



LESSONS LEARNED

How Active Seeing Contributes To Defensive Driving

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Active seeing by a driver depends on visual ability and the continuous movement of his or her eyes. Safe driving is accomplished with knowledge and understanding of how our senses enable us to function as we do in our daily tasks. Let's take a few moments to investigate the science of vision.

VISION: HOW IT WORKS

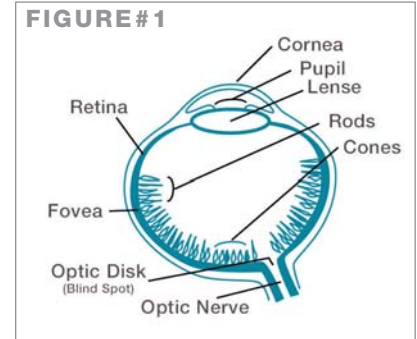
Sight is the most valuable sensory system in the driving environment. Visual acuity, depth perception, color vision and night blindness are used to gather data from inside and outside the truck cab. However, processing this visual data does not necessarily mean the eyes will be used effectively. A driver with average visual capabilities using a proper scanning technique has an advantage over a driver with superior vision who doesn't know how to "see."

In the driving environment, there are also distinct physiological and perceptual limitations on the sense of vision. The human body is designed to travel at roughly four miles per hour. At this speed, your sense of vision is designed to acquire, process and react to information. However, trucks can travel many times faster than four miles per hour, so you're at a disadvantage because of your limited visual and perceptual processes.

ANATOMY AND FUNCTION OF THE EYE

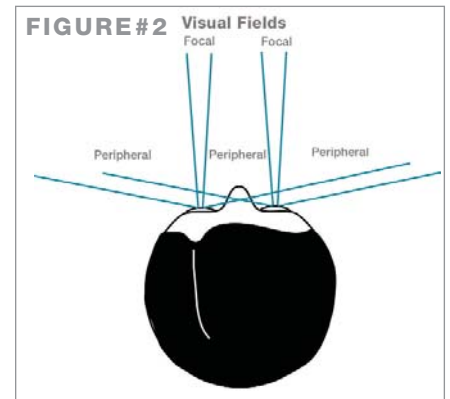
(Figure 1)

- Cornea and lens: Bend and focus light on the retina
- Photoreceptors in the retina stimulate the messages to the brain via the optic nerve.
- Cones and rods allow the eye to sense images under different light conditions. Cones enable you to see the world in color under bright light conditions. They are most dense in central vision; least dense in peripheral vision. Rods allow you to see gray tones in dim light. They are most dense in peripheral vision and less so in central vision. Rods are 10,000 times more sensitive to light than cones.
- Optical disk: The place where the optical nerve leaves the eye. No photoreceptors in this location; therefore, it is an effective "blind spot."



CHARACTERISTICS OF VISION

The total visual field is about 160 degrees to 170 degrees, depending on the individual. Of this total, the central five to seven degrees is for focal vision. The remaining visual field is used for peripheral vision. Focal vision is processed at a high level of awareness and peripheral vision is processed at a sub-conscious level. Figure 2 shows areas of overlap.



ANATOMICAL BLIND SPOT

Each of us is a little blind. There is a small blind spot in your eye about 30 degrees right of center when you are looking straight ahead. Your peripheral vision compensates for this “defect” because your brain normally combines the picture from both eyes. When the peripheral vision from one eye is obstructed by a co-driver, post or other object in the cab of the truck, the brain cannot fill in the missing part of the picture.

Focal vision continues five to seven degrees of the total field of vision. Its primary function is to recognize and identify objects. This is a conscious process requiring the driver’s active attention. Visual acuity markedly decreases as the image is focused away from the focal vision.

Peripheral vision comprises the remainder of the field of vision. It is used primarily to orient oneself relative to the environment. Peripheral vision does not require active attention in order to process information. Since it is characterized by few cone cells and many rod cells, peripheral vision is deficient in color and visual acuity. However, peripheral vision enables you to see at night and detects motion and position information. Orientation cues provided by peripheral vision are very powerful. The audience “sway” that occurs while movie goes are viewing movement on a wide screen is a result of peripheral vision.

SEEING THE BIG PICTURE

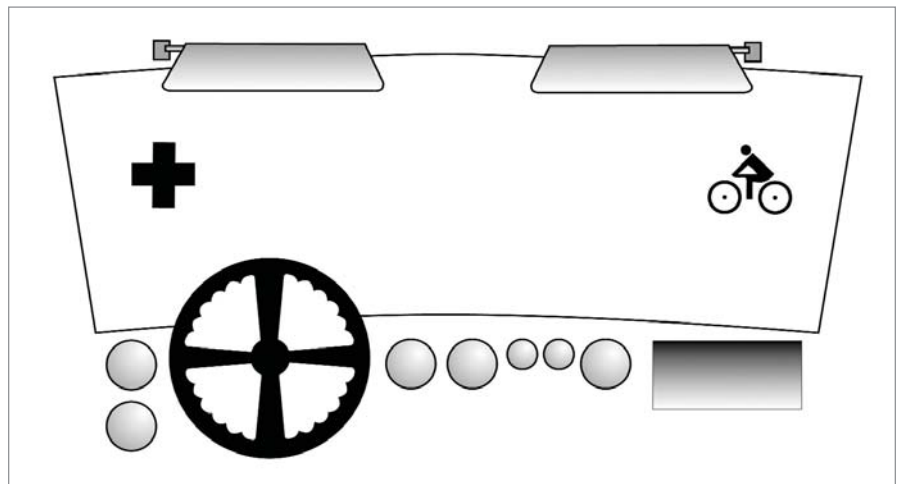
Many defensive driving courses preach the necessity of moving your eyes frequently to see the whole picture. The preceding information provides you with a brief explanation of why moving the eyes, while driving at a speed faster than four miles an hour (for which mother nature designed our senses), “paints” a clear, vivid picture. By understanding peripheral vision and the visual acuity gained by focal vision, drivers can be safe defensive drivers.

TRY THIS TEST

Hold the picture below at arm’s length and focus both eyes on the cross on the left windshield. Now move the picture toward your face. You should be able to see the bicyclist all the way in. Try it again with your left eye closed. The bicyclist will disappear and then reappear as you draw the picture nearer to you. Ask yourself, “How much roadway will my truck cover during the time the bicyclist disappears?”

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