LEARNING OBJECTIVES/OUTCOMES
As a result of taking this course, the attendee should be able to:

1. Identify Donder's Table of Accommodation and relate it to the onset of presbyopia for myopes, hyperopes and emmetropes

2. Compare/contrast PAL design parameters including, but not limited to:
   A. Mono-design/multi-design
   B. Symmetric-design/asymmetric-design
   C. Excessive cylinder/ratio of add power

3. Identify optical considerations when fitting various PAL designs

4. Cite examples where optical aberrations will reduce optical performance and visual acuity

5. Identify various optical techniques/solutions to help offset aberrations including unwanted induced astigmatic error (excessive cylinder)

6. List common optical problems and match technology solutions to counteract each problem

7. Apply helpful fitting/dispensing tips for successfully selling/dispensing PALs
Presbyopia: An Optical Problem You Don’t Want To Keep At Arm’s Length

Today’s presbyopic market is booming, and optical opportunities for growth will follow. Young presbyopes are hip to fashion and function and are beginning to get the concept that “just one pair won’t work.” And, at the same time, new technologies in lens designs and coatings help us find optical solutions to visual/task-oriented problems. All we have to do now is pick up the ball and run. But, before we do, we must be well educated on this very important market sector.

When Does Presbyopia Occur?

The onset of presbyopia will depend on where we were to begin with. If we already have a refractive error prior to the onset of presbyopia, the speed at which we need corrective lenses will vary. Hyperopes are likely the first to show subjective symptoms/complaints of presbyopia. (They are the first to notice that their arms are too short!) People who are hyperopic already need plus power for distance vision. If they have “extra accommodation” (normally used for near vision), they will have already tapped into this for the required plus power at distance. They will need corrective lenses sooner rather than later.

Emmetropes will become presbyopic at approximately age 40. As in any data, this represents the majority, or approximately 80 percent of the population. Some will fall above or below this norm. Have you ever wondered why we turn presbyopic at around age 40? There is a mathematical reason. According to F.C. Donder’s Table of Accommodation, we have +4.25 total amplitude of accommodation at age 40.

That’s the objective part. Subjectively, emmetropic people will fall close to this range, with some variables. Low myopes will ignore the onset of presbyopia by taking their eyewear off prior to reading. Myopes with -1.50 will automatically induce +1.50 add by removing the lenses from in front of their eyes. That may sound like a great solution, but it isn’t. When we accommodate, we automatically converge. It is an involuntary muscle reaction based on the brain’s perception of diverging light rays from a near-point source. The eyes need to turn inward, or converge, to read. When uncorrected myopes read without accommodation, they must force their eyes to converge. After a while, this can cause asthenopia (uncomfortable vision). The solution, of course, is progressive addition lenses. The more attractive and convenient we can make wearing a premium progressive design to our patients, the sooner they will make the commitment.

Why wait until your arms are too short?! We have enough stress to deal with in life, so why add asthenopia to the list?

What Is A Presbyope To Do?

The following examples detail various choices and optical solutions for today’s young, active presbyopes. The first, over the counter (OTC) readers and prescription readers, are (surprisingly) still quite common. With OTC readers, there are obvious problems with optical center placement for near-point vision. A typical example is a petite person with optical centers out too far.

I remember one client, Vicki, who was a counselor and tennis coach at our college. She is an extremely petite person (possibly a size 2!), with a pupillary distance of around 55mm. One day she came into our optical clinic complaining of eyestrain. She actually described “a pulling effect on the sides of my eyes” (as she motioned toward the temporal areas on each side of
compatibilities of coating options can give presbyopes a new look and good vision. Yes, I can “make the line invisible” by dispensing a progressive addition lens, but how about if I add polarization and a flash-coat mirror with AR on the back? We can be hip presbyopes and geek chic at the same time.

These premium lens combinations add to the hip-appeal factor as well as to the ultimate goal of better vision. We just need to tell our story.

**A Captive Audience**

One thing is certain; there are more presbyopes now than ever before—baby-boomers and beyond.

A while back, I attended an educational symposium dedicated to the subject of presbyopia. In one of the classes, the professor discussed population trends worldwide and the effects on the ophthalmic market. He was an optometrist/epidemiologist, specializing in the distribution and trends of refractive errors and other eye-health related topics. He related the population pyramid to recent growth trends.

Population Pyramid

We are all familiar with the food pyramid, the fashion pyramid, etc. The population pyramid can be used to describe global societies by age and number of people. Until now, the population pyramid has been a typical triangle shape: The tip of the triangle represents the elderly population, and the base of the triangle represents the younger portion of a society.

Presently, the population pyramid is parallel or “straight up and down.” That is, worldwide, there are equal numbers of elderly people and younger people. Some countries, Italy for example, are promoting families to expand and giving economic incentives to do so. They recognize that a strong base of younger people is vital to the prosperity of a nation.

The point? We have an unprecedented number of emerging presbyopes. We are living longer and enjoying more active lifestyles, and our prescription eyewear must keep up. And, adding presbyopia to the mix, the combination of optical possibilities is endless. Addressing the needs of new presbyopes means knowing some things about their lifestyles.

**Demographics and Lifestyle**

Years ago emerging presbyopes would put off the decision of purchasing multifocals (bifocals or PALs) until the absolute last second. They would wait until they became absolutely miserable trying to stretch their arms out far enough to read. Even though they endured discomfort and embarrassment for never being able to read menus in restaurants with low lighting, they wouldn’t give in. Multifocals, even “invisible lines” (PALs), were a sign of aging.

While the aging stigma may have remained, new technologies in PALs combined with innovations of
Begin Where They Live…the OFFICE!

It is hard to believe how much time we spend on the computer compared to a few years ago. As a new presbyope myself, I can tell you the onset of presbyopia hit me first, and with the most force, at my office. As much as I try to limit my time on the computer, it is next to impossible. And, even though I am a low myope (-1.50), taking off my eyewear for computer work is not enough.

Computer Vision Syndrome and ergonomic issues and problems with viewing video display terminals (VDTs) should not be underestimated. It’s all about balance. The viewing angles required for the visual task of computer work are specific. Many people suffer from neck and upper back/shoulder pain due to poor ergonomics at the workplace, especially when working with a computer. This could be avoided with the right eyewear that is visual-task specific.

How Do We Tell Our Story and Make The Match?

My personal philosophy in regard to society and prescription eyewear is this: “I cannot rest until everyone has at least four pairs!”

And, I am talking lay people, not optical people. We should have more than four pairs! As crazy as this may sound at first, it is a business mantra I believe, and it has brought me continued success.

The story goes like this: We ALL need a pair of clear (or variable tint), AR coated lenses for everyday indoor activities and while driving at night. And, we must have a serious pair of prescription sunwear for driving and other outdoor activities, and my only choice here is polarized. And, if our workspace requires wide intermediate viewing areas out to 10-to-13 feet (a typical office space), we need an occupational lens (progressive/variable in power) for our time at work and at the computer. We are up to three pairs, and, for number four, “Can’t they have ONE more pair for everyday use? Do they HAVE to wear the same look over and over, every single day?”

You may be surprised at how many clients react favorably to this approach. They may not order four pairs in one day, but they will often order two. Then, I offer to take the measurements for pairs three and four; they can purchase those one-to-three months later, bringing us closer to our mutual goal of four pairs.

It’s Not Just About Marketing…It’s About Optics

There are many visual interruptions and disturbances due to the nature of light and how it refracts through lenses at various points. Not only does light refract differently at disparate points of a lens, it refracts, reflects, diffracts and causes specular aberrations as a result. These optical phenomena are sometimes referred to as visual noise. Most aberrations can be fixed with lens design and coating options. The only exception here is chromatic aberration, which is inherent in the material. Picking a material with a high ABBE value is the best approach for eliminating chromatic aberration.

Given new PAL wearers’ active indoor/outdoor lifestyles, suggesting lens options to match visual needs is critical. Some examples:

- Uncomfortable transmitted light: tinted lenses
- Ultraviolet protection: UV coating
- Reflective factor/transmission of light: AR coating
- Distracting glare: variable tint, AR coating
- Blinding glare: polarized lenses
- Reflection problems/sport: polarized, mirror coatings, AR back surface
It is helpful to choose PAL designs that are also available in polarized, high index and photochromic so there is no need to switch designs when selling the second pair. Creating packages with inclusive pricing for second pairs will help as well.

Other Sunlight-related Eye Diseases New Presbyopes Should Know About in Addition to UV

Lately there has been talk about using melanin in lenses to offer protection against light-related eye problems, such as pterygium, cataracts and age-related macular degeneration (AMD). Lenses with melanin can provide added protection against sun-induced AMD and cataracts.

Develop your Image…Create Your Story

Demographics matched with lifestyles matched with PAL technologies and options … We can easily see the need for multiple pairs. That’s half the battle. How do we get our message through?

Visual advertising, whether external or internal, can make the difference between selling one, two (or four!) pairs of eyewear to a patient/client. It is not only about the added business revenue, people really do need multiple eyewear for various tasks! The following tips for advertising will help get your message through:

• Show the product in use.
• Lead with an illustration.
• Use photographs of real people.
• Does the picture alone tell the story?
• Intrigue readers.
• Keep it simple.
• Use color.

Many manufacturers provide point of purchase (POP) displays to help portray an optical message. As visual learners, we can receive a message quickly from displays showing the lenses in action with real-life scenarios.

Dispensing Tips to Avoid Costly Mistakes

First, and most importantly, choose premium PAL designs that are soft in design, with low, controlled amounts of excessive cylinder/surface astigmatic error. This means the lowest possible amount of unwanted cylinder on the front surface of the lens, due to design parameters. The brain can tell the difference.

Progressive addition lenses are designed with a series of aspheric curves. How the aspheric curves are manipulated mathematically has a lot to do with the resulting lens design. The goal is to keep the excessive cylinder/unwanted astigmatism down to a 1:1 ratio or less. That is, the total amount of excessive cylinder anywhere on the lens will not exceed the total add power. And, if the design is successful in keeping the entire amount of excessive cylinder below the 180 line/fitting cross, the quality difference is huge, and the patient will enjoy better vision for multiple viewing tasks.

Symmetric/Asymmetric

One way to describe lens design parameters is symmetric/asymmetric, and mono/multi. A lens design that is the same for the right and left does not follow the natural viewing habits of the eye. When a PAL is designed specifically with both the right and left eyes in mind, the benefits are substantial. Such a design will help gain the most natural vision. Insist on lenses custom designed for right and left lenses, with variable insets.

Fun Fact!

“Not only does light refract differently at disparate points of a lens, it refracts, reflects, diffracts and causes specular aberrations as a result. These optical phenomena are sometimes referred to as visual noise.”
Helpful Tips for Fitting and Measuring PALs

First and foremost, a good fit is worth 1,000 remakes. Even with advances in softer, better PAL designs, the success is only as good as the fit. Brushing up on good fitting techniques can only help. Here are some guidelines:

1. Sit at eye level from patient/client, 40 cm apart.
2. With the demo lens (or tape) in the eyewire, spot the pupils. (Remember to close one eye at a time; avoid parallax errors!)*
3. With your right eye closed, ask patient to look at your left eye.
4. Spot patient’s right pupil.
5. Repeat back and forth, right to left, then spot patient’s left pupil.
6. Make a cross at the dot, indicating the fitting cross location.
7. Observe patient in his natural stance, even at a full length mirror to be sure that the fitting crosses bisect each pupil.
8. Measure the fitting cross heights monocularly and record.
9. Monocular distance PDs and fitting cross heights are a must!

*Why do we close one eye at a time? This question is asked quite frequently. We close one eye at a time for two reasons:

1. To simulate parallel vision, as if the patient were looking through us out to 20 feet.
2. To be sure that, when we spot the pupil, we are spotting straight ahead (parallel), and not from our other, possibly dominant eye. This will cause parallax error, and the marking will be in too much nasally.

One more tip: Be sure the frame is adjusted as if the patient were leaving prior to taking any measurements. This means the right amount of pantoscopic tilt, a close vertex distance and a good parabolic curve (face form). Taking these extra steps can avoid costly remakes later.