National Academy of Opticianry

Continuing Education Course

Approved by the National Contact Lens Examiners

Presbyopia – Through the Looking Glass

National Academy of Opticianry
8401 Corporate Drive #605
Landover, MD 20785
800-229-4828 phone
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National Academy of Opticianry

PREFACE:

This continuing education course was prepared under the auspices of the National Academy of Opticianry and is designed to be convenient, cost effective and practical for the Optician.

The skills and knowledge required to practice the profession of Opticianry will continue to change in the future as advances in technology are applied to the eye care specialty. Higher rates of obsolescence will result in an increased tempo of change as well as knowledge to meet these changes. The National Academy of Opticianry recognizes the need to provide a Continuing Education Program for all Opticians. This course has been developed as a part of the overall program to enable Opticians to develop and improve their technical knowledge and skills in their chosen profession.

The National Academy of Opticianry

INSTRUCTIONS:

Read and study the material. After you feel that you understand the material thoroughly take the test following the instructions given at the beginning of the test. Upon completion of the test, mail the answer sheet to the National Academy of Opticianry, 8401 Corporate Drive, Suite 605, Landover, Maryland 20785 or fax it to 301-577-3880. Be sure you complete the evaluation form on the answer sheet. Please allow two weeks for the grading and a reply.

CREDITS:

The National Contact Lens Examiners has approved this course for one (1) Continuing Education Credit toward certification renewal. To earn this credit, you must achieve a grade of 80% or higher on the test. The Academy will notify all test takers of their score and mail the credit certificate to those who pass. You must mail the appropriate section of the credit certificate to the ABO and/or your state licensing board to renew your certification/licensure. One portion is to be retained for your records.

AUTHOR:

Jane S. Buckland, FNAO, FCLSAH, NCLEM

COURSE LEVEL:

Technical, Intermediate

COURSE DESCRIPTION:

The Presbyopic population is growing exponentially. This course is intended to share with the participant how early bifocal/multifocal designs and modalities influenced present-day screening and fitting options. An explanation of various soft lens modalities currently available, as well as how to utilize and adapt these designs to fit vision needs will be discussed. A description of Monovision, modified monovision, as well as aspheric options will be presented.

OBJECTIVES:

1. Identify today's presbyope and various screening methods used to evaluate the patient's visual needs
2. Describe the most current bifocal/multifocal/aspheric lens modalities and characteristics
3. Determine the appropriate method to select the optimum bifocal/multifocal/aspheric or monovision design for the patient's visual needs

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Presbyopia - Through the Looking Glass

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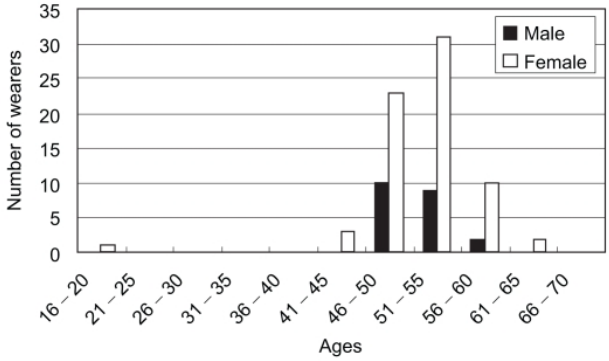
This continuing saga of Alice in Wonderland resurfaces Alice's innate curiosity and risk-taking. It would appear that a great majority of Eye Care Professionals have gotten a bit too close to the "Looking glass" when searching for the answer to the age-old question; "what is the best contact lens option for the presbyope?"

Regrettably, most Presbyopes and many Eye Care Professionals still perceive bifocal/multifocal contact lenses as incapable of providing acceptable vision. The reality is, functional Bifocal contact lenses have existed for *more than six decades*. As early as 1938, Dr. Feinbloom an Optometrist from New York reported he had developed both a segmented bifocal and a trifocal[i]… It was reported that these lenses were not clinically adaptable as there was no means of lens stabilization… pioneers such as Feinbloom opened the door for others to pursue their designs. In 1957, Dr. John DeCarle a renowned optical scientist in London developed the first simultaneous-vision " bifocal" contact lens which by design was more stable… his early designs helped launch current bifocal/multifocal contact lenses.[ii] Unfortunately, the overall success rate was less than hoped for until later years. Since those early years, contact lens manufacturers have worked diligently to create the "perfect" bifocal/multifocal contact lens.

Eye Care Professionals (ECPs) specializing in Contact lens fitting need to be vigilant when striving for cutting-edge answers as the worldwide population of presbyopes grows exponentially. The good news is there is now a wealth of varying designs and modalities available to fulfill most visual needs of the growing presbyopic population. That's great news for fitters since more than half of the presbyopes in the US are over 50! Baby boomers (1946 - 1964) number somewhere around 78 million while the Gen Xers (1965 - 1980) are the new emerging presbyopes. It is estimated that approximately *8% of this population* wears contact lenses.[iii] One poll states presbyopes in the US will most likely be the greatest population of potential contact lens wearers in 2018… (28% or approximately 13.5 mil people.) Current statistics figure there will be over *2 billion presbyopes worldwide by the year 2020.*[iv]



In the early 60's the renowned Ophthalmologist/Contact lens specialist and clinical investigator Whitney Sampson had already authored numerous contact lens fitting texts some of which are still in use today. His practice specialized in custom rigid contact lens fitting utilizing "in-office" modifications and adjustments allowing for firsthand experience in custom fabricating lenses to better accommodate patient needs. The Senior Contact Lens fitter tells a story dating to the mid 70's detailing how prior to dispensing a pair of rigid PMMA (poly-methyl methacrylate) lenses her associate fitter having been taught to always inspect the lens with a [reticule/jeweler's loupe]

noticed a definitive line across the lower portion of the lens, the senior fitter to look at the lens, laughed, and said "that is a bifocal lens!"

Sometimes adding levity to the fitting experience allows for an appreciation of the significance of selecting the appropriate lens design and modality to meet the individual needs of each patient. Unfortunately, in the early days of contact lens fitting, there were few designs to choose from and the clear majority were PMMA materials. Bifocal lenses by design were thicker and heavier than single vision lenses and most lenses were truncated (removal of the peripheral portion of the lens) for stability, often performed in-office with an emery board. Thick lenses were often fenestrated (holes drilled through the entire lens to provide for greater tear exchange.) Patients had to be willing to put up with increased lens awareness as well as reduced wear time. Although manufacturers were working with "breathable" materials, the only material capable of withstanding the rigors of bifocal lens fabrication was PMMA.

The average fee for bifocal lenses in the 70's was around $350.00, (in today's dollars that would be roughly $1200.00.) Even at that price patients willingly paid those fees and treated their lenses like precious gems. Individuals involved in the fitting and maintenance of these lenses did likewise. Patients did what was recommended regarding lens care and maintenance and respected the fitter's skill and expertise. With the limited availability of products in those days successfully fitting a bifocal contact lens was quite an accomplishment.

Fast forward a few years to the introduction of later generation “gas or oxygen” permeable materials. Latter generation materials were more durable than their predecessors and sturdy enough to take the rigors of the additional lathing required in the machining and manufacturing process. Fitters were encouraged with newer design concepts such as concentric "bull's eye" designs and trifocals. Computers were beginning to emerge on the scene so the need for “intermediate" vision correction was taking notice as well.

The early 80's were groundbreaking times in bifocal soft lens technology. The major soft lens manufacturers were making attempts at several design concepts. The Hydrocurve II Bifocal® introduced in 1977 was the first progressive aspheric soft Lens design. The first bifocal to receive FDA approval (1982) was the Ciba Vision Bisoft® a front surface concentric design with a distance center zone. Then came the Bausch and Lomb PA1 which also received FDA approval in 1982; this design was a spin-cast concentric bifocal which worked on the principal of Simultaneous Vision. (This lens is still available today as the Occasions®.) In 1983 the Wesley Jessen DuraSoft® TruFocal was introduced, this lens incorporated a lathe-cut crescent seg alternating vision design. Bausch and Lomb later went on to design a crescent as well as translating design which was a joint effort with Paris Contact Lenses in Miami. This translating/alternating version was called the Softsite® lens. This design incorporated a large prism ballast that worked well only if the patient could master maneuvering the distance and near zones with blink; discomfort and poor adaptation lead to its early demise. Later attempts incorporating newer designs yielded increased success.[v]

Manufacturers in the 80's enhanced the momentum with the desire to find a better bifocal/multifocal design. There were many challenges; ideas were beginning to emerge on the technology front and designs were being introduced that incorporated more of a "multifocal" effect. It was difficult to describe how this "visual system" really worked but it did! Some labeled it "selective” or “forced suppression" others called it "the circle of least confusion"[vi] at the same time use of computers was growing exponentially and the need for a design that would give the patient distance, near and intermediate vision range was becoming reality.

University Optical (formerly Automated Optics/Milton Roy) was one of the cutting-edge manufacturers responsible for pioneering the "Reverse Centrad" concentric design. This concept was originally introduced by the renowned optical genius John DeCarle. In 1985 University Optical Products introduced the ALGES® bifocal based on the DeCarle Centrad design discussed earlier. The first lens of its kind utilizing differing central near zone segment sizes. This company later became Unilens, which presently manufactures the C-Vue® line of products.

Concentric and simultaneous designs continue today with great success although segmented designs did not fare as well, inherent problems from lack of movement prevented translation. Unlike its rigid lens predecessor, which moved with the patient's blink the lack of translation of the soft lens allowed the patient to see only in one area at a time either distance or near.

Frustrations fitters of the past had to undergo with soft bifocal/multifocal modalities lead them to discard many previous teachings relative to rigid bifocal fitting since large diameter soft lenses had minimal movement. Any design that required translation was not very effective in a soft modality, however the race to find a viable soft bifocal design had begun.

THE FITTING PROCESS

We need to prepare for meeting the needs of the Presbyopic patient as they inquire from ECPs how to best correct their near vision problems without having to wear the "dreaded" reading glasses. Older patients are rapidly becoming network and media savvy and get a great deal of their health information from the internet. They have colleagues, friends and peers in their work environment and social circles that are successfully wearing multifocal contact lenses.

Presbyopic patients are wise beyond their years; they want what's best for the health of their eyes even if it comes with a higher price tag; which has been proven with higher premiums attached to PALs. The idea of monovision when correctly presented creates confusion for patients, or perhaps they currently wear or have previously worn monovision and are no longer able to tolerate monocular disparity. This patient requires (and deserves) a detailed explanation as to WHY they can no longer tolerate this modality. *Present a professional and comprehensive comparison of both modalities.* A comparison might be; when brakes need to be replaced or an MRI is prescribed, do we opt for the older brake options or antiquated MRI equipment because it will be less costly?

Expert advice derived from the spectacle industry suggests offering higher-end options detailing the benefits stressing that good vision is priceless. If that same philosophy had been applied to PAL's we'd still be fitting conventional bifocal and trifocal spectacles! Because of minimal bifocal/ multifocal lens options thirty years ago, most fits were attempted utilizing some form of monovision, after all the median age of the presbyope was 45.

Most patients adapted *with pushing minimum plus on the non-dominant eye* (which was the edict of that era ;) they were slowly being *forced to see in a monocular world; sometimes referred to as selective or "forced" suppression.*

Fast forward; the median age of the presbyope today is between 55 and 65. With the growth of the aging population, statistics indicate greater than half of the patients presenting to practices today are over 50!

Success in monovision fits has dropped dramatically, the aging patients today offers a greater challenge. The over 50 patient requires an approximate add of +2.00D. Fitting a new patient in monovision with an increased add will introduce greater disparity. As it is, aging patients are visually compromised i.e.: motor skills and early stages of nuclear sclerosis, as well as cataracts, may limit visual clarity. These are areas of concern which should be outlined in all prospective fit discussions.

Many ECPs are still reluctant to present Multifocals as their first option when addressing the needs of the inquiring presbyope. Some possible "perceived" reasons for this lack of enthusiasm is, ECP's think it takes too much additional chair time, and/or they are not willing to invest the time to learn how to make them successful.

Another reason for the lack of enthusiasm in fitting multifocal lenses stems from monetary issues. This topic presents many debates, the one most intriguing is that ECPs routinely feel the amount of time spent with a multifocal fit does not justify. Advances in technology have provided products that are far superior to lenses of the past at costs that are less than some of the earlier modalities. Another reason may be that many patients frequent retail optical providers today. In many instances, an ECP who working within a retail establishment could be limited in both lens options and modalities thus limiting lens options.

In today's market patients can be fit with pennies on the dollar mono fit single vision lenses ordered online or purchased at their favorite flea market, or they can be fit with multifocal lenses for a stable and secure outcome. The personal satisfaction of making the presbyope happy and the fact that the presbyope associates with fellow presbyopes (who could present potential referrals) should offer a great incentive. This patient base is financially secure compared to a younger patient base and tends to be more social. Beware, they also tend to be more demanding!

The fitter should develop a plan of action when dealing with the inquiring presbyope to eliminate less likely candidates, especially in the preliminary fit stages. Develop a screening process which allows for selection of the optimum patient. A systematic collective approach by all involved affects the overall success. Selecting patients wisely, based on motivation, previous lens wear history as well as refractive needs will aid in determining success or failure. Avoid being overly optimistic. A wise person once said, "under promise and over deliver..." Bifocal/multifocal fitting in any modality is still a visual challenge.

Most Presbyopic patients are entering the fitting process with some sort of compromise, i.e.: PALS, monovision CLs, reading glasses over single vision contact lenses or worse yet are reluctant to admit they are presbyopic! If the patient is already "successfully" wearing soft contact lenses you are halfway there in the fitting process.

KNOW THE OPTIONS

It is pertinent to *be prepared to offer a comprehensive description of all contact lens options available.* Take advantage of diagnostic fitting sets whenever possible. Several manufacturers' offer fitting programs that will allow the utilization of different modalities and designs with minimal investment. Limiting fitting options will reduce overall success.

Consider success with PALs if fitting options were limited to only a few designs. Fitting or dispensing sets should contain a broad enough range of parameters and powers to suit the practice population. Don't ignore the astigmat or low cylinder patients. There are now several

excellent aspheric as well as multifocal/toric designs to accommodate most refractive needs. Manufactures can custom produce sphere powers in the + to - 25.00D range as well as produce higher adds and cylinder. Become familiar with the limiting parameters and power range of each manufacturer *before* proceeding with the fit.

PATIENT SCREENING

A detailed fact sheet should be provided to answer frequently asked questions, such as fees, types of lenses provided and fitting duration. Exhibit caution by *not quoting a definitive fee* or fitting modality; instead present fees leading up to maximum fees while allowing leverage to adjust for the more challenging fit. The staff should be well versed in these areas before any dialog with the patient.

As experience allowed for increased proficiency in fitting the Presbyope I observed several ways to cut down on time spent with this challenging patient. The same set of questions kept surfacing:

- *Have you previously worn any type of multifocal contact lenses?*
- Have you ever tried monovision (what was the outcome?)
- If you are currently wearing monovision what problems (if any) are you experiencing?

Questions could be included in a patient information profile; as a result, the fitting time could be greatly reduced. Utilizing this profile greatly streamlined the fitting process with bountiful information to aid in determining what lens modality to select initially.

Assess each patient's visual needs on an individual basis. Identify the visual tasks from the most to least uses; categorize needs as they relate to working distance, environment, and lighting. For example, a hairdresser requires correction for prolonged intermediate working distance often under intense lighting, while a dentist will require correction at a very close working distance for prolonged periods of time.

Short list of potential questions:

- What is the computer/electronic device working distance?
- Define near tasks performed
- What types of driving are most performed (night or daytime?)
- Define hobbies/location
- What types of sports are performed
- What is the working area; distance/range
- What type of lighting is used
- How is the air quality?

OCULAR/ADNEXA EVALUATION

Musts for the preliminary ocular evaluation

- Pupil size (dim and bright illumination)
- HVID (horizontal visible iris diameter)
- Tear quality/quantity
- Lid tension/elasticity/ptosis
- Palpebral aperture
- Corneal topography

- Current Refraction *(essential)*
- Stereopsis
- DES evaluation *(dry eye, essential)*
- Medications (specifically hormones and antihistamines)

A thorough exam of the ocular Adnexa including lid configuration/condition must be performed. A detailed measurement of the pupil size in dim and well-lit environments is important *as pupil size will have a direct impact on the lens design/modality selected.* Several manufacturers offer varying add diameters or "zones" and will work with you to determine the appropriate selection. The diameter of the cornea is also tantamount to a stable fit, as overall corneal diameter measurement is critical for centration. Smaller corneas tend to be steeper and larger corneas tend to be flatter. I have yet to see a multifocal design where centration is not critical for optimum results.

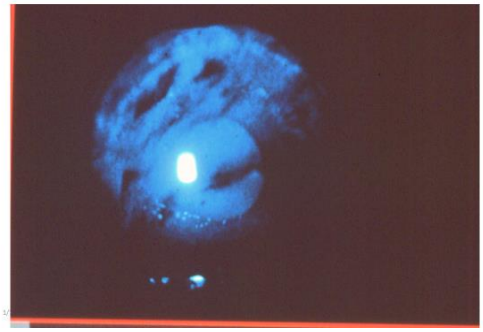
Fitting Pearl:

Don't attempt a fit if the patient has static (fixed) or dilated (miotic) pupils

Often the presbyope presents an additional challenge because biologically the older eye tends towards lower tear production/volume as well as quality.

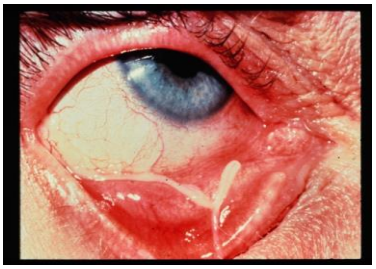
The presbyope may use medications which may alter the tear chemistry and often reduce tear production. Utilizing a high-quality tear volume assessment such as Lissamine green™ and or Schirmer™ testing as well as measuring the quality of the tear film with a simple BUT (break up time) test is advised.

BUT (tear break up time)



Poor blinker

MGD (meibomian gland disease) courtesy Soper slide library



Chronic Dry Eye

Photo Courtesy: Review of Optometry

A thorough evaluation is critical to determine if the patient can tolerate certain materials as well as wear regimens. DES can pose a problem as *Soft multifocal lenses require complete hydration for maximum performance.* Once the fitter has determined that the patient can tolerate a soft contact lens the design option and modality need be determined.

Ocular Dominance

There are numerous methods developed over the years to determine *ocular dominance; (a most important test in fitting Multifocals.)* The one that seems to work best in determining dominance for CL fitting has historically been the **"Fogging Technique."**

Lens Fogging Technique. The subject fixates a distant object with both eyes open and appropriate correction in place. A +2.00 or +2.50 lens is alternately introduced in front of each eye, which blurs the distant object. The subject is then asked to state in which eye is the blur more noticeable. That is the dominant eye.

*(*Compliments from Wikipedia for offering a few more :)

The Miles test. The observer extends both arms, brings both hands together to create a small opening, then with both eyes open views a distant object through the opening. The observer then alternates closing the eyes or slowly draws opening back to the head to determine which eye is viewing the object (i.e. the dominant eye.)

The Porta test. The observer extends one arm, then with both eyes open aligns the thumb or index finger with a distant object. The observer then alternates closing the eyes or slowly draws the thumb/finger back to the head to determine which eye is viewing the object (i.e. the dominant eye)

The Dolman method is also known as the hole-in-the-card test. The subject is given a card with a small hole in the middle, instructed to hold it with both hands and to view a distant object through the hole with both eyes open. The observer then alternates closing the eyes or slowly draws the opening back to the head to determine which eye is viewing the object (i.e. the dominant eye.)

The convergence near-point test. The subject fixates an object that is moved toward the nose until divergence of one eye occurs (i.e. the non-dominant eye). It is an objective test of ocular dominance.

The Camera Test. The subject brings a camera up to his/her face. Whichever eye is used to look through the viewfinder is the dominant eye. This test is more indicative than it is certain; it is similar to unexpectedly throwing a ball at someone to see which hand they catch it with, which usually turns out to be the dominant hand.

BIFOCAL/MULTIFOCAL DESIGN OPTIONS

Translating This is a “true” bifocal system. There are two distinct powers in this design.

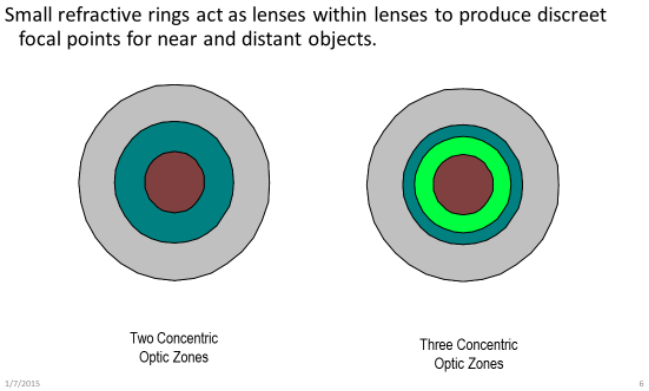
Translating Designs include segmented or concentric modalities. The true segmented design offers a definitive distance and adjacent near segment system which generally does not give the patient adequate intermediate vision. These designs must be either truncated and or prism ballasted for stabilization which leads to adaptation as well as comfort issues.

Concentric Designs

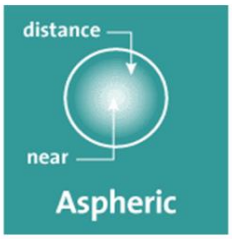
The *concentric design* is often classified as *“simultaneous”* perception. Light from both distance and near objects form images on the retina simultaneously. *Simultaneous vision occurs when both distance and near optical portions of the lens allows awareness of binocular images in the same visual plane.* Although the patient sees both images, the brain chooses which image to select. This choice was sometimes referred to as “the area of least confusion.”

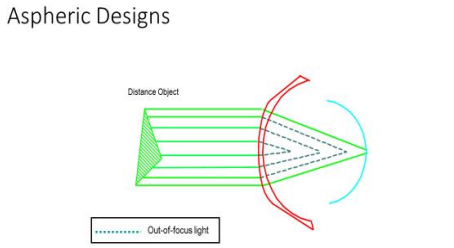
“Annular” designs; [distance or least plus in center,] or the reverse centrad [near or most plus in center] utilize zone placement which enhances the image depending on what the patient is focusing on at a moment. The patient learns to automatically process the most in focus image for that viewing distance.

During early adaptation, patients may complain of "ghosting" or a 3-D effect at near.



Limitations of Concentric Designs: The junctions between the different optical zones can cause optical distortion if their dimensions are not critically controlled. Optics are dependent upon pupil size changes.





Aspheric Designs

There is discussion as to whether the aspheric modality can truly be called a "multifocal." There are varying theories on how this system works. It is sometimes described as “crowded optical system” The bifocal effect is achieved by the principle of adjusting focused light on the retina by the constant change of curves on the contact lens surface.

There is a theory that the eccentricity of the lens alters light as it passes through the shifting “e” value. The advantage of aspheric designs is that the vision is natural at all distances.

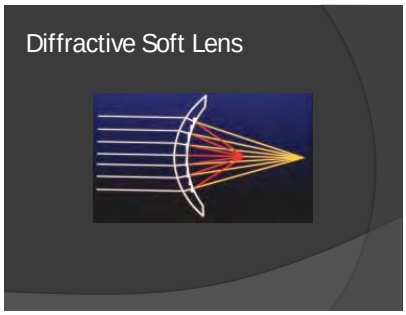
Aspheric curves produce a range of focal points; this range is designed to incorporate near, intermediate and distant objects which provide the wearer a broader range of vision.

The human cornea is aspheric; it is naturally flatter in the periphery than it is in the center. Correcting the aspheric cornea with spherical lenses could result in optical aberrations (distortions.) Correcting the aspheric cornea with aspheric contacts can potentially lessen those aberrations and *may improve quality of vision for patients with low cylinder* (0.75D or less.) Some designs may enhance near correction; however, be aware that aspheric designs have power limitations. If in doubt with like Rx’s you may want to try an asphere in one eye and single vision lens in the other to compare options.

A*spheric design suggestions:*

- Patient has .75D cyl or less and/or +1.00D or less add.
- Complaints of night driving
- Computer/electronic device fatigue
- Not enough cylinder for a toric
- Emerging presbyope, not enough add for a multifocal/bifocal

Diffractive



This system allows for incident light rays to be “diffracted” or evenly split between distance and near portions. This is achieved using “phase plates” echellettes, or diffractive rings. These small refractive rings act as lenses within lenses to produce discreet focal points for near and distant objects.

The distance image is formed at the center of the lens while the distance image is created in circular diffractive rings or "zones." This system generally causes the greatest reduction in contrast and often created tremendous glare. This design was extremely dependent on pupil size.

This *soft lens multifocal modality is no longer popular in the US market* and availability is limited.

Diagnostic Fitting

The use of diagnostic lenses is recommended; most fitting sets provide powers and parameters to satisfy most patient needs. Don't disregard the patient with astigmatism or unusual refractive requirements. There are numerous multifocal and aspheric custom modalities that cover a wide variety of astigmatic as well as refractive needs. Avoid limiting design options as that will limit overall success.

It is imperative to determine the patients “dominant” eye; {discussed later in paper} to help in the *selection of the appropriate eye to apply distance contact lens.* Select diagnostic lenses based on the *specific manufacturer's recommendations,* they know their products best.

Most manufacturers recommend allowing the lenses to equilibrate a minimum of 15 minutes, (the longer the better.) *Make certain to stress to the patient the significance of proper lighting when reading for near tasks.*

While waiting, you might suggest the patient check out the optical dispensary, now that they are able to see up close it will be easier for the patient to experience how they look in a frame choice for Rx spectacles as well as quality sunglasses.

If the patient is presently wearing bargain sunglasses use a projector and *hold their sunglasses in front of the projector to view distance target,* then compare to quality sunglasses; (a picture is worth a thousand words!)

Once diagnostic lenses have settled patients should also be encouraged to perform visual tasks relevant to their personal day to day vision environment. Allow the patient to experience a real-world perception with their new lenses. (The pinhole effect of the phoropter or low-lit exam room does not provide a real-world environment.)

Suggest the patient go outside to view road signs, also encourage the patient to utilize electronic devices to experience the "real picture." If the patient is visually tolerant, do nothing at that point. One of the major faux pas fitters make at the onset is trying to “fix” the patient observations during the initial visit. One analogy might be, these are multifocal lenses; would patients dispensed PALs to adapt to their spectacles at the initial dispense? If so, there would be an inordinate number of remakes on PALs! Patients need to adapt to this different way of seeing, which generally takes a *few days, however, sometimes adaptation can take up to several weeks.* Don't rush to make changes too quickly.

Patient scenarios

The golden rule of fitting a multifocal or aspheric design suggests working with one eye at a time but utilizing it binocular summation. The patient is not going to walk around in the real world with one eye closed. If the job/hobby or sport requires an unusual amount of close work, there is no reason why a pair of +1.00 ancillary readers cannot be dispensed to wear over the Multifocals when necessary. Most often these additional near aids (it is advised they not be referred to as reading glasses) are worn minimally so patients really don't mind. For the 60+ patient, this option could be offered in the multifocal package.

Attempt to refrain from making changes with patients on the first visit as they are still adapting to a “different” way of seeing.

The premise of the multifocal modality meeting 80% of the patient's vision expectations should prove satisfactory. After all the best PAL in the world doesn’t meet 100% of vision needs.

The fitter could suggest investing in a pair of good quality sunglasses to avoid blaming distorted vision on a pair of bargain sunglasses.

THE FOLLOW UP VISIT

Generally, the first few weeks will determine success or failure in most cases. LISTEN TO THE PATIENT, evaluate subjective and objective complaints.

As stated previously, avoid making multiple adjustments whenever possible and DON'T use a phoropter to perform any refractive changes, the *best method is loose or hand-held lenses!* Patients don't live in a false, restricted visual world as produced from behind a phoropter!

What occurs in the follow-up evaluation is often more important than the initial fit. Hopefully, by the time the patient has worn the lenses for several days, they will have begun to adapt to their new visual environment. That adaptation should improve their vision and make it much easier for the fitter to evaluate what adjustments if any need to be made.

With most multi-focal lens designs today the manufacturer is the best resource for determining the steps to take in adjusting lens design or power, follow their recommendations until comfortable with the process. When the patient returns for follow up it is best not to lead the questions, let them tell you their experiences. If the patient states they are happy and their vision is acceptable, avoid making any adjustments!

OBSERVATIONS VS: COMPLAINTS

Differentiate between an observation and a complaint; one impacts the patient's lifestyle the other is merely an observance.

If the patient has a legitimate complaint, take the path of least resistance. If the complaint is mainly near task or computer related, position the patient in front of an office terminal or his own personal electronic device; take a few hand-held trial lenses or flippers in .25D increments and push plus on the non-dominant eye.

Use Hand-held lens or flippers

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If that approach proves unsuccessful, attempt to fit the patient a higher add power in the non-dominant eye, if unsuccessful, consider changing lens design or modality. If the patient presents with distance issues, attempt the reverse; encourage the patient to venture outside or into a "realistic" distance environment and push minus on the dominant eye in -0,25D increments. If that is not successful, decrease the add diameter or add power in the dominant eye. If the patient is already wearing a low add consider applying a single vision distance lens in the dominant eye. It's easier for the patient to accept monocular near vision than distance.

Another tool for differentiating an observation from a complaint; if the patient states the only problem they are experiencing is difficulty with night vision, the fitter needs to identify the extent of the difficulty. The fitter should inquire if the patient drives routinely a great deal in the evening; if the answer is no, this is an observation; however, if the patient drives routinely for a delivery service at night that is a justifiable complaint which must be addressed. This patient needs to improve distance vision without compromising near vision. *Pushing minus on the dominant eye is the preferred method.* Begin by introducing a -0.25D hand held trial lens over the dominant eye in a low light environment, if distance vision is improved demonstrate to the patient what their vision binocularly when performing near tasks with the added minus, if the patient doesn't notice much change, reduce the distance power of the lens by the appropriate amount.

If the patient is unhappy with near vision do not proceed. Attempt not to push minus as near vision may suffer: begin by adjusting the add; this can be done in most cases by simply reducing the add power or adjusting the add diameter or zone. If results are not acceptable attempt to fit a distance lens on the dominant eye. Several manufacturers offer varying sizes in add and distance zone diameters. Be certain to ask the manufacturers recommendation on which add, or zone diameter will work best for their design.

Adhere to the PAL philosophy and make as few changes as possible. When adjustments are needed, proceed with caution and make changes minimally; attempt only one change at a time. If multiple changes are made, it will be difficult to determine what worked or worse… what didn't.

Note: .25D changes in most multifocal or aspheric designs can produce notable results with minimal compromise. It is strongly recommended that over-refractions be performed with hand held lenses **binocularly.**

Modified or Enhanced Monovision

ECPs today are hesitating in referring to this approach as monovision because in the true sense of the word as described in the earlier scenario this system does not cause degradation to distance vision binocularly. This system reduces the amount of plus in the patients near eye by utilizing combinations of lens designs and modalities.

Generally, if a patient complains of poor distance acuity or *if the patient is currently wearing a monovision modality* the fitter might slightly *reduce the distance Rx in the non-dominant eye and give the full distance correction in the dominant eye;* this should allow the non-dominant eye to compensate for near. (Note: this is a temporary fix as add requirement increases over time.)

If the patient complains of poor near vision, the fitter may over-plus the non-dominant eye and allow the dominant eye to compensate for distance. Often, adequate intermediate vision will be improved with this system as well.

The fitter may also attempt a *bifocal/multifocal modality in one eye utilizing the patient's best distance Rx in the opposite eye;* if the patient has a greater degree of cylinder in one eye consider fitting a toric lens in the eye with the greater cylinder while fitting the opposite eye with a multifocal modality. There are several lens designs and modalities which provide for modified monovision fitting. A few of these modalities have developed systems utilizing specific distance and near zones. These designs generally use the distance designed zone for the dominant eye and the near zone for the non-dominant eye. This is not monovision as the patient is still using both eyes for distance and near.

Monovision

This system traditionally utilizes a single-vision lens in both eyes. Generally, the best distance Rx will be applied to the dominant eye while the reading correction is applied to the non-dominant eye.

When attempts were made at monovision some thirty years ago the median age of the presbyope was early to mid-40's. Those patients adapted readily to pushing minimum plus on the non-dominant eye because the add difference was minimal. The median age of the presbyope today is between 55 and 65. It is more challenging for those patients to accept a disparity greater than +2.00D; the loss of potential stereopsis may be difficult to manage. Patients wearing monovision with greater add disparities will more than likely have difficulty with intermediate as well as night vision.

How does Binocularity Work?

"There are four levels regarding sensorial fusion of form."

- Simultaneous Perception (diplopia)
  There is no real fusion with this demand and is determined to be present merely by the patient's awareness of binocular images at the same time.

- Superimposition (first-degree fusion) this is the superimposition of two dissimilar targets. However, CONFUSION rather than true sensory fusion exists because SIMILAR targets are not being integrated; they merely have common oculocentric directions.
- Flat Fusion (second-degree fusion) this is true fusion and is the integration of two SIMILAR ocular images into a single precept. In any event, this type of target must be two-dimensional and IDENTICAL in form for each eye to be classified as a flat fusion stimulus. Such targets are the most frequently employed in testing and evaluating MOTOR fusion.
- Stereopsis (third-degree fusion) the perception of three-dimensional visual space due to binocular clues. These test targets are similar to those of flat fusion with one exception: there is lateral displacement in certain portions of the target."[vii]

A few Monovision Disadvantages:

- Potential reduction of binocular function *(inability to judge distance from binocular clues)*
- Potential reduction of stereopsis (depth perception)
- Potential reduction of reaction time
- Reduction of intermediate vision especially in higher add situations
- No established in office screening criteria
- Potential legal considerations
- Headaches (especially with electronic devices)
-

Monovision Factoids and Incidents:

The use of contact lenses …for obtaining a civil airman certificate has been permitted since 1976 According to the FAA Guide for Aviation Medical Examiners, the use of monovision contact lenses is not considered acceptable for aviation duties…

On October 19, 1996, a MacDonnell Douglas MD-88 aircraft, Delta Airlines Flight 554, was substantially damaged … while landing at LaGuardia Airport… during continued descent, the plane struck an approach light structure…shearing off the main landing gear and sliding 2,700 feet down the runway. The NTSB determined the probable cause of this accident was the inability of the pilot to overcome his misconception of the airplane's position relative to the runway, due to monovision contact lenses. [viii]

A previous study was conducted to determine adaptive gait changes in long-term wearers of monovision; eleven participants (53.5+/- 4.6 years) …median wear time of 5 years (were evaluated) as they walked up to and onto a raised surface. RESULTS: Compared to distance correction, monovision resulted in a large reduction in stereoacuity from 17'' to 87". CONCLUSION: *A slower walking velocity with monovision correction suggests participants became more cautious likely as a result of the significantly reduced stereoacuity…* [ix]

Another relative study conducted evaluated three increasing powers of monovision contact lenses on both objective and subjective vision in emmetropic Presbyopic patients… A prospective single-center study was conducted on 50 emmetropic patients with a mean age of 55.4 =/- 4.3 years (range 50 – 66). Each patient wore for 1 week a +0.75D, +1.50D, and +2.25D contact lens in the no dominant eye… Conclusions: In emmetropic presbyopes, near vision improved with increased lens power, but distance vision was degraded objectively and subjectively…

The results of the objective tests showed that monocular distance vision decreased with each increasing lens power, as expected but the binocular distance vision remained unchanged from pretreatment… (Binocularly) however, patients showed a decline of distance vision with each increasing power. Distance stereopsis also decreased with each increasing lens power. *This loss of binocular function may be responsible for part of the subjective vision loss…*[x]

LEGALITIES

Legally the ECP is required by law in many states to provide an adjunct Rx to balance or "compensate" for this disparity created following a monovision fit or provide a third distance contact lens for driving. *Many ECP's require "informed consents" be signed prior to fit.*

So, how does one address patients who have worn monovision for most of their Presbyopic lives? The need for increased plus makes it more difficult to achieve simple binocular tasks such as night driving (which wasn't a compromise 20 -30 years ago because the patient add was minimal.)

Many years ago, when the monovision/multifocal debate was in its infancy, Dr. Michael G. Harris, OD, JD, MS; associate dean emeritus, clinical professor emeritus and past-chief of the Contact Lens Clinic at the University of California at Berkeley School of Optometry, wrote:

Counsel presbyopes seeking a contact lens correction for their refractive condition as to the risks and benefits of the various types of contact lenses…

These include monovision, bifocal/multifocal contact lenses, and distance contact lenses with reading glasses, modified monovision correction or bifocal spectacles.

Dr. Harris advises: “Warn patients fitted with monovision or bifocal/multifocal contact lenses of the potential vision compromises associated with wearing these lenses compared to spectacle bifocal correction…”

Because correction with monovision and most bifocal and multifocal contact lens designs compromise binocular vision, you must advise patients that *depth perception and peripheral vision may be reduced.* These types of vision reductions can be especially important when driving or operating industrial equipment during which acute binocular vision is important.

"A practitioner may be liable to persons with whom he has no special relationship and whom he has never met. For example, a pedestrian who is injured by an inadequately informed monovision contact lens wearer who is driving with compromised vision may sue the contact lens practitioner.

If the patient has no liability insurance, the practitioner and malpractice carrier offer a convenient "deep-pocket" target for the injured party."[xi] [Dr. Harris is an Optometrist as well as an attorney.]

The FUTURE is here

There are now available designs, materials, and modalities that will allow for most presbyopes to wear multifocal contact lenses options. For patients with compromised corneas where traditional GP and or soft modalities will not work, there are presently several multifocal designs in scleral hybrids as well as large diameter gas permeable designs.

The visual needs and outcomes of these designs are similar, however strict adherence to manufacturer guidelines and protocol must be followed.

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[v] Phyllis Rakow FCLSA. The Evolution of Presbyopic Contact Lens Design: Soft Lenses; Eyewitness Third Quarter
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[vi] http://visionhelp.wordpress.com/2011/01/26/the-circle-of-least-confusion/

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