THE LOW VISION ASPECT OF THE OPTOMETRIC PRACTICE

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Low vision, or more currently termed subnormal vision, is an important aspect of vision that optometrists should be familiar with if they wish to offer a full-scope optometric practice to the public. This paper will attempt to answer some of the more common questions concerning the need for low vision care, the causes of low vision, procedures for handling the partially sighted, aids available, and management of the low vision practice. More specifically, this paper will be divided as follows: overview and definition of terms; the case history (and its indications as to the prognosis); the exam: procedures and results (and their indications as to the prognosis); visual aids prescribed; the goals in prescribing; patient management and follow-up care.

What is low vision? According to Faye (1976) this refers to a person with corrected vision that is lower than normal. The term also indicates that they do have vision and, thus, are differentiated from the blind. According to the Ninth Revision of the International Classification of Diseases of the World Health Organization (1977), blindness is defined as "having no vision or no significant usable vision" whereas low vision is defined as "having a significant visual handicap but also having significant usable residual vision".

In fact, there are many different viewpoints on what low vision is . . . visual acuity may range from nearly normal to nearly blind. A working definition of low vision must include the fact that the visual acuity or visual fields response falls below a norm, and that the acuity can not be corrected with conventional spectacle refraction. According to Hunter (1972) a partially sighted individual is one whose best corrected visual acuity is between 20/70 and 20/200. Worse than 20/200 visual acuity constitutes a legally blind person. And 75% of the legally blind can perceive some vision, such as hand motion or light perception.

It is considered a must that the low vision exam be divided into at least two visits (Faye 1976, Hunter 1972, and Espinosa 1970). According to Espinosa (May 1970) the first exam is intended to build a good doctor/patient relationship; to evaluate the patient's psychological motivations and attitudes towards low vision aids; to determine visual acuities, refractive status, fusion, visual fields, responses to low vision aids; and to arrive at some decision concerning the course of action to be ultimately taken on the second visit when aids are usually prescribed. The first exam should be about one and one-half hours long. The second exam should take about half-an-hour and a prescription should be formalized at this time.

The patient should be seen a third time at dispensing for about one-half hour. This time should be used to reinstruct the patient on the use of the aids. A fifteen minute progress report is usually scheduled in two weeks in order to answer any questions and get feedback on the prescriptions. Then the patient is placed on a three, six, or twelve month recall.

A careful and comprehensive case history is one of the most important guidelines in the successful care of a partially sighted patient (see Espinosa, June 1970). In taking the case history, be careful not to get the patient emotionally upset about his ocular problem.

The age of the patient may be a factor in the success of treatment. Seventy-five percent of the partially sighted patients are over 60 years old. Fifteen percent are of school age. Generally, younger patients accept low vision aids more readily. Telescopic systems are seldom accepted by older patients. Teenagers may not accept telescopic aids purely from a cosmetic point of view. Telescopic aids are more readily accepted by pre-teenagers, mature teenagers, and college students. The older the patient, the greater

the need to prescribe the least sophisticated visual aid possible.

The occupation of the patient is an important factor in prescribing an aid. Also, the more education your patient has had, the better the prognosis for success of aids.

The optometrist should observe the manner in which the patient enters the exam room. Extending your hand to offer a handshake can be a useful clue in your case history.

A more recent onset of visual loss indicates a poorer prognosis concerning the patient's acceptance of treatment. On the other hand, a visual loss of many years ago may present you with a patient that may not wish to be placed in a visual world again. He may feel that his dependency on friends and relatives may be threatened. Also, many times, a patient may have one eye that they thought incapable of seeing, and this is actually their better eye. Also, consider the effects medications or systemic conditions may have on the patient's vision.

There are many, many other questions to be asked in the case history. You may feel more comfortable using a form. The Low Vision Center, 3321 South Flower Street, Los Angeles, CA 90007, has a comprehensive exam record available. There is a list of Eye Conditions Associated with Refractive Errors at the end of this paper.

There are three primary elements that must be present in order to successfully prescribe low vision aids. They are: good visual fields, sufficient visual acuity, and a realistically optimistic psychological attitude by the patient.

Small central scotomas have a better prognosis than large central, paracentral, and peripheral scotomas. With a central scotoma present, a cross can be used as a fixation target.

Visual acuity is measured at 10 feet, 5 feet, or 1 meter. This allows a more accurate measure of VA if more lines can be read. A Sloan's Distance Acuity Chart, a Feinbloom Chart, a Shering's Children's Eye Chart (symbols), or an AMA Rating Chart are all useful since they can be used at 10 feet. If a patient cannot distinguish any letters even right in front of their eyes, note the farthest distance at which hand motion is perceived.

In general, poorer VA indicates a worse prognosis. VA decreases with eccentric fixation.

Distance VA's should always indicate the distance and size of the letter. For example, if a 20/140 letter was read at 10 feet, record 10/140. This can easily be extrapolated to 20/280 if desired.

Near visual acuity can be measured with the Feinbloom Near Reading Card for Partially Blind, or Lebensohm or Sloan Nearpoint Test Charts. Again, indicate distance and letter size used.

Retinoscopy is done in any possible way to provide the examiner with some type of objective measurement. For instance, radical retinoscopy may be done at 5 inches and a 30° angle from the patient's fixation.

A trial frame refraction is preferred over a phoropter. The starting point of the refraction should be the lenses that have yielded the best VA thus far. Determination of the spherical component of the correction is best done by using a technique called "bracketing". This is done with plus and minus spheres. You may wish to begin with plus and minus 20.00 diopter spheres and ask the patient if there is any improvement. Reduce the lens powers to a $\pm$ 10.00 and then $\pm$ 5.00 diopters. Once a positive response is attained, begin with this lens in the trial frame and bracket around it. Hand-held cross cylinders of $\pm$ 0.50, $\pm$ 0.75, and $\pm$ 1.00 diopters can then be used.

Since most partially-sighted patients are essentially monocular, a binocular balance may not be indicated. This balance may affect the lens prescription though.

A balance lens may be used. Different types used include on that is clear, frosted, painted black, or covered with clear nail polish.

With most low vision patients, the main problem is one of not being able to read. A question that arises is: "Does distance acuity predict reading ability?" For a number of reasons, the answer to this question is: "Not always." The eye with the best acuity at distance may not be the eye with the best acuity at near.

Kestenbaum's Rule may be used to determine the approximate power of the add. Take the reciprocal of the distance VA. For example a VA of 20/200: 200/20 = 10, thus a + 10.00 D add is used. The patient must hold the target at the focal length of the lens, in this case, 10 cm. This correction allows the patient to read J5 print (20/50). Remember to consider the patient's visual requirements before prescribing an add power. You should always use the weakest amount of plus power possible in the add.

There are various types of reading aids which may be prescribed. They are: bifocals, single vision lenses, and microscopic systems (magnifiers). Determination of which type to use depends on several factors.

Telescopic systems are used to give vision at a specific working distance. Different types include head-borne or hand-held telescopes. Most are Galilean and have a fixed working distance. A list of several types of telescopes can be found at the end of this paper (see Faye, 1976, for pictures of these).

If the add is between 10.00 and 28.00 diopters, either spectacles or magnifiers may be used. However, if the add is greater than 28.00 diopters,

a magnifier should be used. A magnifier can be either a hand magnifier or a stand magnifier. The magnifier should be of approximately the calculated strength of the add.

The hand magnifier should be held close to its focal distance. Begin by holding the lens close to the page and raising it until the image enlargens to maximum clarity. There is a list of the different types of hand-held magnifiers at the end of this paper.

Stand magnifiers include either a fixed or focusable stand type. There is a list of these at the end of this paper (see Faye, 1976 for pictures of these).

Another alternative of aids with a low vision case is the use of non-optical devices. Some examples include large print books (such as Reader's Digest special issue), reading stands, line guides, large print playing cards, large print telephone dials, and many others (there are some pictures of these in Faye, 1976).

In closing, there are a few points that should be emphasized. Children adapt quicker and better than elderly. Follow-up visits are essential. With an elderly patient, give instructions to another family member also. Patients with a recently developed (sudden) visual loss won't accept it as permanent (for about one year) and thus reject visual aids at first. Perseverance and encouragement are essential to success. If the patient has a tremor, reading glasses work best. Good lighting is essential (i.e. Luxo lamps). Glare is very bad. In reading, the patient should learn to move the material and not his head.

REFERENCES

1. Espinosa, Ricardo, O.D. "Low Vision: General Office Procedures", Optometric Weekly, May 21, 1970.

2. Espinosa, Ricardo, O.D. "Low Vision: The Case History", Optometric Weekly, June 18, 1970.

3. Espinosa, Ricardo, O.D. "Low Vision: Case Prognosis", Optometric Weekly, July 16, 1970.

4. Espinosa, Ricardo, O.D. "Low Vision: Examination Procedures", Optometric Weekly, September 10, 1970.

5. Espinosa, Ricardo, O.D. "Low Vision: Prescribing the Subjective and a Reading Lens", Optometric Weekly, October 29, 1970.

6. Faye, Eleanor E. M.D. Clinical Low Vision, 1976.

7. Hunter, W.S., M.D. "Office Management of the Partially-Sighted Patient", Canadian Journal of Ophthalmology, 7:38, 1972

Appendix 1

Suppliers

1. American Optical Corp., Inc., Optical Products Division, Southbridge, Mass. 01550. Catalogue of low vision aids.
2. American Foundation for the Blind, 15 West 16th St., New York, N.Y. 10011. Catalogue of aids and appliances; diabetic supplies and information.
3. American Printing House for the Blind, 1839 Frankfort Ave., Louisville, Ky. 40206. Floor stand for music.
4. Apollo Lasers, Inc., 6365 Arizona Circle, Los Angeles, Calif. 90045. Closed-circuit television.
5. Bausch & Lomb, Inc., 635 St. Paul St., Rochester, N.Y. 14602. Catalogue of hand magnifiers; A.M.A. vision chart 713591-101ND.
6. Designs for Vision, Inc., 120 East 23rd St., New York, N.Y. 10010. Catalogue of devices (telescopes, bifocal segments, compound microscopic lenses); vision testing material; typoscopes.
7. Donegan Optical Co., 1405 Kansas, Kansas City, Mo. 64127. Catalogue of magnifiers.
8. The Good-Lite Co., 7426 West Madison St., Forest Park, Ill. 60130 Vision testing material (Sloan charts, Lighthouse symbol charts); catalogue of material.
9. Gumta Associates, 13 East Fort Lee Rd., Bogota, N.J. 07603. Auditory trainer.
10. Theodore Hamblin, Ltd., 15 Wigmore St., London W1, England. Amsler grid.
11. H. C. Electronics, Inc., 250 Camino Alto, Mill Valley, Calif. 94941. (415) 383-4000. Auditory trainer.
12. House of Vision, 135–137 North Wabash Ave., Chicago, Ill. 60602. Variety of testing equipment including Amsler grid and optical aids and Lumiwand.
13. Keeler Optical Products, Inc., 456 Parkway, Lawrence Park Industrial Dist., Broomall, Pa. 19008. Catalogue of telescopes and spectacle aids.
14. The Lighthouse, Optical Aids Division, 111 East 59th St., New York, N.Y. 10022. Comprehensive optical aids catalogue; vision testing material; basic trial sets; books and films on low vision; Sloan vision testing cards; Sloan magnifiers.
15. McLeod Optical Co., Inc., 357 Westminster St., Providence, R.I., 02903. COIL magnifiers.
16. Meditec, Inc., 9485 East Orchard Drive, Englewood, Colo. 80110. Insulin syringe guide (Insulgage), to be used with B-D Plastipak #8404, #8408 and Jelco long disposable syringe #1022 (U-100 insulin).
17. Night Vision Aid Distributors, Inc., P.O. Box 207, Randallstown, Md. 21133. Night vision pocketscope (produced by International Telephone & Telegraph; distributed only on an ophthalmologist's prescription stating gain of pocketscope desired).

Lighthouse Optical Aids lens systems

1. Magnifier trial sets – selected hand magnifiers and stand magnifiers.
2. Spectacle trial set – binocular and monocular spectacles from +6.00 to 48 D. Modified on request.
3. Telescope kit (hand-held) – selected aids that are most commonly used for the clinician starting low vision work.
4. Keeler-Lighthouse telescope kit (see above).

Appendix 3

Directories and Information Sources

1. American Foundation for the Blind, 15 West 16th St., New York, N.Y. 10011. *Directory of Agencies Serving the Visually Handicapped in the United States* (19th ed.). Also, publications catalogue (see References, Chapter 12); aids and appliances catalogue; films.
2. Better Vision Institute, 230 Park Ave., New York, N.Y. 10017. List of available large-print material.
3. American Speech and Hearing Association, 9030 Old Georgetown Road, Washington, D.C. 20014. *1976 Guide to Clinical Services in Speech Pathology and Audiology*.
4. Library of Congress, Division for the Blind and Physically Handicapped, Washington, D.C. Information about communication aids.
5. The Lighthouse, New York Association for the Blind, 111 East 59th St., New York, N.Y. 10022. Information; *Catalogue of Optical Aids;* books; films; nonoptical aids; referral services.
6. National Society for the Prevention of Blindness, 16 East 40th St., New York, N.Y. 10016. Information; *Directory of Low Vision Clinics;* Sloan's *Recommended Aids for the Partially Sighted;* catalogue of publications.

Appendix 4

Sources of Large Print Material

1. Better Vision Institute, Inc., 230 Park Ave., New York, N.Y. 10017.
2. National Aid to the Visually Handicapped, 305 East 24th St., New York, N.Y. 10010.
3. *New York Times, Large Type Weekly*, 229 West 43rd St., New York, N.Y. 10036.
4. *Readers Digest*, Pleasantville, N.Y. 10570.

Appendix 6

Vision Testing Material

1. A.M.A. 713591-101ND Chart (Bausch & Lomb*).
2. Feinbloom vision charts for distance and near (Designs for Vision).
3. Vision tests, Sloan distance and near testing material, Lighthouse symbol charts and cards for distance and near, Lighthouse Near Acuity Card, Snellen Cards (Lighthouse, Optical Aids Service).
4. Near vision test material (Keeler).

*For addresses of suppliers, see Appendix 1, "Suppliers."

Appendix 5

Sample History Form "Checklist"

This outline is only a suggestion, in the briefest possible form, of areas to cover in taking the history of a low vision patient. Not all of the questions need to be asked in every case. However, it does indicate important information to uncover in a low vision case.

Chief Complaint

1. "What bothers you most about your vision?"
2. "Do you think your vision is poor?"
3. "Why did you come for this examination?"

Visual History

1. "When was the onset of your vision loss [O.D. and O.S.]?"
2. "What treatment – surgical and medical – have you had?"
3. "What drugs are you currently taking, or have taken in the recent past?"
4. Ascertain whether the eye disease is stable or progressive.
5. Does the patient understand his eye condition?

Optical Aid History

1. "Have you ever had a low vision examination before?"
2. "Do you know what a low vision aid is?"
3. "Do you have any optical aids now [Spectacles? Hand magnifier? Stand? Telescope? Closed-circuit television? Nonoptical (large-print)?]? If so, were the aids prescribed for you, or did you find them yourself?"

Family History

1. "Are there other members of your family with the same history?"
2. "How have they managed?"

Medical History

1. Find out whether the patient is now under adequate medical care.
2. "What was the date of your last examination?"
3. Is the patient diabetic? Hypertensive? Arthritic? Orthopedically handicapped? Does he have a neurological problem?

4. What is his history of medication, of reaction to medication?
5. What is his diet and vitamin history?

Education History

1. Learn his current grade level in school.
2. What is his principal mode of getting information in school: regular print, large print, tapes, records, readers, braille?
3. Does he need a reader's services?

Mobility

1. "How did you travel here?"
2. "Do you get around alone [Guide? Cane? Dog?]?"
3. "Do you use the subway or bus?"
4. "Are you afraid to go out [Principal reason?]?"
5. "Where do you have the most difficulty?"
6. "What type of lighting do you prefer [Day? Evening? Night?]?" "Does light and or glare bother you?"
7. "Do you see street signs?" "Do you use a telescope?" "Do you ask directions?"
8. "How is your hearing?" "Can you localize sounds?"
9. "Do you see curbs [White lines on the street? Obstacles or hazards? Colors?]?"
10. Are there any problems specifically related to the patient's peripheral vision?
11. "How close must you be to objects to have useful vision [to identify details]?"

How Does the Patient Use His Vision?

1. "Do you see objects [Faces?]?"
2. "Can you describe your vision [how you see things]?"
3. "Do you watch television [How close? Color or black-and-white?]?"
4. "Do you ask people to describe things to you?"
5. "Are you afraid to use your vision?"

Use of Near Vision

1. "Do you read now?" "Were you interested in [or did you enjoy] reading before your vision problem started?"
2. Ask which, of these types of reading material, is of major interest to the patient: newspaper, large print, job-related material, magazines, type-written material (regular type, large type, capital letters), personal mail, religious books, school texts, the telephone book, other.
3. Inquire about the patient's primary interests: sewing (hand or machine), knitting, needlepoint, music (instrument), job-related, financial independence (checkwriting, signing checks, bookkeeping), writing letters, housework, cards, games.
4. Ask what his favorite recreational activities are: walking, golf, swimming,

5. "How long can you read?" "Do you get tired?" "Do you have eye symptoms?"
6. "What size print do you read?"
7. "What would you like to be able to read?"
8. "Do you use an aid? Which one do you prefer?" (See "Optical Aid History" section.)
9. "What type of light source do you use [Type of lampshade? Does source diffuse light or direct it? Number of watts?]?"
10. "Does your vision fade if you read in bright light?"
11. "Does someone read to you?"
12. "Do you use Talking Books or cassettes?"

Personal Reactions to Poor Vision

1. "How do you spend your day?"
2. "What do you miss most, visually?"
3. "Do you want to use your vision?" "Do you fear that using vision will harm it?"
4. "Do you fear that your eye condition will lead to blindness?"
5. "What are your principal interests now?"
6. Look for signs of depression and lack of adjustment or acceptance during the history-taking. (For referral services, see Chapter 12.)
7. Does the patient enjoy being dependent, or does he rebel? (This is better observed than asked directly.)
8. What constitutes his social life? What are his social outlets?

Family Reactions to Poor Vision

1. Is the patient's family supportive, rejecting, overprotective?
2. Are family members interested in helping the patient adjust? Will they help with training with the optical aid?

Training

If the patient is sent home with a prescription or an aid on loan, he is given a definite return appointment, preferably in two weeks. He also is given supportive advice at the first visit and definite assignments to read (either for specific intervals or for as long as he wishes). Print size should be clearly specified. The patient should be encouraged to think of other uses of aids at home or at work. On the patient's return visits, the examiner should direct his questions toward the patient's general attitude, applications of aids to his daily life, and proper understanding of his aid(s).

5

Eleanor E. Faye

Corrective Techniques for Distance Acuity in Low Vision

Patients almost always ask if their distance vision can be improved. The efficacy of spectacles and telescopes must be judged by the improvement shown on a distance acuity chart and verified by the patient's evaluation of the improved sight in his customary environment.

REFRACTION IN LOW VISION PATIENTS

Conventional Spectacle, Contact Lens, or Lens Implant Correction

The purpose of refraction is the same for the diseased eye as for the normal eye: accurate evaluation of the refractive state, regardless of the presence of disease. The patient must be given the best baseline distance acuity possible with corrective lenses. It should never be assumed that the diseased eye is incapable of improved vision. In cases of significant refractive error, corrective lenses are worth the attempt, if only to clarify the peripheral retinal image.

Eye Conditions Associated with Refractive Errors

It is desirable to achieve emmetropia before telescopes are used to improve distance acuity or near vision is tested.

Unusual refractive errors may be encountered in the following disorders:

1. *Albinism* (complete, incomplete, ocular): look for and correct the astigmatic error that is present in almost all cases.
2. *Amblyopia of unknown etiology:* may mask a high refractive error. Include keratometer reading.
3. *Congenital cataracts with aphakia:* frequently children are given a stock convex sphere without astigmatic correction or a reading add. Use contact lenses or a high-add, aspheric, low vision cataract bifocal.
4. *Corneal scarring:* look for astigmatic error. Contact lenses may improve vision, particularly if a pinhole test indicates the possibility of better acuity.
5. *Keratoconus,* or *high astigmatism after cataract or corneal surgery:* contact lens correction is preferable, including soft lenses with an over-refraction for high cylindrical corrections. A keratometer reading may be less helpful

than trial and error with a stenopaic slit rotated 180 degrees or with a pinhole. Try an astigmatic dial closer than 20 feet as a gross test.

6. *Marfan's syndrome* or *subluxation of the lens:* refraction should be done through the aphakic and phakic portions of the pupil. Patients may be corrected monocularly for distance vision with a contact lens for the aphakic portion, and then be able to read with the uncorrected eye through the convex dislocated lens, which is highly myopic. These are interesting refractions.

7. *Monocular aphakia:* elderly aphakic patients with macular degeneration may respond particularly well to a monocular contact lens correction, which restores their peripheral visual field. Consider an intraocular lens implant for these types of cases when surgery is indicated.

8. *Myopia, degenerative:* often undercorrected, particularly if patients are developing nuclear cataracts. They may be able to accept full correction with the understanding that they are to use the lenses only while they are sitting down. A contact lens will minimize the effect of the reduced image size of a high minus lens.

9. *Retinitis pigmentosa:* blurred vision may be caused by a refractive error. With a distance correction to clarify the image in the central field, patients with reduced reading acuity may then need only a low-strength addition, which they can supplement with a hand magnifier. If the central field is extremely limited, a patient may not feel secure walking around with a bifocal add. A contact lens or lens implant should be considered for the retinitis pigmentosa patient with cataract who otherwise loses peripheral field when he is rendered aphakic.

10. *Retrolental fibroplasia:* these patients tend to have myopic refractive errors, but usually they reject the corrective lens because of its minifying effect. The young person often accepts a monocular prism telescope of 6× or 8×. Many children with retrolental fibroplasia are institutionalized with other problems, and their visual potential is neglected. Every effort should be made in these cases to determine measurable acuity (using symbols or familiar objects) and then to recommend a program emphasizing visual stimulation rather than including these children with partial sight in programs for totally blind children.

11. *Postsurgical detachment of the retina:* scleral resection procedures may change the shape of the globe and thus alter the refractive error. Myopic patients may be wearing overcorrections after shortening procedures.

12. *Vitrectomy:* although some of the visual acuity improvement resulting from vitrectomy may seem minor by normal standards, refraction should be done and visual acuity recorded if measurable.

Techniques of Refracting a Low Vision Patient

There are a few exceptions to the usual diagnostic techniques:

1. Vision tests are done at less than 20 feet, preferably at 10 or 5 feet. An astigmatic dial may be used as a screening test at a close distance, particularly for corneal irregularity. Acuity tests at 1 meter allow rapid calculation of the add.

Table 5-3. Head-borne telescopes for distance, manufactured by Designs for Vision, Keeler, and Selsi.* The Bioptic 2.2X and 3X telescopes can be used as full-field lenses, but usually they are prescribed as smaller inserts in a spectacle carrier lens. Reading caps are available for intermediate or reading. Some telescopes have adjustable objectives for near.

Model	Magnification	Horizontal Field†	Vertical Field	Type of Focus	Converts to Near Use
Keeler	2X	7°		Variable	Focus (3X)
Bioptic I (rectangular)	2.2X	12°	9°	Fixed	Cap
Bioptic II (round)	2.2X	10°		Fixed	Cap
Bioptic Wide-angle	2.2X				
Rectangular		17°	9°	Fixed	Cap
Full-field		17°		Fixed	Cap
Selsi Sportscope	2.5X	10°		Variable	Focus
Selsi Sportscope	2.8X	12°		Variable	Focus
Bioptic (standard)	3X	8°		Fixed	Cap
Bioptic Wide-angle	3X				
Full-field		18°		Fixed	Cap
Keppler telescope		30°		Fixed	Cap
Bioptic Wide-angle	4X	20		Fixed	Cap
Bioptic (Keppler telescope)	6X	7.5°		Fixed	

*See Appendix 1, "Suppliers."
†A field of 10° at 6 meters, or 20 feet, has a diameter of 42 inches. At 2 meters, it is 14 inches.

A patient may do quite well with a spectacle, or he may express doubts about the close reading distance. The next aid to try is a hand magnifier.

HAND MAGNIFIER

Remove the spectacle addition after a short trial, leaving the distance prescription in place, or use the patient's own distance glasses, *avoiding the use of a bifocal.* (A hand magnifier with an add requires a different technique that reduces the effect of the magnifier.) Give the patient a hand magnifier of approximately the calculated strength of the add.

An assortment of magnifiers can be labeled and kept in a box or drawer in the examining room. A set of magnifiers covering the entire range from 3.00 to 68 diopters is manufactured by Bausch & Lomb; however, other lenses are available that may have superior fields or more acceptable or practical mountings. An exceptionally useful trial set is made up of the following lenses, which are described in Chapter 8, Table 8-2, illustrated in Chapter 9, and available from [1].

Hand Magnifier Trial Set

3 D. Bausch & Lomb
5 D. COIL Windsor range (large field, light weight)
5 D. Easi-read COIL (same lens as above, supported by neck cord for sewing)
5 D. Edroy (rectangular, spans news column)
7 D. COIL Windsor range (large field, light weight)
11 D. Selsi (favorite lens of patients particularly useful on a neck cord)
12 D. Bausch & Lomb packette (rigid case, small lens)
12 D. COIL Windsor range (large field, light weight)
12 D. Magnalite (illuminated penlight battery)
14 D. Selsi
4X Bausch & Lomb (folding)
20 D. COIL cataract hand reader (favorite of patients)
20 D. Bausch & Lomb packette (rigid case, small lens) (5X)
7X Bausch & Lomb (use close to the eye)
9X Bausch & Lomb (use close to the eye)
10X Bausch & Lomb
12X Bausch & Lomb
20X Bausch & Lomb (68 D.)

Trial of the Hand Magnifier

Teach the patient to hold the magnifier as close to its focal distance as possible, starting with the lens close to the page and raising it until the image

Figure 7-4. I

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There are few stand magnifiers to choose from. The following list contains the minimum complement of fixed stands for trial purposes, which are included in Chapter 8, Table 8-3, illustrated in Chapter 9, and available from [1].

Stand Magnifier Trial Set

3.5 D. Selsi or Bausch & Lomb cylinder bar magnifier
4.7 D. Selsi plano convex
9 D. COIL cataract reader, 9 D. Jupiterlupe
12 D. COIL Optima (illuminated, battery-powered)
15 D. Sloan S-15
16 D. COIL Raylite (illuminated, battery-powered)
17 D. COIL Hi-power stand
20 D. Selsi (illuminated, battery-powered)
33 D. Agfa loupe

Trial of Stand Magnifiers

If a patient needs 12 diopters of addition, for example, there is only one stand in the 12-diopter range — the COIL Optima. The COIL and Jupiter stands are approximately 9 diopters, and the S-15 is 15 diopters if the patient uses a +2.50 add or accommodation and maintains a 40-cm. viewing distance from the image. However, by increasing the current add to +3.00 (using a Halberg clip to hold the additional correction), the equivalent power of the 9-diopter stands becomes about 11 diopters with the eye about 18 cm. from the lens (Fig. 7-6).

Sloan suggests that the next strongest stand be used to maintain the viewing distance of 40 cm. from the image,* in this case the 15-diopter S-15 stand (Fig. 7-6, C). Some patients prefer the 9-diopter stand with the slightly higher addition, stating that they see a greater number of letters. A patient can read comfortably with a stand after he learns to hold his head at the correct distance and to move the device along the page. Many patients start by lifting the stand from the page for better magnification. The average patient may think that the stand is not as flexible in its use as the hand magnifier until he has had some practice with it.

Focusable Stands

If the power of the stand must be more than 18 diopters, a focusable stand is the lens of choice (Chapter 8, Table 8-4). This type of stand can be adjusted for ametropia. The patient moves his head close to the stand to obtain the widest possible field (Fig. 7-7). The reading material is supported best on a reading stand.

*Louise L. Sloan, personal communication, 1975.

Table 9-1. Print size of common publications correlated to visual acuity needed at each level. 1M is the standard for average reading requirements. The strongest optical aid is 74 diopters.

Diopters Addition for 1M	Distance Acuity	Near Acuity at 40 cm.	Metric	Print Correlated to Acuity	Point
1.00	20/20	40/40	.4M	Mail order; medication labels	3
1.25	20/25	40/50	.5M	Classified ads	4
1.50	20/30	40/60	.6M	Telephone book	5
2.00	20/40	40/80	.8M	Newspapers; paperback books	6
2.50	20/50	40/100	1M	Magazines; typing; books	8
3.00	20/60	40/120	1.2M	Magazines; newspapers	9
3.50	20/70	40/140	1.4M	Adult books	10
4.00	20/80	40/160	1.6M	Books for ages 9–12	12
5.00	20/100	40/200	2M	Books for ages 7–9	14
6.25	20/125	40/250	2.5M	Books for ages 6–8; large print magazines and newspapers	18
8.00	20/160	40/320	3.2M	Large-print publications; pre-primer	
10.00	20/200	40/400	4M	Children's books; subheadlines	24
12.00	20/250	40/500	5M	Subheadlines	
15.00	20/300	40/600	6M	Letters 9 mm. high (lowercase)	
16.00	20/320	40/640	6.4M		
20.00	20/400	40/800	8M		
24.00	20/480	40/960	9.6M (10M)	Letters 14 mm. high (lowercase)	
30.00	20/600	40/1200	12M	Letters 18 mm. high (lowercase)	
40.00	20/800	40/1600	16M		
50.00	20/1000 (5/200)	40/2000	20M	Letters 30 mm. high (lowercase) Headlines over 1 inch; display ads	
74.00	3/200	40/3000	30M	Letters 45 mm. high (lowercase)	

Table 8-2. Head-borne aids most commonly prescribed. M rating and true dioptric power (measured by Sloan and Jablonski [6]) indicated where available. A.O. = American Optical Corp.; D/V = Designs for Vision; Hyperoc. = Igard Hyperocular; L.H. = Lighthouse.

		Spheres (full-field)						Bifocal			Special	
				Aspheric Microscopic		Aspheric Compound		Microscopic				
Diopters	M Rating	Stock Spheres	Aspheric Lenses (A.O.)*	Hyperoc.	A.O.	D/V Microscopic	Keeler LVA 9	Standard R-seg (D for V)	Keeler LVA 12	One-piece and Cataract (standard, A.O.)	Half-eye with Base-in$^{\Delta}$ Prism (A.O.)	Clip-on Loupes (Ary, L.H.)
4	1.5	x								standard		
5	2	x								standard		
6	2.5	x								A.O.	× 8$^{\Delta}$	
7	2.5	x										
8(2×)†	3	x	1.9×			x		x	8 D.		× 10$^{\Delta}$	
9	4	x	2.1×							A.O.		
10	4	x	2.4×								× 12$^{\Delta}$	x
11	4	x	2.6×									x
12(3×)	4	x	2.8×						11 D.	A.O.		x
13	5	x	3×									
14	5	x	3.2×									
15	6	x	3.4×									
16(4×)	6		3.6×	16 D.	16 D.	15 D.		15 D.	15 D.			x
17	6		3.8×									
18	7		4×							A.O.		
19	7		4.1×									
20(5×)	8		4.3×	20 D.					17 D.			x
24(6×)	8			22 D.	25 D.	23 D.		23 D.	22 D.			x
32(8×)	10			30 D.	31.9 D.	30 D.	30 D.	30 D.	29 D.			x
36(9×)	10								35 D.			
40(10×)	14				39 D.	37 D.	45 D.	37 D.				
48(12×)	14				47 D.	44 D.	47 D.					

56(14×)	20	47.9 D.‡	
60(15×)	20		50 D.
64(16×)	20	53.4 D.‡	
80(20×)	20	64.4 D.‡	74 D.

*Actual magnification based on reciprocal of equivalent focal length (EFL), based on front vertex rather than back vertex power. (Personal communication, Donald B. Whitney. Calculations by John Davis, American Optical Corporation.)

†Some manufacturers use a designation for spectacle lenses that assumes that magnification, M, equals dioptric power, D, divided by 4: M = D/4; for example, a 20-diopter lens would be designated 5×.

‡Personal communication, Louise L. Sloan. True dioptric powers.

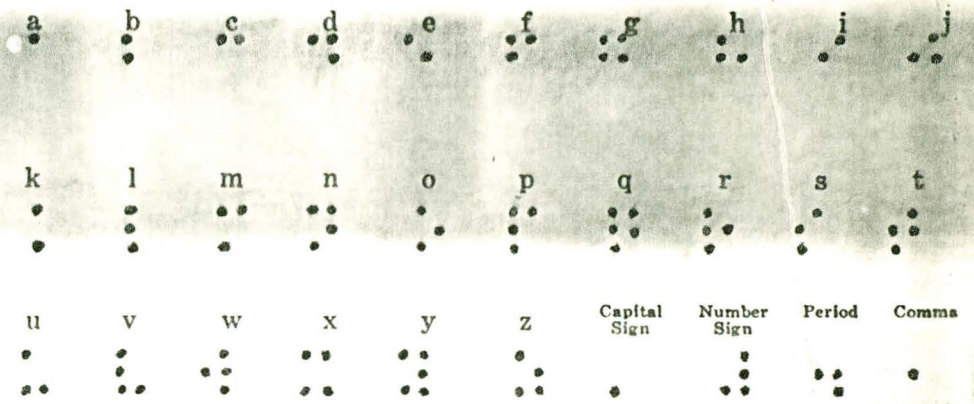
NATIONAL LIBRARY SERVICE FOR THE BLIND AND PHYSICALLY HANDICAPPED
THE LIBRARY OF CONGRESS, WASHINGTON, D.C. 20542

Embossed and printed on Braille paper

BRAILLE ALPHABET AND NUMERALS

The six dots of the Braille cell are arranged and numbered thus: 1 4 / 2 5 / 3 6

The capital sign, dot 6, placed before a letter makes it a capital. The number sign, dots 3, 4, 5, 6, placed before a character, makes it a figure and not a letter.



In addition to the braille symbols on this card, the braille system contains equivalents for all the other punctuation marks and special symbols, such as the italic sign and the general accent sign. There are a total of 189 contractions and short-form words.

One type of contraction consists of a single letter, which, when standing alone, represents a common word, such as "b" for "but", "h" for "have". Other whole-word contractions consist of dot combinations not used in forming the letters, such as "and" (⠯) or of a letter or contraction preceded by dots from the right-hand portion of the preceding cell, such as dot 5 before a "d" for "day". (⠰⠙)

Commonly recurring letter combinations, such as "gh" "ou" are represented by other dot combinations. Short-form words are abbreviations for common words, such as "alm" for "almost" (⠁⠇⠍), "ei" for "either" (⠑⠊). An expert braillist must know and apply a great many technical rules.

National Library Service for the
Blind and Physically Handicapped
The Library of Congress
Washington, D.C. 20542
202-882-5500

Application for Free Library Service—Individuals

Notice: Records relating to recipients of Library of Congress reading material are confidential except for those portions defined by local law as public information. To find out the extent to which the information provided on this application form may be released to other individuals, institutions, or agencies, consult the agency to which you are submitting this application. If you do not know that address, send the completed application to the Library of Congress. It will be forwarded to the appropriate agency.

Please print or type:

Name _____ Telephone _____
(last) (first) (initial)

Address _____
(street) (city) (state) (zip code)

Date of birth _____ Sex _____

By law, preference in the lending of books and equipment is given to veterans. Please check here if you have been honorably discharged from the armed forces of the United States.☐

Indicate the disability preventing you from reading standard printed material. See definitions under eligibility criteria on page 4.

☐ blindness ☐ visual handicap ☐ physical handicap ☐ reading disability

In addition to any of the above conditions, do you also have a hearing impairment? If yes, indicate the degree of hearing loss:

☐ moderate(some difficulty hearing and understanding speech)
☐ profound(cannot hear or understand speech)

over

Books and Equipment

You may borrow any of the following items. (Check those you wish to receive:

- ☐ talking books on discs and a talking-book phonograph (plays 8 rpm, 16 rpm, and 33 rpm discs)
- ☐ talking books on cassettes and a cassette player (plays 1-7/8 ips, 15/16 ips, 2-track and 4-track cassettes)
- ☐ talking books on open-reel tape (open-reel tape players are not provided)
- ☐ braille books
- ☐ music (instructional texts and scores)
  - ☐ braille
  - ☐ large print
  - ☐ cassette
  - ☐ disc

Special attachments for talking-book phonographs and cassette players. Check any you need:

☐ plastic tone arm clip	Assists in placing tone arm on record. Helpful to readers with limited use of their hands. **For talking-book phonograph only.**
☐ headphones	For private listening. May also assist readers with impaired hearing. **For talking-book phonograph or cassette player.**
☐ amplifier	Special booster for use with headphones by hearing impaired persons. **Not to be used by persons with normal hearing. For talking-book phonograph or cassette player.**
☐ pillowphone	Solely for readers confined to bed. **For talking-book phonograph or cassette player.**

Playback equipment and special attachments are supplied to eligible persons on extended loan. If this equipment is not being used in conjunction with recorded reading material provided by the Library of Congress and its cooperating libraries, it must be returned to the issuing agency.

Reading Preferences

To help your library begin serving you, information is needed about your general reading interests. Check the types of books you prefer, or write your reading interests in the space provided:

- ☐ current novels
- ☐ historical novels
- ☐ family stories
- ☐ mysteries
- ☐ westerns
- ☐ short stories
- ☐ poetry
- ☐ Bible and religion
- ☐ biography
- ☐ history and travel
- ☐ science and nature
- ☐ current affairs
- ☐ books in foreign languages (specify the language) _____

Other reading interests _____

_____

☐ Send only books I request. ☐ Select books for me in the subject areas indicated above.

To Be Completed by Certifying Authority

I certify that the applicant named is unable to read or use standard printed material for the reason(s) indicated on page one of this form.

_____
(signature)

_____
(title and occupation)

_____
address

_____
(city) (state) (zip code)

_____
(date)

over

Eligibility of Blind and Other Physically Handicapped Persons for Loan of Library Materials

A. The following persons are eligible for loan service:
   1. Blind persons whose visual acuity, as determined by competent authority, is 20/200 or less in the better eye with correcting lenses, or whose widest diameter of visual field subtends an angular distance no greater than 20 degrees.
   2. Other physically handicapped persons as follows:
      (a) Persons whose visual disability, with correction and regardless of optical measurement, is certified by competent authority as preventing the reading of standard printed material.
      (b) Persons certified by competent authority as unable to read or unable to use standard printed material as a result of physical limitations.
      (c) Persons certified by competent authority as having a reading disability resulting from organic dysfunction and of sufficient severity to prevent their reading printed material in a normal manner.

B. In cases of blindness, visual disability, or physical limitations, "competent authority" is defined to include doctors of medicine; doctors of osteopathy; ophthalmologists; optometrists; registered nurses; therapists; professional staff of hospitals, institutions, and public or welfare agencies (e.g., social workers, case workers, counselors, rehabilitation teachers, and superintendents). In the absence of any of these, certification may be made by professional librarians or by any person whose competence under specific circumstances is acceptable to the Library of Congress.

C. In the case of reading disability from organic dysfunction, competent authority is defined as doctors of medicine who may consult with colleagues in associated disciplines.

D. Qualified readers must be residents of the United States, including the several states, territories, insular possessions, and the District of Columbia, or American citizens domiciled abroad.

Lending of Materials and Classes of Borrowers

A. **Veterans.** In the lending of books, recordings, reproducers, musical scores, instructional texts, and other specialized materials, preference shall be given at all times to the needs of the blind and other physically handicapped persons who have been honorably discharged from the armed forces of the United States.

B. **Institutions.** The reading materials and sound reproducers for the use of blind and physically handicapped persons may be loaned to individuals who qualify, to institutions such as nursing homes and hospitals, and to schools for the blind or physically handicapped for the use of such persons only. The reading materials and sound reproducers may also be used in public or private schools where handicapped students are enrolled; however, the students in public or private schools must be certified as eligible on an individual basis and must be the direct and only recipients of the materials and equipment.

* U.S. GOVERNMENT PRINTING OFFICE : 1978 O - 261-403/3522