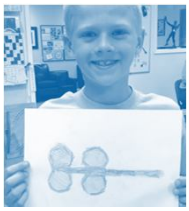


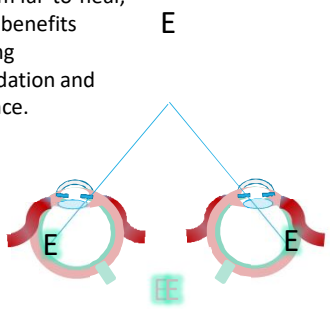
The Near Triad

AC/A AND CA/C

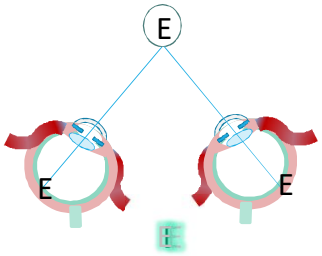
JEN SIMONSON, OD, FCOVD

The AC/A

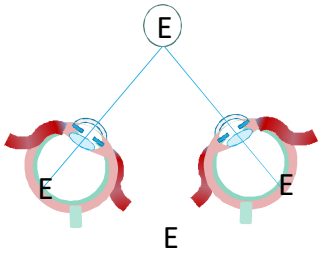
Normally when a target moves from far-to-near, our vision benefits from linking accommodation and convergence.



1. Our eyes accommodate to see clearly at near.
2. The accommodation also drives convergence to see single vision at near.

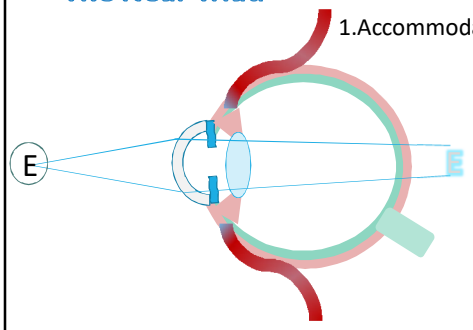


The amount of accommodative convergence (AC) driven by the amount of accommodation (A) is called the AC/A ratio.



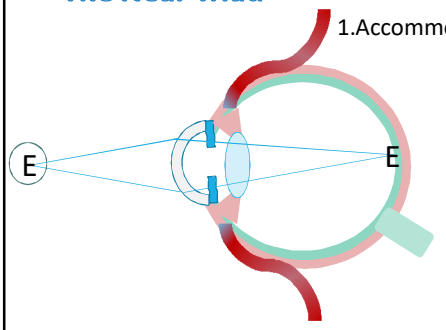
The Near Triad

1.Accommodation



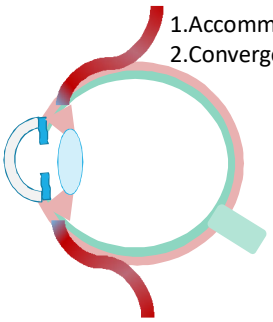
The Near Triad

1.Accommodation



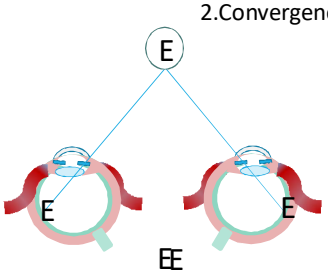
The Near Triad

1.Accommodation
2.Convergence



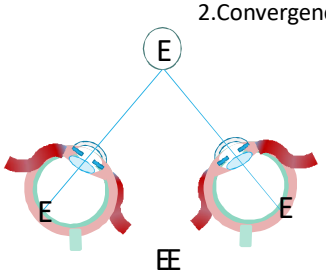
The Near Triad

1.Accommodation
2.Convergence

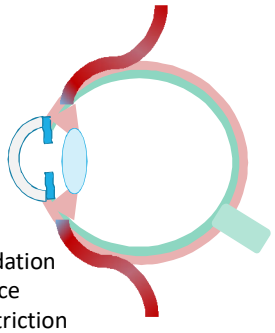


The Near Triad

1.Accommodation
2.Convergence



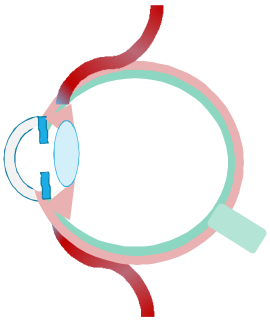
The Near Triad



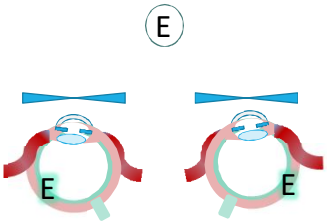
1.Accommodation
2.Convergence
3.Pupil Constriction

The Near Triad

All three neuro-muscular responses occur with a stimulus moving from far to near.

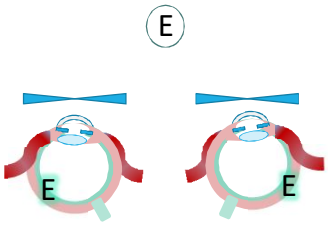


How does the visual system respond to a minus lens?



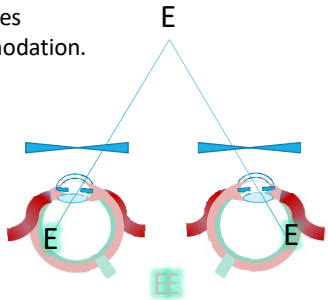
Minus Lens

Minus lenses stimulate accommodation. Through the AC/A, the eyes reflexively converge. This creates the situation where our eyes must adjust by diverging to keep the image clear and single.



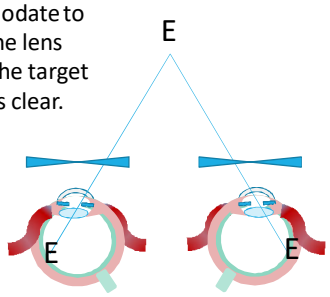
Minus Lens

Step 1: Minus lenses cause defocus, which stimulates accommodation.



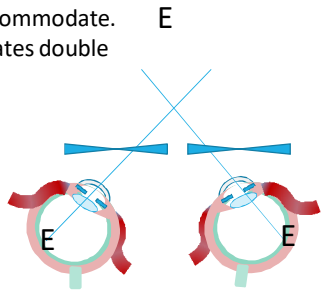
Minus Lens

When the eyes accommodate to match the lens power, the target becomes clear.



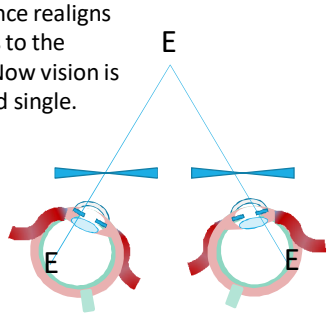
Minus Lens

Step 2: Convergence is stimulated when the eyes accommodate. This creates double vision.



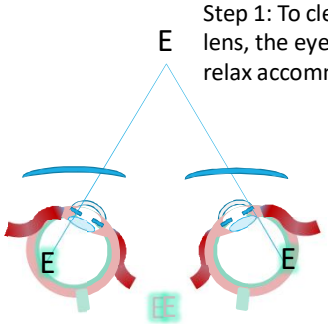
Minus Lens EE

Step 3: Fusional Divergence realigns the eyes to the image. Now vision is clear and single.



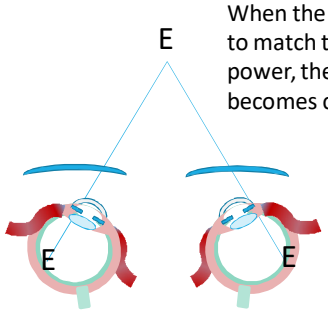
Minus Lens E

Step 1: To clear a plus lens, the eyes must relax accommodation.



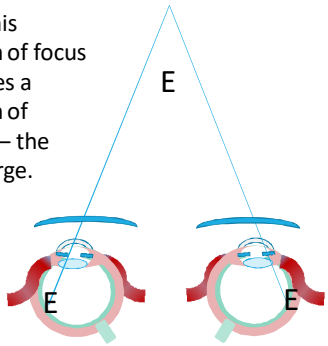
Plus Lenses

When the eyes adjust to match the lens power, the target becomes clear.



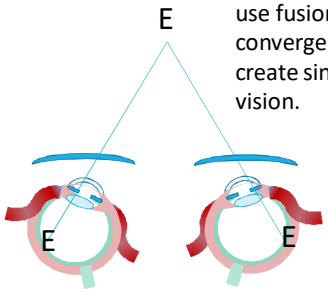
Plus Lenses

Step 2: This relaxation of focus also causes a relaxation of vergence – the eyes diverge.



Plus Lenses

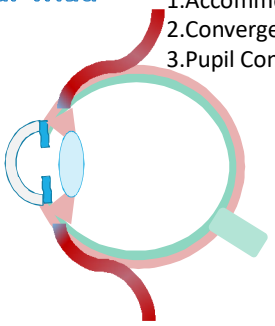
Step 3: We must use fusional convergence to create single vision.



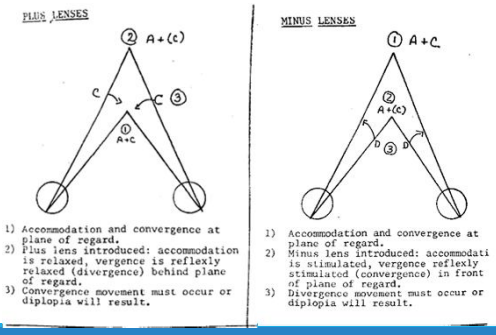
Plus Lenses

The Near Triad

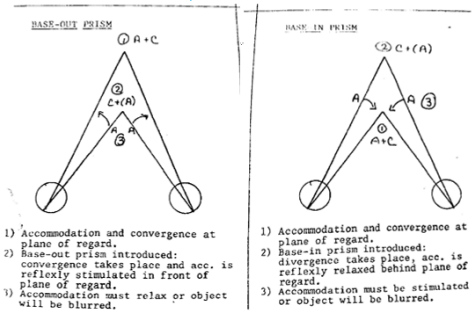
1. Accommodation
2. Convergence
3. Pupil Constriction



The work of Linda Sanet, COVT:

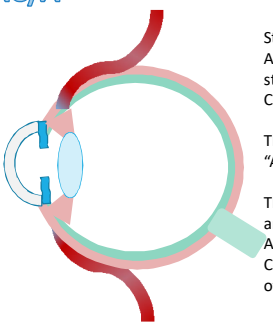


The work of Linda Sanet, COVT:



The AC/A

E



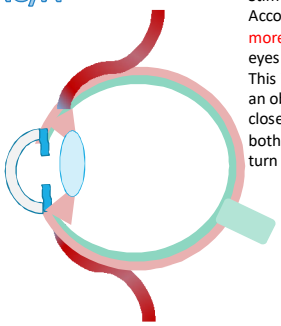
Stimulating Accommodation also stimulates Convergence.

This is called the "AC/A"

The AC/A is the amount of Accommodative Convergence per unit of Accommodation.

The AC/A

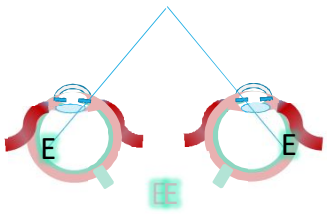
E



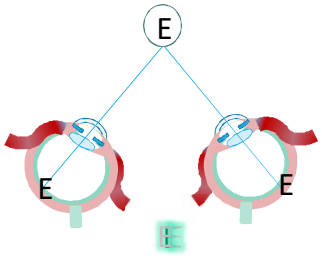
Stimulating Accommodation more makes the eyes converge more. This is because when an object moves closer, the eye has to both focus more and turn in more.

The AC/A

E

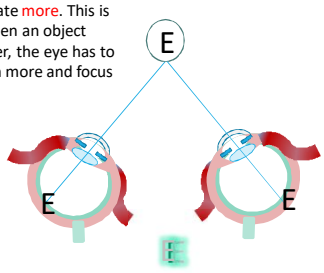


The AC/A



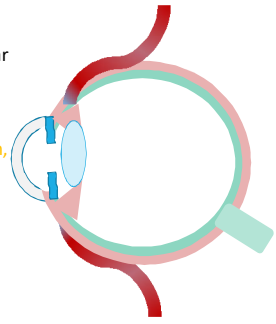
The CA/C

Stimulating Convergence more makes the eyes accommodate more. This is because when an object moves closer, the eye has to both turn in more and focus more.

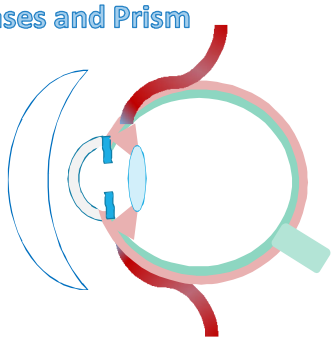


The Near Triad

When an object moves from near to far, the response is relaxed accommodation, divergence and pupil dilation.

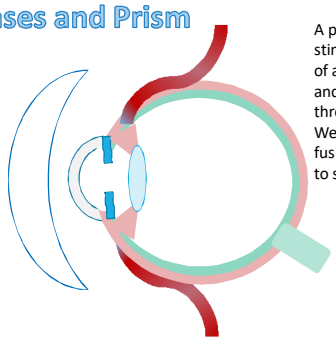


Lenses and Prism



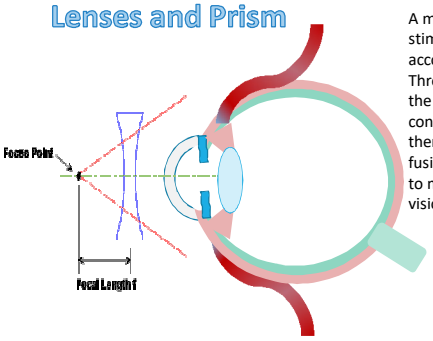
When we add a lens or prism in front of the eye, we still respond as if the target moved closer or further away. We must then make an adjustment to see clear and single vision.

Lenses and Prism



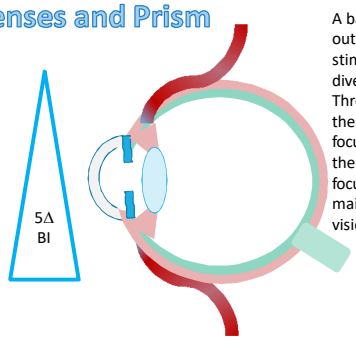
A plus lens will stimulate relaxation of accommodation and divergence through the AC/A. We must then use fusional convergence to see single vision.

Lenses and Prism



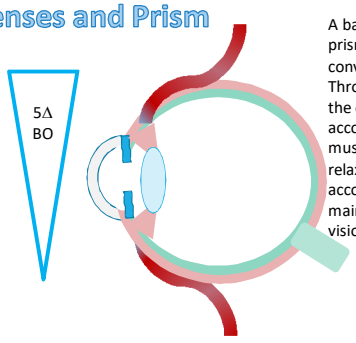
A minus lens stimulates accommodation. Through the AC/A, the eye also converges. We must then adjust by fusional divergence to maintain single vision.

Lenses and Prism



A base-in (apex-out) prism stimulates divergence. Through the CA/C, the eye also relaxes focus. We must then adjust by focusing to maintain clear vision.

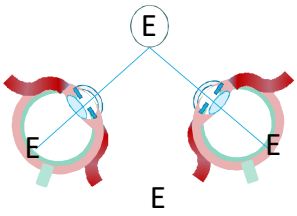
Lenses and Prism



A base-out (apex-in) prism stimulates convergence. Through the CA/C, the eye also accommodates. We must then adjust by relaxing accommodation to maintain clear vision.

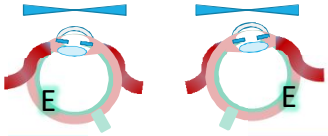
The AC/A and the CA/C

The more you accommodate (focus), the more the eyes converge. The more you converge, the more your eyes focus.

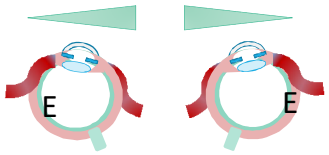


How lenses and prisms affect eye alignment and focus:

Plus and Minus lenses cause defocus – the first eye response will be to clear the image. The second response is reflexive, the vergence will change. Lastly the eyes will have to realign.

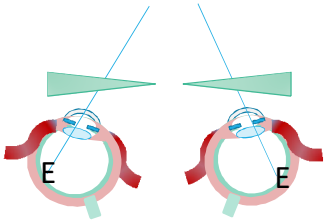


How lenses and prisms affect eye alignment and focus:



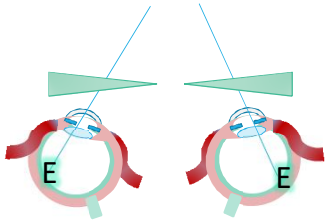
Base-in and Base-out prisms cause disparity – the first eye response will be to fuse the image. The second response is reflexive, the focus will change. Lastly the eyes will have to refocus.

How does the visual system respond to a Base-out Prism?



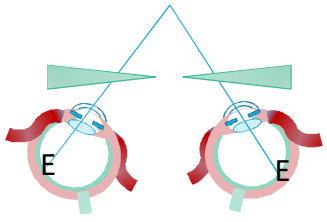
Base-Out Prism

Option #1 – it does NOT respond. The image is blurry and double.

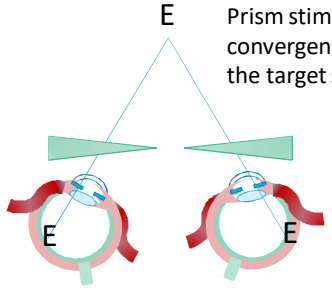


Base-Out Prism

Base-Out Prism stimulate convergence. Through the CA/C, the eyes reflexively accommodate. This creates the situation where our eyes must adjust by relaxing focus to keep the image clear and single.



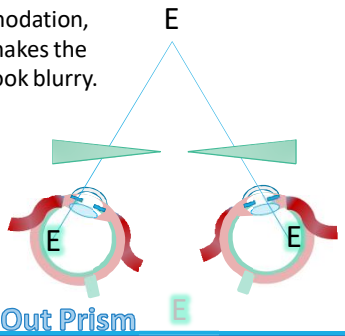
Base-Out Prism



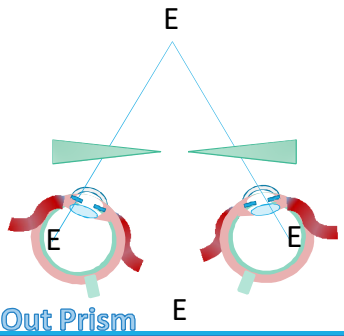
Step 1: Base-out Prism stimulates convergence to keep the target single.

Base-Out Prism

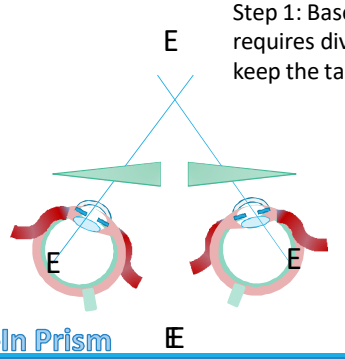
Step 2: Convergence stimulates accommodation, which makes the target look blurry.



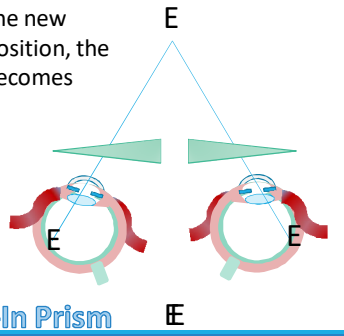
Step 3: The eyes must relax focus to clear the image.



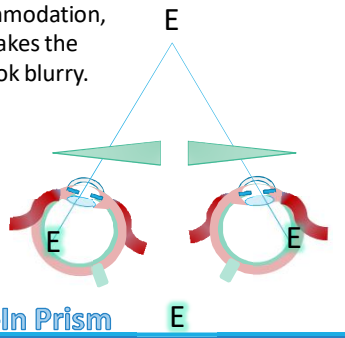
Step 1: Base-in Prism requires divergence to keep the target single.



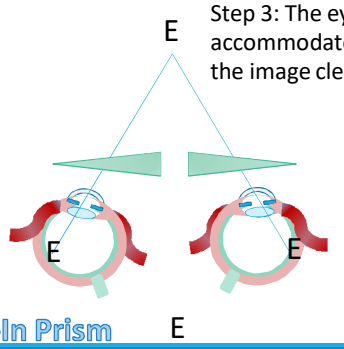
When the eyes divergence to match the new image position, the target becomes single.



Step 2: Divergence creates a relaxation of accommodation, which makes the target look blurry.

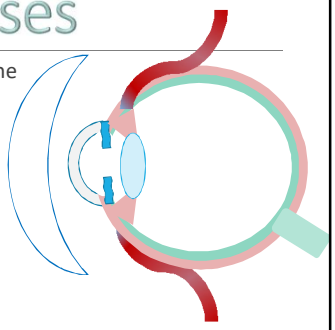


Step 3: The eyes accommodate to make the image clear.



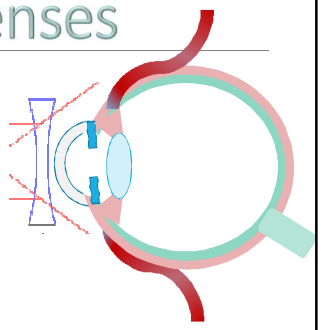
Plus Lenses

1. Relax focus to clear the image.
2. Eyes reflexively diverge.
3. Converge eyes to regain single vision.



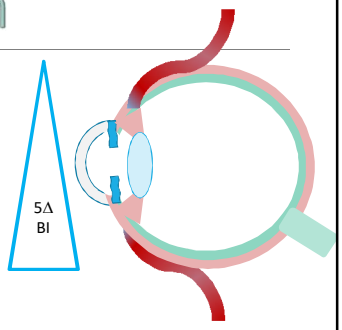
Minus Lenses

1. Increase focus to clear the image.
2. Eyes reflexively converge.
3. Diverge eyes to regain single vision.



BI Prism

1. Diverge to fuse the image.
2. Eyes reflexively relax focus.
3. Accommodate to regain clear vision.



BO Prism

1. Converge to fuse the image.
2. Eyes reflexively focus.
3. Relax accommodation to regain clear vision.