

**Conducting Sunglass Evaluations
What You Need to Know**
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There are 4 things to consider:

1. the color of the lens
2. the amount of light transmittance through the lens
3. the size of the frame
4. preference of user

It is a given that all UV-A and UV-B light should be filtered. See articles in the kit binder for details and download a copy for yourself!

Lens Colors:

The color of the lens determines which visible light rays are filtered out and which light rays are let through to the eye. Blue light rays are the shortest visible rays. They bounce and scatter and are responsible for glare known as "blue haze". Some research suggests that blue light can be hazardous to the lens and retina of the eye over time. For most users, the results of filtering out the blue light rays are: 1) reduced glare; 2) increased contrast 3) increased depth perception and 4) increased object detection. However, when 100% of the blue light rays are eliminated, there will be significant color distortion. In some cases this is irritating; in others it can be hazardous. It may be better to filter out *most* rather than *all* blue light.

- Only orange and red-orange lenses filter 100% of blue light rays.
- Any shade of Yellow, Amber, Gold, Brown and Plum give moderate protection allowing some visible blue. Green is composed of yellow and filters out some blue light but in my evaluation experience, is not often preferred by users because of color distortion. Green is also known to provide the highest contrast and greatest visual acuity of any tint. Unlike the 100% blue blockers (orange and red-orange), these shades do not distort all colors.
- Gray does not filter blue; although it darkens everything making the eyes comfortable, it does not increase contrast, depth perception or object detection.
- NoIR Medical Technologies makes the UVShields found in this evaluation kit. In their printed material, they list specific lens-color recommendations according to eye conditions. This information can be downloaded from www.noir-medical.com, and is found in the binder (that you must return with the kit.) My personal experience is that colors recommended for achromatopsia, night-blindness and retinitis pigmentosa accurately reflect the ones most often preferred by students/clients who can accurately report. But for all other eye conditions, I haven't seen any distinct correlation between color and eye condition. This does not mean the correlation is not there; I simply haven't seen it in my experience. Individual students might prefer a lens that is different than what the manufacturer suggests, and there is nothing wrong with this.
- In my experience, the color most often preferred is Plum. Purple and rose tints such as plum offer the best contrast of objects against a green (grass) or blue (sky) background. In the case of children who cannot accurately report preferences such as babies and children with additional disabilities, Plum is the default color I choose for them.
- The color of the lens affects the eye's perception of brightness and darkness. Try on a pair of 4% dark yellow and a pair of 4% dark gray UVShields to experience this phenomenon. Although they both filter out the same amount of light (96%), allowing in only 4% of all visible light, your visual experience will be totally different. The yellows will

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give you the sense of increased illumination over the grays. Many kids will say the yellows are too bright, even when filtering 96% of all visible light.

Light Transmittance:

The NoIR lenses filter out 100% of UV and IR light which is invisible to our eyes. What is of concern for your evaluation is the amount of visible light reaching the eye. The percent (%) listed for all NoIR sunglasses represent the amount of visible light transmitted through each lens.. A 4% Plum lens filters out 96% of all visible light, allowing only 4% through to the eyes. Lenses are typically described as dark, medium or light.

- Dark: light transmittance runs from 1%-7%.
- Medium: light transmittance runs from 10%-40%
- Light: light transmittance runs from 40%-65%
- There is a clear option that has a 90% light transmittance while filtering all ultraviolet rays.

General rule of thumb: start with a dark lens for bright light conditions such as full sunshine and sunshine on snow. If the lens is too dark, try a medium light transmittance. An evaluation on a cloudy day is still valuable. Clouds reflect and scatter shorter light rays, creating glare. A medium light transmittance lens is typically a good choice for a cloudy day. A light transmittance lens is often helpful for indoors and while working on computers if glare from overhead lights and the computer screen are an issue. Download a helpful article entitled: *Artificial lighting and the Blue Light Hazard*, by Dan Roberts from <http://www.mdsupport.org/library/hazard.html> for information regarding the effects of different kinds of lighting including full-spectrum, fluorescent, incandescent and neodymium. This article can also be found in the evaluation binder that you must return with the kit.

Frame Sizes:

Adult NoIRs come in small (S), medium (U) and large (L) frames.

Styles include

- Fitovers (to fit over prescription glasses),
- Non-fitovers (which are sometimes used as fitovers for small faces) and
- Wrap-arounds or aviators (which do not have side and top shields).

None of these are particularly fashionable and understandably, some students simply refuse to wear them.

There is a nice line of infant frames. These are cute, colorful, and flexible plastic frames that cost about \$20-\$40, depending on the color of the lens.

- Local Lions Clubs are often willing to cover the costs of these.
- In defense of paying that much for baby sunglasses: our kids already have compromised vision. We don't want to compromise the vision they do have by distorting images through cheap plastic lenses. These lenses have a high optical quality. Because their brains are still wiring visual images with other sensory input to form concepts, we want to give our kids the best visual image possible, including increased contrast, depth perception and object detection. If children are uncomfortable in bright light conditions they will simply close their eyes and shut down their visual system. This isn't in their best interest. We want them to be visually aware of their environment so they can learn about it.
- An elastic head strap can be purchased for about \$5 from NoIR.
- Babies and toddlers will often take glasses off. I typically recommend that OT start a desensitization process so the child will learn to tolerate the feel of glasses on their face. I also recommend that when first introduced, the glasses be put on the child *outside* after the child reacts to the brightness so that the child feels instant relief when they are put on (positive reinforcement).

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There is a new line of kid (child) frames that are fashionable. They come in size medium (KM) for ages 7-9 and size small (KS) for ages 4-7.

User Preference:

While there is considerable science behind sunglasses in terms of color, amount of light transmittance and eye conditions, the final decision rests with the user. If the child is an accurate reporter, trust that s/he will know best which lens enhances the visual experience. It is common to need more than one pair of sunglasses for different lighting conditions. If a user is unable to make a choice based on personal preference, my default choice for them is always plum. Why? Because it's my personal preference, and over time, I've noted that those who can make their own choices choose it more than any other color. How scientific is that?? "Choosy choosers choose Plum". It also gives the best contrast of objects against a blue or green background.

Who Should Pay for Sunglasses for Vision Impaired Kids?

You may or may not share my personal opinion, but this is what I typically convey in reports: Fully sighted children have access to the general curriculum and expanded curriculum without adaptations and accommodations. Children with visual impairments are at risk for not having access to the environmental information that is available to their sighted peers. They experience reduced visual capacity and performance in a variety of lighting conditions in which their sighted peers can see perfectly. Curriculum happens in a multitude of environments such as the school building, the playground and on field trips. Sunglasses are an accommodation for lighting conditions that reduce visual efficiency for this child, decreasing his/her access to the academic, social and physical environments which support human growth and development. Sunglasses can increase contrast, acuity, object detection and depth perception for a child with reduced vision much like an FM system increases auditory contrast, acuity and perception for children with hearing losses. Therefore, the school district should purchase the sunglasses as a visual accommodation (like a monocular or FM system).

Typical school related activities that may be affected by lighting conditions:

- Line up for the bus
- Find friends on the playground
- Chase a ball during recess or "field day"
- Participate fully on field trips
- Read signs
- Use skills of independence rather than needing a sighted helper

Sunglasses for glare reduction and increased contrast worn indoors is easier to justify as an accommodation because of the direct link to accessing academic materials and computer screens.

Matching Tints in Prescription Glasses

Most labs can match a tint that you show them in a prescription sun-lens. Most cannot, however, measure the amount of visible light transmittance. So if you bring a pair of NoIR 4% plums to be matched, for example, they can match the color but cannot guarantee that it is filtering 96% of visible light.

Chadwick Optical will get NoIR blanks and cut them to fit the frame you send them -- not prescription (Rx), but at least the same with look good.

<http://www.chadwickoptical.com/>

You can order from the Wisconsin Council of the Blind or NoIR Medical Technologies. Ordering information is in the binder.

Best Practice Recommendations:

Evaluations are best done under various lighting conditions, during different seasons and over time. Again, one pair of sunglasses may not do justice to the child's needs and may cause

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dissatisfaction with the glasses themselves. If fit-over filters work indoors for a specific person, the filter sheets for reading may also be beneficial. The O&M or TVI professional working with a child is in the best position to do an evaluation justice. They are also in the best position to read a child's non-verbal responses.

How Can I Get My Own Sunglass Evaluation Kit?

NoIR medical technologies may be willing to send you your own sunglass kit for evaluations at no cost. They agreed immediately to send me two free kits, one for myself and one for borrowing.

General Assessment Protocol, by Marshall Flax

1. Have all the sunglasses immediately within your reach.
2. Stand with your student in the area with the selected light condition i.e. outdoors on a sunny day.
3. Estimate the student's need for light filtering – let's say 15%.
4. Offer the student a lens with this level of light transmission to try on. Have him or her look at a specific target (car in the parking lot? Kids on the playground?).
5. Before the student removes the lenses/filter, have her close her eyes.
6. Keeping her eyes closed, have her place a lens of the same or nearly same light transmission but in a different color.
7. Have the student open his eyes and look at the same set of visual targets.
8. Discuss similarities and differences.
9. Either repeat with previous lens or try a 3rd, 4th, 5th etc option.
10. Keep the "#1" choice available as a reference point when a new lens is tried.
11. Avoid using the lens color as the name of the lens. Instead of "Try this yellow one" say "This is lens number 4 – do you like it more or less than lens #3. This will help reduce any built in bias toward a specific color – "I hate yellow". "I love green."

Good luck with your sunglass eval. Feel free to contact me with questions:

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Information in Binder (that you returned with the kit)

www.noir-medical.com = all sunglass info; styles, colors, sizes, suggested applications

www.cocoonseyewear.com/lenses = role of color in lenses, polarization

<http://science.howstuffworks.com/sunglass2.htm> = role of tints, explanation of various coatings, polarization.

www.mdsupport.org/library/sunglasses.html = *Sunglasses and Macular Degeneration* = explanation of UV-A, UV-B, filtering blue light rays, coatings and recommendations for what to look for in sunglasses.

www.mdsupport.org/library/hazard.html = *Artificial Lighting and the Blue Light Hazard (The Facts About Lighting and Vision)*, Dan Roberts. Information on how light works, types of lamps, problems with full spectrum lamps, market survey.

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