

## **Vision Aids for People Having Bi-Nasal Hemianopsia**

(Normal Acuity in Both Eyes ... but No Inside Vision toward Nose, with each eye)

The National Institute for Rehabilitation Engineering (NIRE) is a non-profit organization which engaged in research and clinical work for the development and dispensing of low-vision aids from 1967 through 1997. NIRE staff assisted *hundreds* of people having permanent impairments of visual acuity and/or visual fields. This paper summarizes successful clinical methods developed and used for assisting individuals having BI-NASAL HEMIANOPSIA. Because the NIRE no longer operates vision clinics, the information is being made available in order that NIRE's methods and data may be used by vision-care professionals all over, to help rehabilitate individuals having Bi-Nasal Hemianopsia. These data are updated to year 2004. The N.I.R.E. continues to serve the public with research, information, advice and referrals. Individual and personal communications are welcomed.

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### **Different Forms of Hemianopsia:**

**“Bi-Nasal Hemianopsia”** is one of the less common forms of hemianopsia. Typically, the person has good visual acuity in both eyes and has fused, binocular stereoscopic vision. He has good vision straight ahead and to each side. The problem is the person has no vision toward the nose with each eye and thus has a central blind area that can lead to accidents and injuries. ***THIS PAPER** describes eyeglasses that can help these people in their everyday activities.*

**“Bi-Temporal Hemianopsia”** is one of the less common forms of hemianopsia. It is almost as disabling as Tunnel Vision and is difficult to live with. Typically, the person has good visual acuity in both eyes and has fused, binocular stereoscopic vision. The problem is the person has no side vision to either the right or left. He or she sees only straight ahead. *Another N.I.R.E. paper describes special eyeglasses that can significantly help people with “Bi-Temporal Hemianopsia” in their everyday activities.*

**“Monocular Hemianopsia”** is one of the less common forms of hemianopsia. Typically, the person is blind in one eye and has hemianopsia, or “half-eye” vision, in the one good eye. This disability can occur in any of four forms. It is rare but quite disabling when it occurs. *Another N.I.R.E. paper describes eyeglasses that can be helpful for each of the four forms of “Monocular Hemianopsia.”*

**“Homonymous Hemianopsia”** is the most common form of hemianopsia. Typically, the person has good visual acuity in both eyes and has fused, binocular stereoscopic vision. He has good vision straight ahead and to one side – the same side for each eye or both eyes. Both eyes may be blind to the left (Left Homonymous Hemianopsia) – or to the right (Right Homonymous Hemianopia). The problem is the person has no vision toward one side with each eye (both eyes) and, unaided, this can lead to accidents and injuries. *Another N.I.R.E. paper describes eyeglasses that can help these people in their everyday activities.*

**ALL FORMS of Hemianopsia** are most often caused by brain or optic nerve disorders rather than by problems within the eyes. **Early medical attention** is of the utmost importance to diagnose, treat, arrest or, sometimes, to reverse these disabilities. Optical aids may help, functionally, but do not substitute for essential medical care. People having any form of hemianopsia may also have slowed reflexes and/or cognitive problems arising from the same brain lesions causing the hemianopsia. Therefore, even with field expanding optical aids for the hemianopsia, formal mobility and/or driver training may be needed to assure safety.

## **SERVICE PROVIDERS ... and professionals**

to help people with any form of hemianopsia:

**Medical Doctors** such as ophthalmologists, neuro-ophthalmologists, and neurologists.

**Optometrists** to examine and refract patients' eyes; to design and use special optics with trial frames for training and evaluation purposes; to design and construct special lenses and optics; to train and advise patients regarding use of special optics for specific functions and tasks.

**Optical dispenser or Opticians** to construct and dispense customized optics and eyeglasses, to the specifications of, and under the supervision of either an ophthalmologist or an optometrist.

**Instructors ... for Safe Driving** ensure that a person with hemianopsia drives safely using special field expanding eyeglasses, special rearview mirrors, and special visual scanning techniques. Some hemianopes can safely drive day or night; others can safely drive in daylight but not at dusk or in the dark due to night blindness. Others cannot drive safely at all, either because of the type of hemianopsia or because of co-existing reflex or cognitive impairments. (Some states still refuse to road test or license hemianopes no matter how well their instructors feel they drive.) *In all cases, a hemianope who wants to drive will need a licensed driving instructor after he has his hemianopic field expanding eyeglasses and has mastered walking in crowded areas without bumping into people or furniture.*

**Optics to Help Bi-Nasal Hemianopes** are relatively simple to make and should be available from any local optical dispenser or optician, at low cost. Fortunately, they maintain sharp, clear binocular vision and yield a full horizontal field of vision of 140 degrees with reduced danger from central blind spots. Using these glasses, and with some training or supervised practice, most bi-nasal hemianopes can drive safely and comfortably. Furthermore, there should be no difficulty in qualifying for road testing and licensing (when written and road tests are passed.) *This assumes no impairments of reflexes or cognitive functioning.*

### **The Optics are simple and effective:**

Assume the person lives in the United States where we sit on the left side of a car and drive to the right side of the road (or in another country with similar driving standards). Central vision straight ahead and to the right is most important for safety, for walking in crowded areas and for driving. Peripheral vision to the far right and to the far left are also very important. Fused binocular and stereoscopic vision with both eyes will be maintained no matter how the visual fields are compensated. These goals can be accomplished with light-weight, low-cost eyeglasses that look like ordinary eyeglasses.

A standard eyeglass frame is used, plastic or metal. The lens openings should be fairly large, in width – and moderately large in height. The lenses are of composite, resin or plastic – but not glass. The person's regular refractive corrections are ground into each

lens. In addition, the two lenses have coordinated prism characteristics ground in to shift the fields of vision for the two eyes in a synchronous manner.

In the U.S.A. (and in all countries for driving right) both lenses should have the same amount of prism, base-left. The amount of prism is, typically, 6 to 10 prism diopters – the higher the better. The highest amount should be used that the person can see clearly and comfortably with. Younger people can handle more prism than older people, generally. When 10 prism diopters are in both lenses, base-left for each eye, the person sees 10 degrees farther to his left with each eye. If 6 prism diopters are used, then he will see 6 degrees farther to the left than with no prism. Generally, 10 prism diopters are the most a person can handle comfortably although some people can use up to 12. The lenses should be coated to lessen reflections and to block ultraviolet.

ABNORMAL CONVERGENCE - If the patient's two eyes do not have normal convergence or tracking, then corrective prism differentials may be needed between the two eyes – which can be determined using trial lenses for testing. Some such patients can be compensated and some cannot be compensated with prism differentials, to achieve convergence and binocular fusion.

DECENTRATION of LENSES to increase or decrease prism is a technique requiring careful thought and planning. In general, for weak to moderate lens prescriptions, it is better to NOT decenter, and to use the lens's prism characteristics to generate the desired amount of prism. Decentration becomes a factor for strong correction, e.g. plus or minus 3 or 4 (or more) diopters of sphere. Where there is strong correction, it is helpful to use Decentration to prevent the strong Rx from lessening the effective prism. It may also be used to enhance or increase the effective prism. Remember, both eyes need the same net prism. If the corrective Rx is strong for one eye and weaker for the other, don't allow Rx Decentration to unbalance the overall prism for the two eyes because doing so can impair convergence or cause double vision.

ASTIGMATISM CORRECTIONS and Rx Tolerances are very important when using prism lenses and are especially more sensitive when making field expander eyeglasses for people over 40 years who are less accommodating or more presbyopic. All candidates for these glasses **must** be very carefully refracted with trial lenses, in combination, to arrive at the exact cylinder and sphere corrections required for each eye, without and WITH the added prism factors. If this is done carefully, the patient will see as clearly with his prism Rx glasses as he sees using similar glasses lacking the prism features. *What must be avoided is a situation where a patient has both regular and prism glasses and chooses to use the regular glasses instead of the prism glasses because he sees more sharply through the regular (non-prism) glasses.*

With these dual-prism eyeglasses, the person will have a wide continuous field of vision with the right eye, ahead and to the right side. The left eye will have a good field to the far left and toward the right, but will stop short of the nose or center. Using these lenses, the person's vision is now more comparable to that of a person with near normal vision to the right, but peripheral vision to the left, with a blind small spot on the left side where the nose would create a blind spot anyway.

EXPLANATION of OPTICS: These eyeglasses effectively move the blind spot from being central to the combined field of vision (as a dark tunnel extending forward from the nose). The "dark hole" is moved about 10 degrees to the person's left. The resulting vision is roughly comparable to a person having normal right-eye vision and less than complete left-eye vision. This person can drive safely and his overall vision is far better than that of a person sighted in the right eye but totally blind in the left eye. Without these glasses and their prism lenses, the person could have more of a handicap with the blind spots of both eyes, combined and centered ahead of the nose.

The bi-nasal hemianope wearing these eyeglasses and driving, is better off, functionally, than the driver who is blind in one eye, with normal vision in the other eye. Compared to drivers with normal binocular vision, the bi-nasal hemianope need only develop the habit of constant left-to-right-to-left visual scanning with slight eye and head movements. His vehicle should also have a good rearview inside mirror plus outside mirrors on both sides of the vehicle.

Residents of England (or other countries where people drive left) can use similar eyeglasses but would have them made with prism, base-right, ground into each lens.

**DRIVER TRAINING and ASSESSMENT** by a licensed driving instructor is highly recommended. This should include visual training and defensive driving training. The driver should receive a written report from the instructor after the training is complete. This can be helpful later, if any questions arise concerning driver licensing or insurance. The driving instructor should note whether or not there are any problems due to slow reflexes, slow or inappropriate responses or reactions, or any cognitive problems relating to signs or traffic signal interpretations and responses. *Some hemianopes should not drive because of response or cognition deficiencies.*

All states license people sighted in only one eye to drive, provided they have normal corrected acuity, normal fields, and can pass their written and road tests. Bi-nasal hemianopes have wider vision than monocular people and usually can drive as safely or even more safely, provided they have no reflex or cognitive deficiencies and provided they have lenses as described above ... plus supervised practice.

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For additional information or free technical support, please email: [nire@warwick.net](mailto:nire@warwick.net) or contact us by regular mail or telephone.

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