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INSTRUMENTATION

Using the Lensometer: A Reference Guide for Ophthalmology Office Staff

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■ ABSTRACT

When providing ophthalmologic care to patients, a task that is often delegated to office staff is the neutralization of the patient's current pair of spectacles. If staff members are unfamiliar with the lensometer, the results may be unreliable and unrepeatable. This article has been constructed with the intent that it be used as a quick-reference guide for office staff asked to neutralize a pair of spectacles, and encompasses the process of spectacle neutralization from focusing the eyepiece to recording the result. Basic single vision, bifocal, and progressive prescriptions are covered; more challenging prescriptions, such as those containing prism, are not addressed.

■ TECHNIQUE

Focusing the Eyepiece

1. Although this does not need to be done each time you use the lensometer, it is important to check that the lensometer is focused before you neutralize a pair of spectacles, especially if there is more than one person using it. Each person will likely require a different setting for the eyepiece, as the amount of instrument myopia will vary between individuals because of differences in experience with the task and other factors.[1,2]
2. Set the power on the power drum to 0. The cylinder axis does not matter.
3. Turn the eyepiece until the lines come into focus.[3]

Neutralizing Spectacles

1. Determine if the lenses are single-vision lenses, bifocal lenses, trifocal lenses, or progressive lenses.
2. Neutralize the distance prescription.
3. Determine the addition power. This is done differently for bifocal lenses and progressive lenses. Single-vision lenses do not have an addition.

Single-Vision Lenses

1. This refers to lenses that do *not* have a bifocal or trifocal segment and are not progressive. Single-vision lenses may be spherical or astigmatic; they may contain cylinder.
2. Center the right lens in the lensometer with the temples of the spectacles facing away from you.
   a. The thin and thick lines should cross in the center of your field of view. If they do not, adjust the position of the lens (right/left, up/down) until they do (Fig. 1). Important note: make sure that you do not try to move the lens while it is secured in place, as you could scratch the surface.
   b. Adjust the height of the table so that the bottoms of both lenses are resting on the table (Fig. 2). If they are not, your cylinder axis will be incorrect.
3. Turn the power drum and rotate the cylinder axis until the thin lines are focused at the most minus/least plus power.
   a. Turn the drum away from you until both lines are blurry.
   b. Slowly rotate the drum toward you until the first set of lines clears. If both lines clear at the same time, this is a spherical lens, and there will be no cylinder power or axis to record.[2,3] Small amounts of cylinder can be tricky to find. Rotating the axis around the clock can sometimes help you pick up small amounts that might otherwise go undetected.
   c. Adjust the cylinder axis until the thin lines are the clear set of lines. Here again, small amounts of cylinder can be problematic. Sometimes it is

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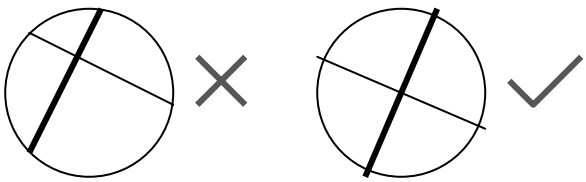

FIGURE 1.

easier to bracket the cylinder axis than it is to find it directly. To do this, adjust the axis 1 way until you notice that the thin lines are no longer straight. Then adjust the axis in the other direction until you note the same thing. From there, you can refine your axis while also refining the power.

d. Continue to make fine adjustments until the thin lines are clear and straight. The thick lines should also be straight, but they will be blurry if the lens contains cylinder.
e. This is your sphere power.[4] Read directly off the power drum.

4. Turn the power drum (leaving the cylinder axis where it is) until the thick lines are focused at the least minus/most plus power.
   a. Continue to turn the drum toward you until the thick lines clear. You no longer need to turn the cylinder axis.
   b. The difference between the value on the power drum and your sphere power is your cylinder power. It should be a positive number.
5. Record your cylinder axis directly off of the axis protractor. If you cleared the thick lines before the thin lines, you will need to adjust your axis by 90 degrees.
6. Repeat with the left lens, making sure that the bottoms of both lenses are once again touching the table. Do not change the height of the table. It is important to note that you will be able to center the lines horizontally, but you may not be able to center them vertically. Likely, there is a vertical prism (intentional or not) in the spectacles if the lines do not center vertically.[2]

Bifocal Lenses

1. Determine the distance prescription for the right lens in the same way that you would with single vision lenses. It may not be possible to center the lines vertically, as the bifocal segment may get in the way.

FIGURE 2.

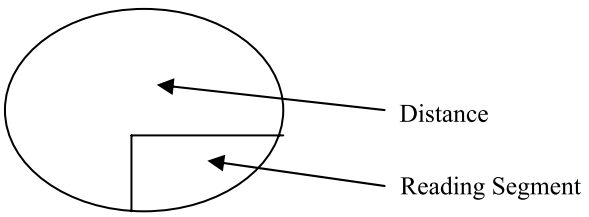

FIGURE 3.

2. After you have determined the distance prescription, move the lens up so that the lensometer is focused just below the top of the reading segment (if you watch the lines inside the lensometer, you will see them "jump" when you move from the distance portion of the lens into the reading segment[3]) (Fig. 3). It is important to note that the lines will no longer be centered, nor will they be straight. This is perfectly okay. *Do not* adjust the cylinder axis.
3. Make a mental note of the reading on the power drum.
4. Continue to turn the power drum toward you until the thick lines are again in focus (but likely not straight). The difference between your "mental note reading" and the reading on the power drum is your addition power.[3]
5. Repeat with the left lens. As a hint, the addition power is usually the same in both lenses.

Trifocal Lenses

1. Follow the instructions on neutralizing bifocal lenses. The intermediate segment addition is a percentage of the reading segment addition,[3] and you do not need to neutralize it (Fig. 4).

Progressive Lenses

1. To identify a progressive lens, hold it above an object (text works very well) and watch how the object changes as you move from the center of the lens to the bottom nasal section of the lens. If it is a single-vision lens, there will be very little or no change. If it is a progressive lens, you will notice that the object becomes larger and more distorted.
2. Hold the lens up to the light, looking toward the temporal part of the lens. You will notice the temporal

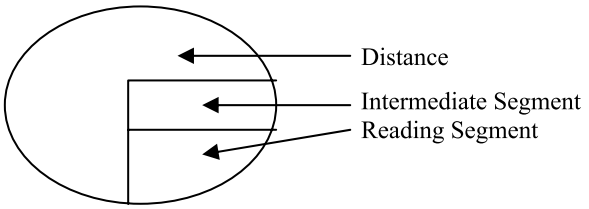

FIGURE 4.

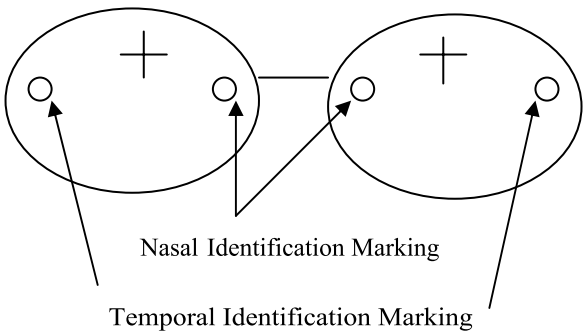

FIGURE 5.

identification marking (usually a circle) etched into the lens (Fig. 5). Below this is a 2-digit number. This is your addition power[2] (Table 1).

3. Determine the distance prescription for the right lens in the same way that you would with single-vision lenses, centering them slightly differently. For a progressive lens, you want to center the lens slightly higher than the center of the nasal and temporal identification markings[2] (the cross in the previous diagram). Ideally, you would mark the lenses to ensure that you are measuring the distance prescription at the appropriate point on the lens, but that takes time that you may not have. It is important to be aware that you may get an incorrect cylinder reading because of the construction of the lens if you are not measuring the distance prescription in the correct part of the lens.[5] This becomes more of an issue in high prescriptions[5,6] and varies with lens construction.[7,8]
4. Repeat with the left lens. As a hint, the addition power is usually the same in both lenses.

Prism in Lenses

1. To read the amount of prism in the lens, use the graticule in the lensometer. You can read directly off of this graticule using the designations *base up*/*base down* for vertical prism and *base in*/*base out* for horizontal prism[3] (Fig. 6).

TABLE 1.

Etching	*Addition power*
12	+1.25
15	+1.50
17	+1.75
20	+2.00
22	+2.25
25	+2.50
27	+2.75

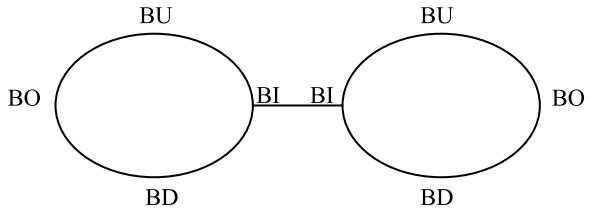

FIGURE 6.

Horizontal Prism

1. Unless you have marked the pupil position on the lenses, you are not able to determine if there is horizontal prism (intentional or otherwise) in the lenses.

Vertical Prism

1. If when you move the spectacles from the right lens to the left lens, the lines do not center vertically, there may be vertical prism in the lenses. Unless you have marked the pupil position on the lenses, you will not be able to determine the amount of prism in each lens. You will only be able to determine the overall prismatic difference between the lenses.
2. It is important to note that if the amount of vertical prism in the right lens is equal to the amount of vertical prism in the left lens, there is an overall prismatic effect of zero.

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