
- Listen to music, talk to passengers (without getting distracted), chew gum, sing, whistle, talk to yourself, or ask passengers to stay awake with you.
- Don't drive when you are sick.
- Keep 4 or more seconds of following distance to reduce stress.
- Wear sunglasses to cope with glare during the day.
- Shift your seating position regularly.
- Constantly scan for hazards.
- Check mirrors frequently.
- Don't drive late at night or when you would normally be sleeping.
- Stop and take a short nap in the mid-afternoon, or whenever you feel tired.
- Keep the vehicle's interior cool.
- Rotate driver and passengers (with a licence).
- Drink coffee or another drink with caffeine, but note that when it wears off, the level of fatigue can be worse.
- Stop at a rest stop and stretch, walk, jog, or do light exercises.

- Don't try to "tough it out". Drowsiness is not something that can be fought or challenged. It won't soon pass, and can insidiously overcome you, even when you are actively resisting it.
- Admit you're drowsy, and stop for a rest.

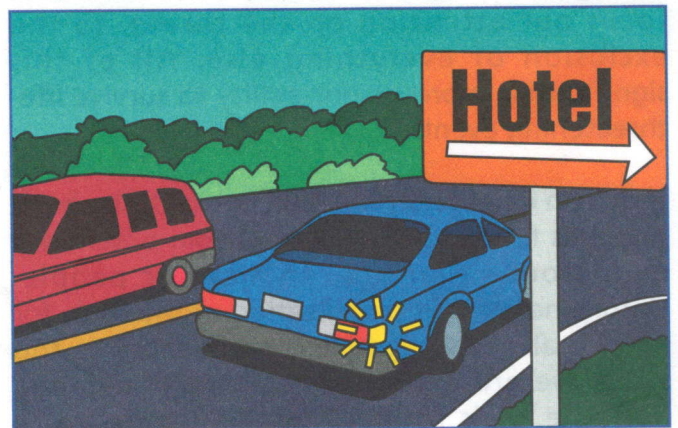
If you find that your brain refuses to scan ahead or check the mirrors frequently, then it is time to pull over and rest. **The only safe way to counteract fatigue is to sleep.**

**IF YOU MUST STOP TO REST**

Drowsiness is recognized as one of the leading causes of crashes. Remember, **rest is the only cure.** It is usually not a good idea to sleep in your vehicle at the side of the road; however there may be times when stopping is much safer than continuing on your way.

**If you must stop, you should:**

- Find a safe roadside rest area (preferably with security); if you cannot locate a hotel or motel to rest and sleep.
- At night, locate a well-lit, highly visible populated area.
- Turn off the engine.
- Open the window a crack to get fresh air but not enough to permit entry.
- Lock the doors of your vehicle.
- Leave parking lights on and turn off all other accessories.
- Relax and just try to rest. Don't worry if you fall asleep.
- After resting, before you leave, walk around the vehicle to wake up.







## Emotions

**A**n emotion is a mental state that arises spontaneously rather than through conscious effort and is often accompanied by physiological changes - a subjective experience, associated with mood, temperament, personality, and disposition. We often say a person was overcome by his/her emotions.

Strong emotions can interfere with your ability to think and reason. Anger, anxiety, fear, joy, hate, grief and depression are some examples of the strong feelings that add spice to our lives but can have an adverse affect on your ability to drive.

### PHYSICAL EFFECTS

Emotions can cause changes in the functioning of your body. Your heartbeat increases, your breathing quickens, your digestion slows, your palms sweat, and your muscles tighten. This can create stress and cause a feeling of exhaustion.

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Extreme fear or anger can cause your body to release hormones that help it to survive - the fight or flight mechanism. These hormones help us to run faster and fight harder. They increase heart rate and blood pressure, delivering more oxygen and blood sugar to power important muscles. They increase sweating in an effort to cool these muscles, and help them stay efficient. They divert blood away from the skin to the core of our bodies, reducing blood loss if we are damaged. And as well as this, these hormones focus our attention on the threat, to the exclusion of everything else. All of this significantly improves our ability to survive life-threatening events.

This is an emergency reaction in which the body prepares for combat or escape from potentially dangerous situations, animals, or people. Unfortunately, this mobilization of the body for survival also has negative consequences. In this state, we are excitable, anxious, jumpy and irritable. This reduces our ability to work



effectively with other people or to drive and share the roadway safely.

### GENERAL EFFECTS OF EMOTIONS

Emotions can affect your alertness, concentration, and decision-making - all aspects central to your safety. They can cause you to act out your emotions and to increase your risk taking behavior. Because of strong emotions, mental distractions can preoccupy your thinking. Your ability to search the roadway and to process the information is reduced.

#### Some techniques for coping with emotions:

- Understand your emotional makeup and identify situations that cause stress.
- If upset, postpone driving or let someone else drive.
- Drive in a rational manner - apply your concentration and skills.
- Identify situations well in advance.
- Adjust your expectations - expect delays and other drivers to make mistakes.
- Direct emotions toward your actions, not at individuals.
- Avoid heavy traffic situations.
- Take a less stressful route.
- Stop driving and rest if emotions get out of hand.







## Vision

**M**ost of the information you need to drive is collected by your vision. The eye receives images by utilizing reflected light through the iris - like a camera - and transmits these images to the brain by the optic nerves. Each eye captures "30 to 40 images" per second.

To become a skilled driver, you must develop this eye quickness, by practice, so that you can effectively search the roadway.

### VISUAL ACUITY

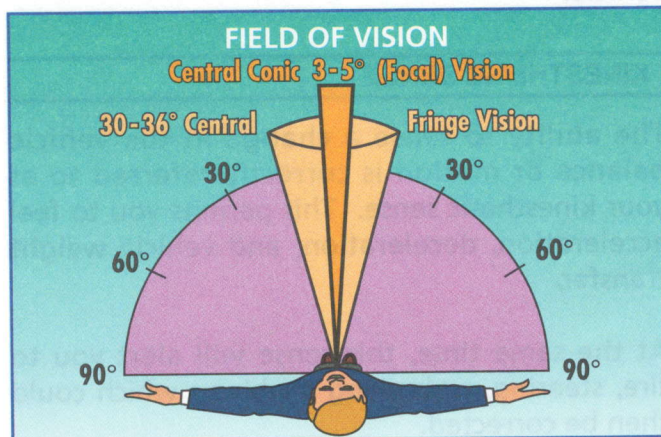
Visual acuity refers to the clarity of your vision. Your ability to distinguish details up close and from afar.

The State of Texas requires a vision test to acquire a license (minimum 20/40). Most problems can be corrected with glasses. Some defects mean license restrictions, in extreme cases, a license is not issued.

The responsible driver should have an eye examination at least every two years or at any time that vision becomes blurred or there is trouble focusing.

### FIELD OF VISION

Your field of vision includes all the area that you can see. It includes two basic types of vision:



**CENTRAL VISION:** a 3 to 5 degree conic range that identifies details, color, etc.

**PERIPHERAL VISION:** vision to the left and right up to a total of 180 degrees for most people (170 to 190). It detects movement, masses and shapes.

Your peripheral vision acts as radar to attract your attention; the central conic vision searches and identifies. The images transmitted to the brain by your two eyes are transformed into a three-dimensional image. This produces "stereoscopic vision" enabling you to judge distance, depth perception and measure relative speeds. All of these abilities are affected when driving at night. In Chapter 20, vision under many adverse conditions will be discussed in detail.

### SELECTIVE VISION

The beginning driver, having developed the ability to search the roadway, is now faced with a situation that is called **INFORMATION OVERLOAD**. The eyes are delivering images to the brain at the rate of a couple of thousand per minute. The human brain is incapable of dealing with all of these.

You must develop a technique called selective seeing. The capability of the brain to retain and concentrate on only those images it considers important to the situation at hand (the signs, hazards and signals that relate to the driving task).

A pedestrian on the sidewalk is seen; a pedestrian walking towards the roadway is seen and verified again as a potential hazard. This ability is essential to becoming a proactive driver.

### VISUAL DISABILITIES

#### MONOCULAR VISION

People who have suffered the loss of an eye





or have an inherent eye problem have to learn to assess distance, speed, and safety margins without 3-D vision. They should center their good eye on the road ahead and search more frequently. In cases of fatigue, monocular vision can develop. This is extremely dangerous because the affliction (due to fatigue) is temporary and the driver has not adapted to this problem.

**COLOR PERCEPTION**

Many people suffer from some form of color blindness. They must learn how to identify signs and signals by shape and position.

**TUNNEL VISION**

Normal peripheral vision is reduced to 140 degrees or less. People with this problem must search more frequently.



**Other Senses**

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**O**n many occasions when you are driving, you will have to rely on senses other than your vision to detect problems or to enhance vehicle control.

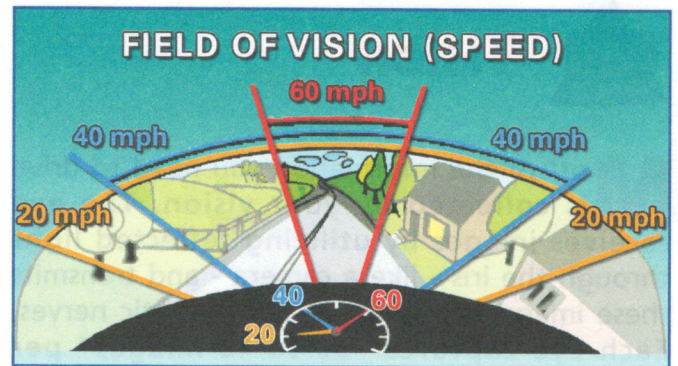
**HEARING**

The ability to hear sounds can often warn you of situations both from outside your vehicle and from the vehicle itself.

A honking horn, a siren, a train whistle, the sound of squealing tires, etc. will all warn you of possible danger even before you may have spotted the hazard with your eyes. Noises from your vehicle may alert you to mechanical problems.

With this in mind, you should make sure the sound system (radio/CD or tape player) does not interfere with your ability to hear the sounds around you.

People who are deaf are permitted to drive, but they must compensate by searching the



**AS YOU INCREASE YOUR SPEED** on freeways, your normal field of vision decreases. The higher the speed, the narrower the field of vision becomes. All drivers must learn to search further ahead and more often to compensate.

roadway and the mirrors more frequently. Often, a hearing aid may help to correct hearing deficiencies.

**SMELL**

Your sense of smell can also alert you to some problems while driving. The smell of smoke can warn you of a fire or an overheated engine. Carbon monoxide is odorless; however, other exhaust gases do have an odor and can warn you of the presence of exhaust fumes in the vehicle.

**KINESTHETIC SENSE**

The ability to sense a change in the vehicle balance or motion is correctly referred to as your kinesthetic sense. This permits you to feel acceleration, deceleration, and vehicle weight transfer.

At the same time, this sense will alert you to tire, steering, or braking problems which could then be corrected.

