

LENSOMETRY: PRISM WORKSHOP



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Murphy

Things you will learn:

- How to Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear
- How to Identify and Resolve Classic Problem Areas in Prism Detection



Identifying Wanted & Unwanted Prism

First off, **WHAT IS PRISM?**

1. A 1970s Canadian Rock Band.
2. A polyhedron w/two congruent & parallel faces (the bases) whose lateral faces are parallelograms.
3. A fictional super-villain character in the Marvel Comics universe; he is a member of the Marauders. He is a mutant & a clone & his first name is Robbie.
4. A transparent piece of glass that refracts or disperses light.

ALL OF THE ABOVE! (but #4 is the one we like...)

Identifying Wanted & Unwanted Prism (cont.)

WANTED PRISM:

- Prism that is prescribed by the doctor.
- Prism we want the labs to put in the lenses.
- When you measure the specs, you want the prescribed amount of prism to be in them **&** you want that prism to be going in the direction prescribed:
 - i.e. Base UP (BU), Base DOWN (BD), Base IN (BI) or Base OUT (BO)

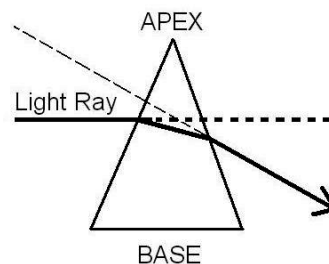
Identifying Wanted & Unwanted Prism (cont.)

UNWANTED PRISM is:

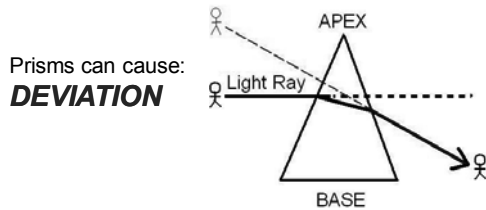
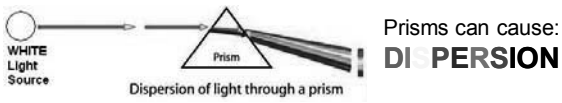
- Prism that is found in the spectacles that that was not prescribed and...
- ...exceeds the 'allowable' amount specified by ANSI standards.
- **ANSI STANDARDS** allow UP TO:
 - 0.33 Diopters UP or DOWN (vertical) prism
 - 0.66 Diopters IN or OUT (horizontal) prism

Identifying Wanted & Unwanted Prism (cont.)

- A prism looks like a triangle. It has a **BASE** & an **APEX**.
- It's power is measured in **DIOPTERS**.



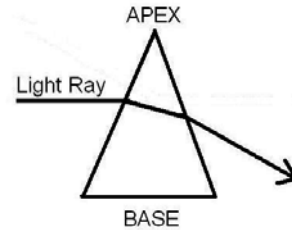
Identifying Wanted & Unwanted Prism (cont.)



Identifying Wanted & Unwanted Prism (cont.)

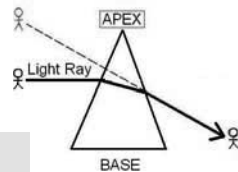
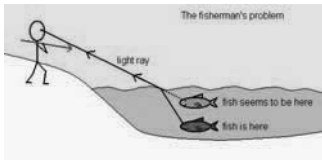
- We are interested only in the **DEVIATION** aspect of prisms today.

Light gets deviated toward the **BASE**.



Identifying Wanted & Unwanted Prism (cont.)

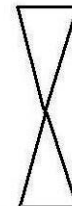
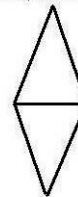
- **Images** appear to get deviated toward the **APEX**



Identifying Wanted & Unwanted Prism (cont.)

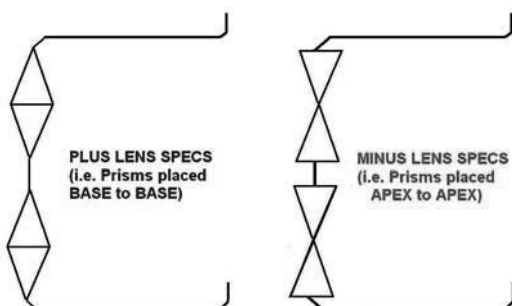
- All spectacles lenses can be thought of as simply **two prisms put together**

PLUS LENS:
Two Prisms placed Base to Base



MINUS LENS:
Two Prisms placed Apex to Apex

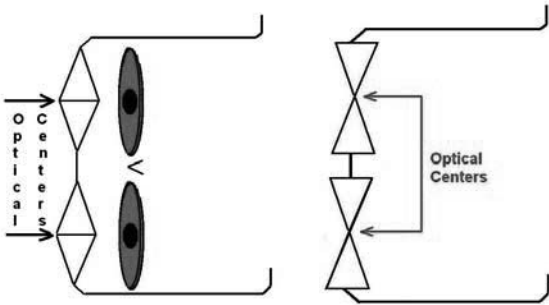
Identifying Wanted & Unwanted Prism (cont.)



Identifying Wanted & Unwanted Prism (cont.)

- Light passing thru the **OPTICAL CENTER** of a lens is **NOT** deviated.
- To avoid **UNWANTED PRISM**, the optician needs to **measure** the patient's interpupillary distance (IPD or just **PD**) **accurately AND** the lab needs to make the specs so that the **optical centers (OCs) match the patient's PD (PPD)**.

Identifying Wanted & Unwanted Prism (cont.)



Identifying Wanted & Unwanted Prism (cont.)

- In a **perfect world**, all patient's eyes would line up perfectly (heterophoria) and no spectacles would ever need prism in them.
- Continuing in our **perfect world**: Every optician would measure every patient's PD perfectly.
- Still in our **perfect world**: Every lab would make the optical centers of every pair of specs line up with the patient's PD so the patient was always looking through the optical centers of the lenses.
- Finally, the **perfect world** would have all glasses fit and adjusted to the patient perfectly.

Identifying Wanted & Unwanted Prism (cont.)

SNAP OUT OF IT!

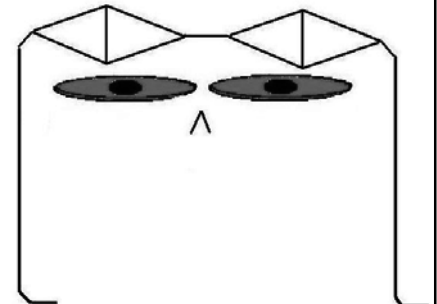
"Perfect World" doesn't exist

- Patient's eyes are not always perfectly aligned (i.e., patient has heterotropia), so patients need prism to see clearly & without diplopia.
- Some opticians aren't perfect & mismeasure patient's PD.
- Some labs fail to make specs correctly, i.e., to the specifications given them.
- Some opticians do a poor job of adjusting specs to sit properly on the patient.

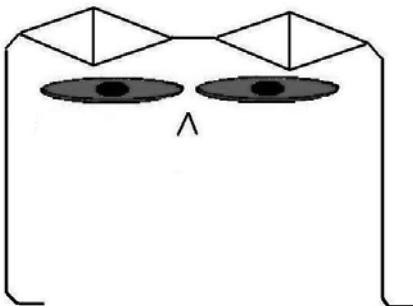
Identifying Wanted & Unwanted Prism (cont.)

What kind of UNWANTED prism is being 'induced' here?

(Base **IN** or Base **OUT**?)

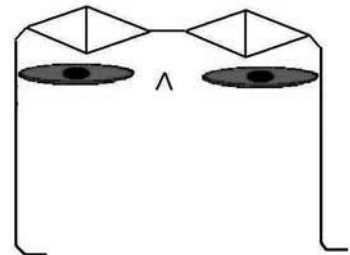


BASE OUT (each eye)

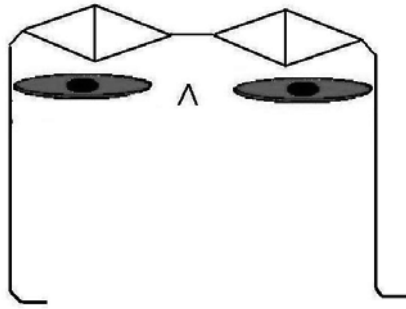


Identifying Wanted & Unwanted Prism (cont.)

- What kind of UNWANTED prism is being 'induced' here?
- (Base **IN** or Base **OUT**?)



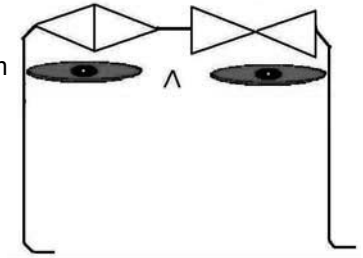
BASE IN (each eye)



Identifying Wanted & Unwanted Prism (cont.)

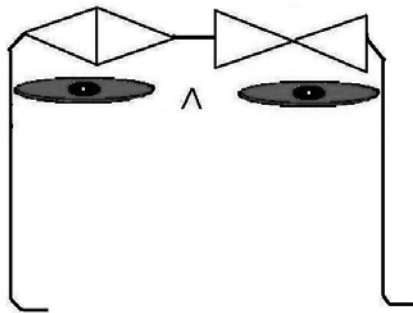
- What kind of UNWANTED prism is being 'induced' here?

(Base **IN** or Base **OUT**?)



BOTH!

Base IN-OS Base OUT-OD



Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear

- So how do you IDENTIFY & QUANTIFY prism?
 - You need a **lensometer** (& the skill to use it)
 - You need to know what the **patient's PD** is
 - You need to know if **prism was PRESCRIBED** (if so, how much & in which direction?)



Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)

- **Neutralize** the specs via the lensometer
 - **Dot the optical centers (OCs)**
 - **Determine which lens is the strongest** (i.e. has the most dioptric power; PLUS or MINUS does not matter!)



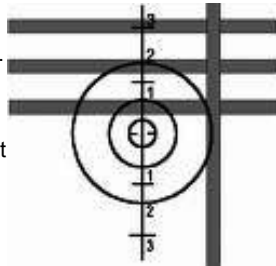
Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)

- To find **VERTICAL PRISM** (i.e. BU or BD) you need to **center the strongest powered lens in the lensometer**



Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)

- Without moving the lens table, move to the 'weaker' lens & center it side to side.
 - DO NOT MOVE THE LENS TABLE UP OR DOWN!!!



NOTE: The picture shows that the lens is NOT centered side to side. You need to do that.

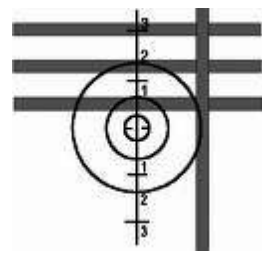
But, looking at the image, how much VERTICAL prism is there?

Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)

- If you said: "2 prism diopters BASE UP," you did great!

(Another way to show "PRISM DIOPTERS" is to use the symbol: Δ)

- So you could say: 2Δ BU



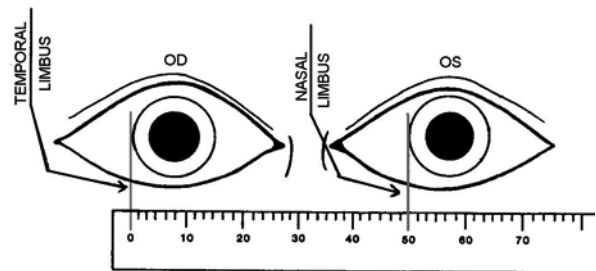
Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)

- Once you have determined how much VERTICAL PRISM is in the glasses, you are ready to see if there is **HORIZONTAL PRISM** (i.e. **BI** or **BO**)
- To do this accurately, you need to know what the patient's interpupillary distance (IPD, PPD, or simply, PD) is for the type of specs being measured.

For example:

- Dist Rx = Dist PD
- Near Rx = Near PD

Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)



Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)

- At this point, you should have the **OCs** of the specs dotted (using the lensometer) and you should have the patient's **PD**.

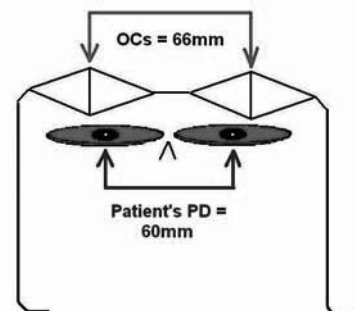
COMPARE THE TWO!

- If the patient's PD is 50 and the Optical Centers (OCs) are at 51, you do not have any horizontal prism worth measuring.

WooHoo!

Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)

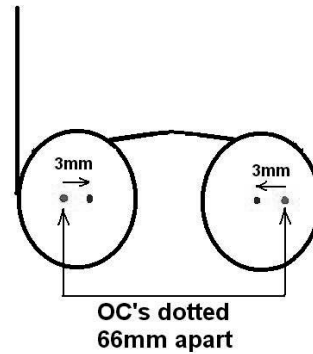
- If the OCs & the PD are **off by 2.5mm or more**, check for HORIZONTAL PRISM.



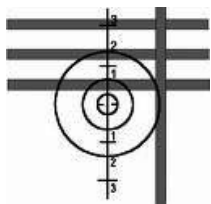
Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)

- If OCs are 66 & Pt PD is 60, there is a difference of 6mm total.
- There are two eyes. So, 6mm divided by 2 = **3mm in each eye.**
- Since your OCs are dotted on the lenses 66mm apart, you will need to measure **INWARD** from that point, **3mm on each lens.** Make a new dot w/your marker here. **THIS IS WHERE THE PT IS LOOKING THROUGH THE SPECS!!!**

Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)



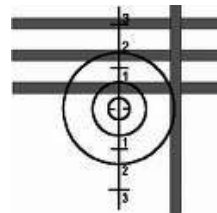
Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)



NOTE: This is the **RIGHT** (OD) Lens

- Center the new dot you made on the specs, in the lensometer, starting with the right (OD) lens.
- Now look inside the eyepiece.
- You see this image...
- How much **HORIZONTAL** prism is there? What **direction** is it going?

Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)



Since this is the **RIGHT** lens, you are seeing:
2 Δ of BASE IN (BI) prism
(Note: Disregard UP or DOWN prism at this point)

Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)

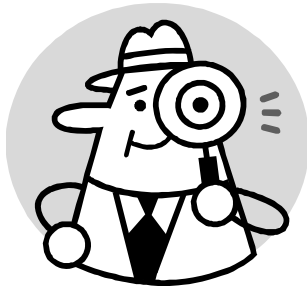
- Now repeat this for the LEFT lens and see what you get there.
- Once you find the prism amount in each eye, you can figure out what your **TOTAL PRISM** amount is for that pair of specs.
- If you had **2 Δ BI** prism in **each eye**, you would have a **TOTAL of 4 Δ BI**

What if you had **2 Δ BI** (OD) and **2 Δ BO** (OS)?
What would your TOTAL prismatic effect be?

Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear (cont.)

- **ZERO!**
- If one eye was **BI** and the other was the exact same amount **BO**, you have effectively done **NOTHING** (prismatically speaking). They cancel each other out.
 - NOTE: Some optometrists will actually prescribe this and it is called “YOKED PRISM” and it seems to help some patients perceive the world better. Go figure...

Identify & Resolve Classic Problem
Areas in Prism Detection



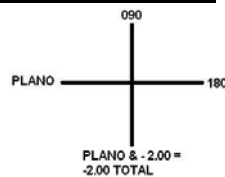
Identify & Resolve Classic Problem
Areas in Prism Detection (cont.)

- **PROBLEM:** Moving the lens table after centering strongest lens, when looking for VERTICAL PRISM
– **SOLUTION:** Don't move the lens table when moving to the other (weaker) lens!
- **PROBLEM:** Mismeasuring OCs or PD
– **SOLUTION:** Get someone to double check your measurements until you build confidence.
- **PROBLEM:** Can't seem to center lens!
– **SOLUTION:** Understand that some lenses can have power in only ONE meridian. If you are trying to center the lens on the meridian with NO power, you will drive yourself to distraction! (But, no power means no prism©)

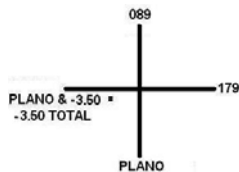
Identify & Resolve Classic Problem
Areas in Prism Detection (cont.)

- Assume the specs have an Rx of:

OD: PL -2.00 X 180
(can also be written:
-2.00 +2.00 X 090)



OS: PL -3.50 X 089
(can also be written:
-3.50 +3.50 X 179)



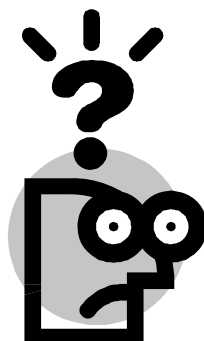
Identify & Resolve Classic Problem
Areas in Prism Detection (cont.)

- **PROBLEM:** You identify the correct amount of prism & the correct direction for each lens, but you are miscalculating the TOTAL prismatic effect when you add OD & OS prism together
– **SOLUTION:**
 - **Vertical** is easy. Center the strongest lens. Then move to the weaker lens. Do NOT move the lens table. Whatever amount of VERTICAL prism you see = the total amount.
 - **Horizontal** prism requires an understanding that BI Δ in one lens will cancel out BO Δ in the other lens (and vice-versa). Let's look at some examples...

Identify & Resolve Classic Problem
Areas in Prism Detection (cont.)

- You find the OD lens has 3.5 Δ BO
- You find the OS lens has 2.0 Δ BI

WHAT IS THE TOTAL?



Identify & Resolve Classic Problem
Areas in Prism Detection (cont.)

- **THE TOTAL PRISMATIC EFFECT is:**
1.5 Δ BO
- Assuming you didn't ask for ANY prism in the specs, is this within ANSI tolerances?

NO!

- ANSI only allows up to 0.66D of unwanted prism HORIZONTALLY...



Identify & Resolve Classic Problem Areas in Prism Detection (cont.)

Let's do another:

- You find the OD lens has **0.50 Δ BI**
- You find the OS lens has **0.75 Δ BO**

– **WHAT IS THE TOTAL?**

– **ASSUMING** the doctor Rx'd a total of **1 Δ BO** for the specs, is this acceptable?

Identify & Resolve Classic Problem Areas in Prism Detection (cont.)

THE TOTAL PRISMATIC EFFECT was:

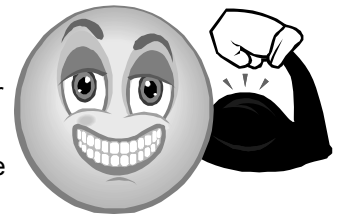
0.25 Δ BO

- Since the doctor Rx'd **1.00 Δ BO**, these are off by **0.75 Δ**
- These would be outside ANSI acceptable standards.



In summary, you learned how to...

- Identify & Quantify Wanted and Unwanted Prism in Fabricated Eyewear
- Identify and Resolve Classic Problem Areas in Prism Detection



THANK YOU FOR YOUR TIME!

- If you **liked** what was presented, please indicate that on your evaluation cards!
- If you did **NOT** like what you were presented, please tell us personally so we can hear what we could do better in the future.



Sincerely,

M. Patrick COLEMAN, Brent SONNIER, and Don MURPHY

