What are visual fields?

The brain organizes visual information by combining what is seen by both eyes into visual fields. The reason this is important is that when a problem in the brain affects vision, a person loses vision within the corresponding part of the visual field—which means that both of the eyes will have difficulty seeing in a particular direction. It is common for a patient with a visual field deficit to mistakenly assume that the problem is in one eye. It is important to recognize that the same visual deficit is present in both eyes, meaning that the problem is actually in the brain’s map of the visual fields.

Visual fields are represented in the brain by combining inputs from both eyes. The left visual field (purple) is seen by parts of both eyes that connect to the right half of the brain. Conversely, the right visual field (blue) is represented by the left half of the brain.

Symptoms

A neurological problem that causes a visual field deficit affects the vision in both eyes.
What are the symptoms of a visual field deficit?

Often a patient will be aware of an abnormal visual field, especially if the change is sudden. In some cases, however, the change is gradual, and it can be difficult to notice the loss of vision. Symptoms of a visual field deficit might include bumping into objects on the affected side. Importantly, car accidents may occur because of the decreased peripheral vision. There can be trouble reading, especially when the enlarged blind spot reaches the center of the visual field. While a small visual field deficit might not be very noticeable, a large visual field deficit can clearly have a profound effect on a person’s life.

A visual field abnormality that is the same with each eye tested separately may signal a problem in the brain rather than in the eyes.

Common symptoms of a visual field deficit are:

- Bumping into things
- Knocking an object over when reaching
- Difficulty reading quickly
- Accidents when driving
What tests will the doctor do to understand the cause of a visual field deficit?

The doctor will use the physical examination and possibly a computerized visual field test to understand the nature of the problem. The doctor will check the visual fields for each eye separately. First, this will be done by asking the patient to describe any missing or blurry areas, for example when looking at the doctor’s face. Then the patient may be asked to count fingers presented in different parts of the visual field. Finally, more thorough techniques can be used to test the visual fields; one common method is an automated test in which the patient pushes a button every time a tiny flash of light is seen. Using the results of these different tests, the doctor can better understand where a problem exists in the visual pathways of the eyes and brain.

Automated field testing is a helpful way to assess the visual fields. A small blind spot is normally present in each eye.
Are there treatments for a visual field deficit?

There is some controversy about specific treatments for a visual field deficit. There can often be some spontaneous recovery, even without specific treatments or therapies. Many patients gradually develop strategies to compensate for the change in their vision, by moving their head and eyes more frequently to the affected side to check the enlarged “blind spot.” Other practical strategies can also be very helpful. For example, if reading is difficult because impaired vision in the left visual field makes it hard to find the beginning of each line of text, then a bright colored marker on the left margin can help guide the eye movements to the correct starting point.

Most specific training programs that intended to expand the visual field are not supported by strong scientific studies. Of course, these products are probably not harmful—except for their financial costs, which are not typically covered by health insurance plans because of their unproven efficacy.

Other potential treatments for a visual field deficit aim to improve a patient’s use of intact vision, rather than specifically trying to restore the vision that is missing. Some low-vision opticians will try special prisms on eyeglasses to artificially expand the visual field toward the affected side. This approach has mixed results, but some patients find it very useful. A commercially available training program is available that attempts to improve one’s ability to search the visual environment using eye movements. Some patients find this type of formal practice to be helpful.

Many patients with persistent severe visual field deficits learn strategies to compensate for the loss of vision.

In some cases, specialized training programs or eyeglasses fitted with prisms can be helpful.
Can I Drive?

Depending on its size and location, a visual field deficit can greatly affect one’s ability to drive a car safely. A reduced visual field may endanger the driver as well as other motorists and pedestrians. Most states have laws specifying the exact minimum vision required to maintain a driver’s license. For example, in Massachusetts a driver is required to have 120 degrees of vision across the middle of the visual field (in addition to having a minimum of 20/40 visual acuity). When the visual field is compromised to less than 120 degrees, it is no longer safe to drive.

Safe driving also depends on other cognitive functions, such as attention and memory. The decision to continue driving after a neurological injury can sometimes be complex. For this reason, many rehabilitation centers offer driving simulators to carefully assess one’s ability to drive safely.
What is the prognosis for a visual field deficit?

The prognosis of a visual field deficit depends upon the exact cause of the problem. Following most strokes, although some recovery is possible, there are usually permanent deficits. When a visual field deficit is due to a brain tumor, the recovery depends on the amount of initial visual loss and the extent of surgery that might be performed. Visual field deficits that result from other processes, such as inflammation or swelling, might recover spontaneously or with medications (such as corticosteroids).

Where can I get more information on visual field deficits?

For more information on visual field deficits, consider the following source:

North American Neuro-Ophthalmology Society
http://www.nanosweb.org/index.cfm?pageID=3289

For a simulated driving evaluation in the state of Massachusetts, consider the following source:

Spaulding Rehabilitation Hospital
http://www.spauldingrehab.org/ourprograms/outpatient/rehabilitation/drivingeval

Some causes of a visual field defect have a better prognosis than others.

The doctor will typically repeat an examination within several months to determine the rate of recovery.