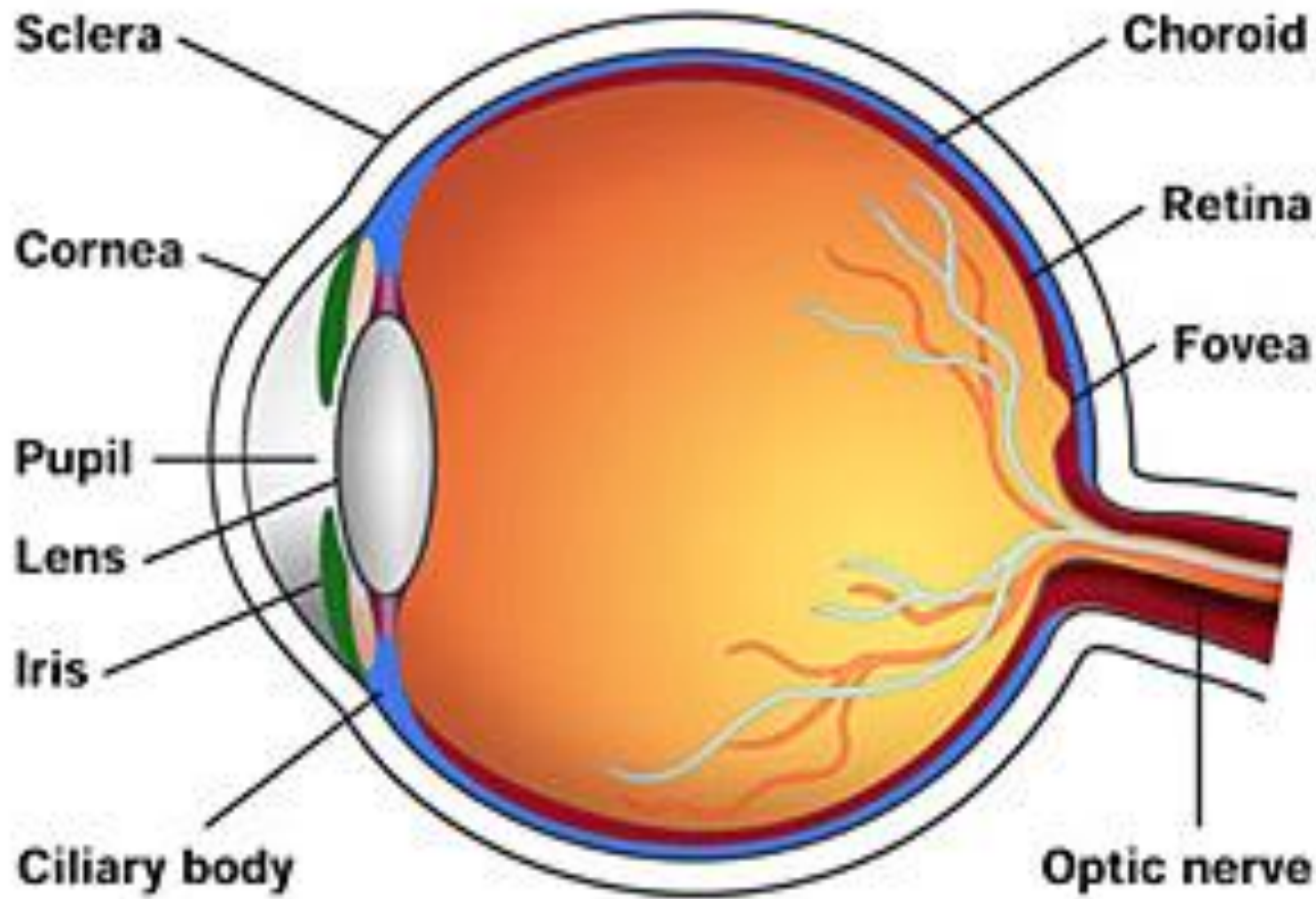
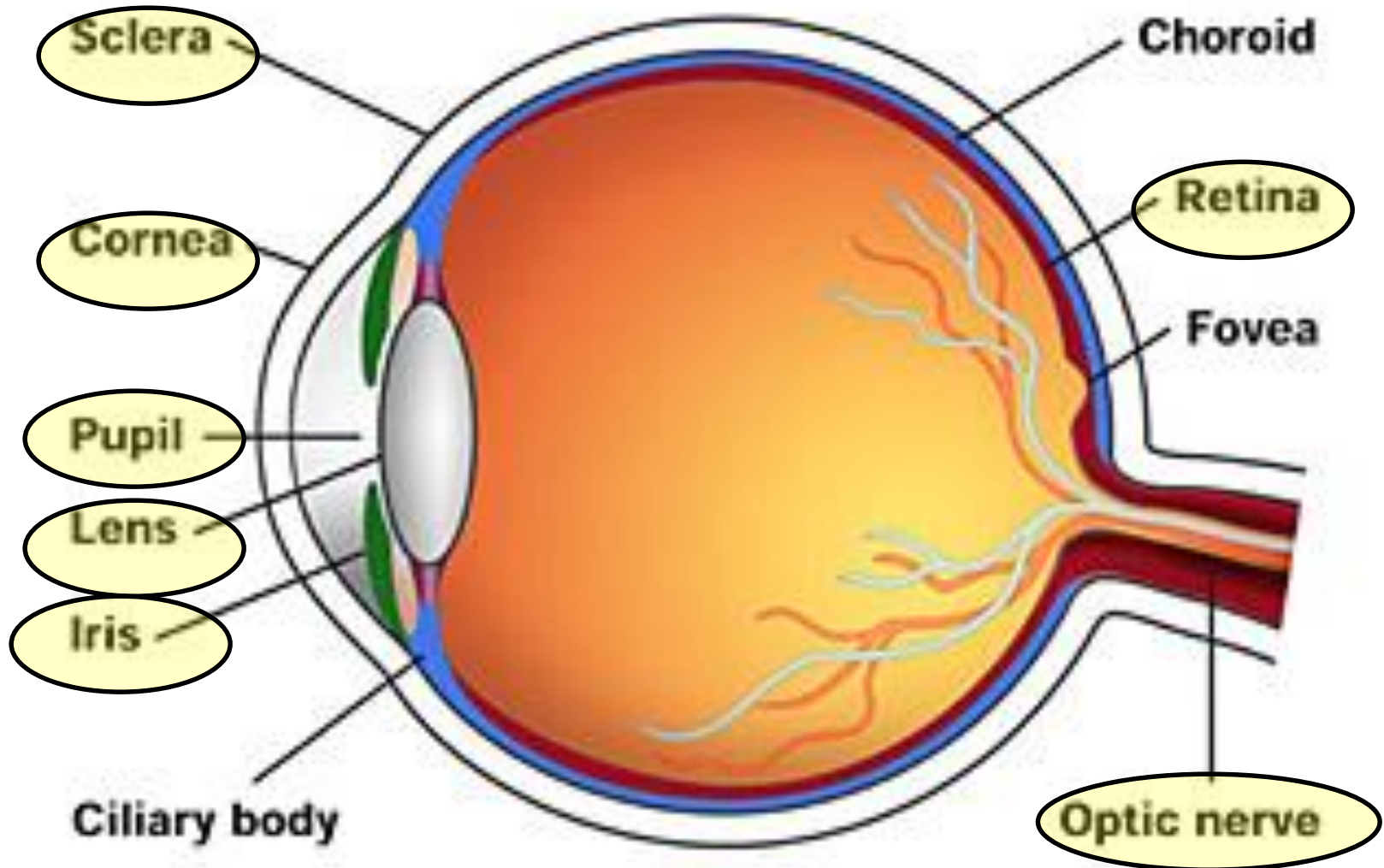


A close-up photograph of a human eye with a light-colored iris. The eye is looking slightly to the right. The eyelids and eyelashes are visible. The text "The Human Eye: Structures" is overlaid in the center of the eye in a yellow, bold, sans-serif font.

# The Human Eye: Structures



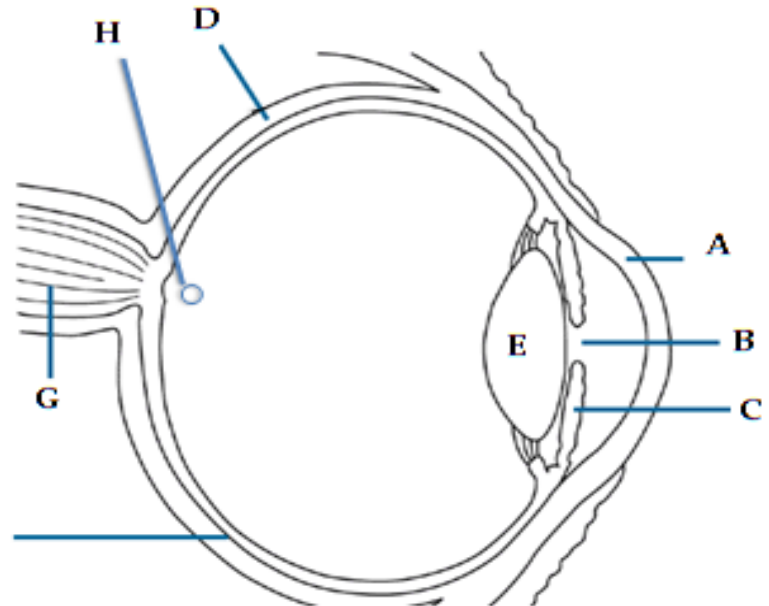
# We will look at the following parts:



# Take notes on this page...

Name: \_\_\_\_\_

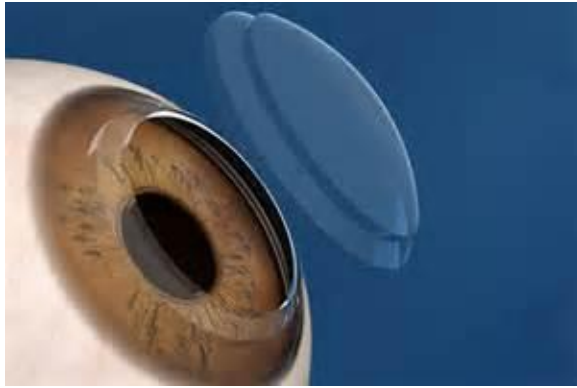
### Structures and Functions of the Eye



The diagram shows a cross-section of the human eye. The following table is provided for labeling the parts and their functions:

	Part	Function
A		
B		
C		
D		
E		
F		
G		
H		

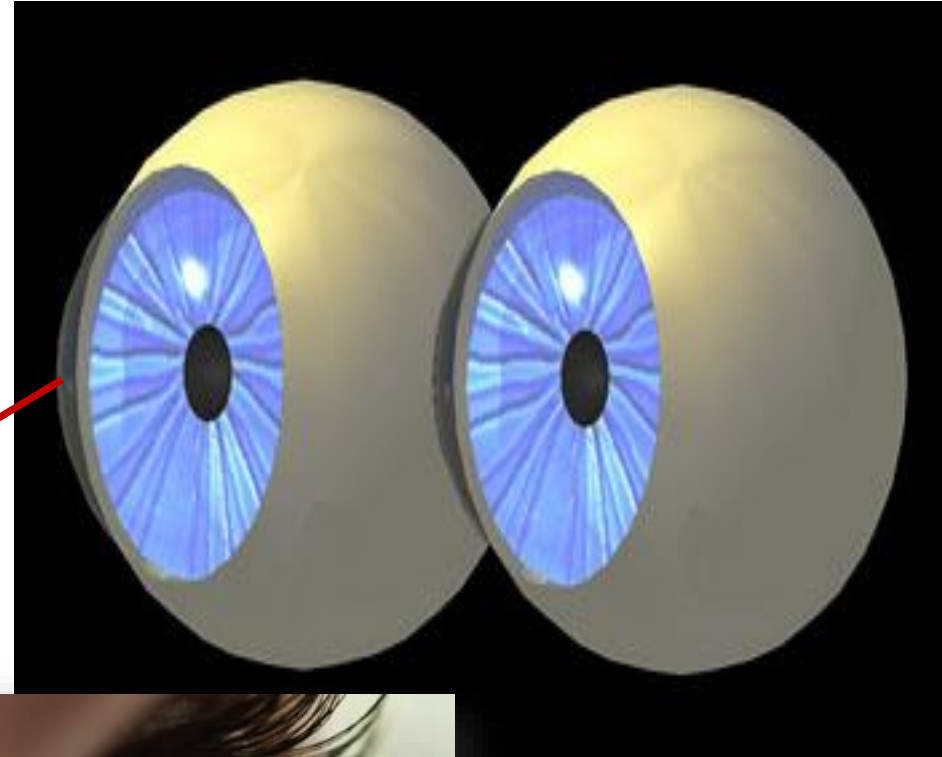
# PARTS: Cornea



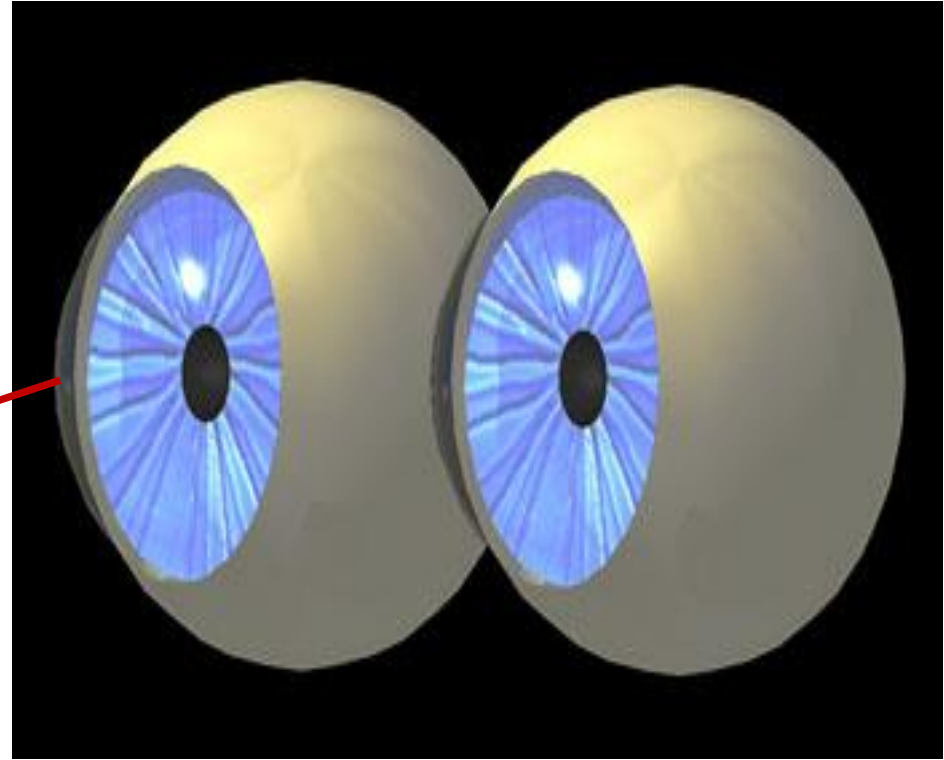
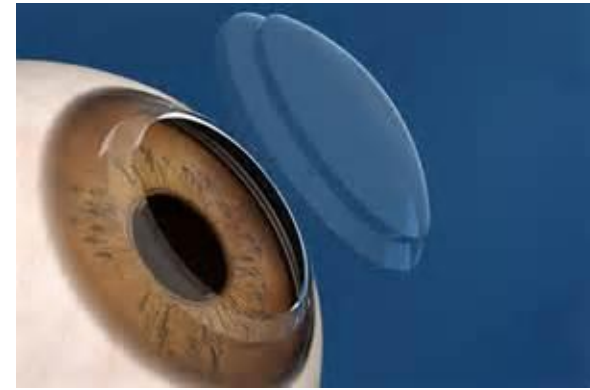
## CORNEA

*(clear lens in front of eye)*

- transparent covering of the front of the eye
- Allows for the passage of light into the eye and functions as a fixed lens.



# FUNCTION of Cornea



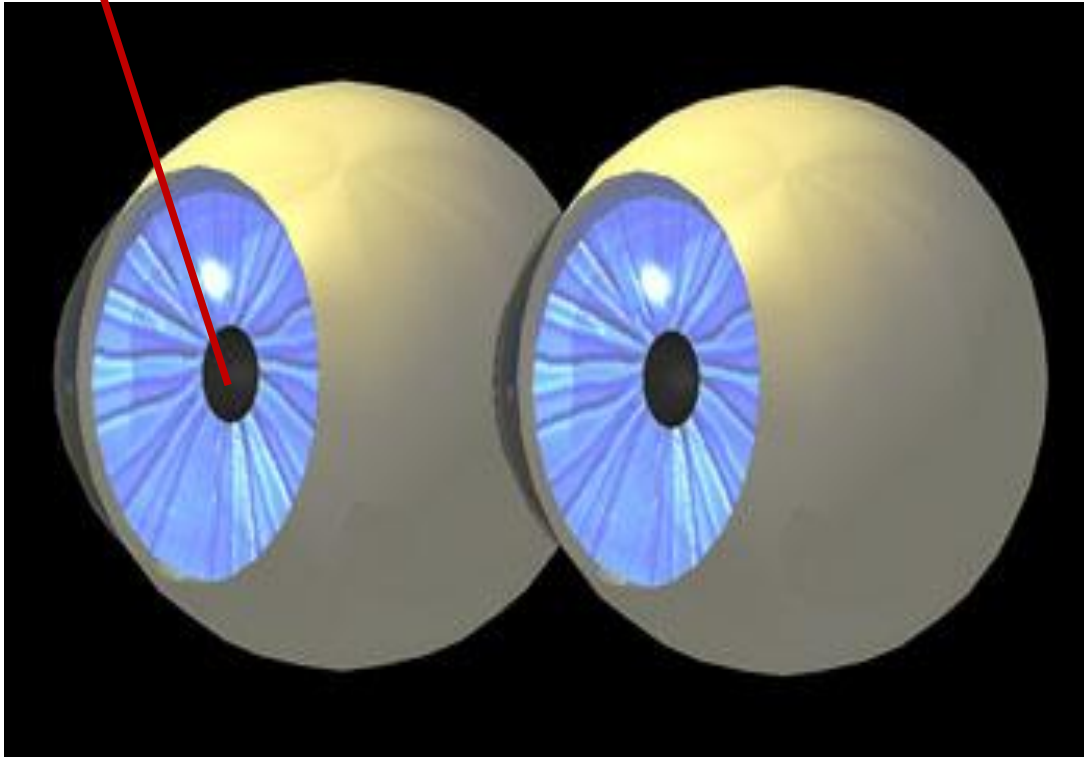
**allows for the passage of light into the eye and it also focuses the light**



# PARTS: Pupil

## PUPIL (*black hole*)

- black hole in iris
- where light enters



Dilated pupil

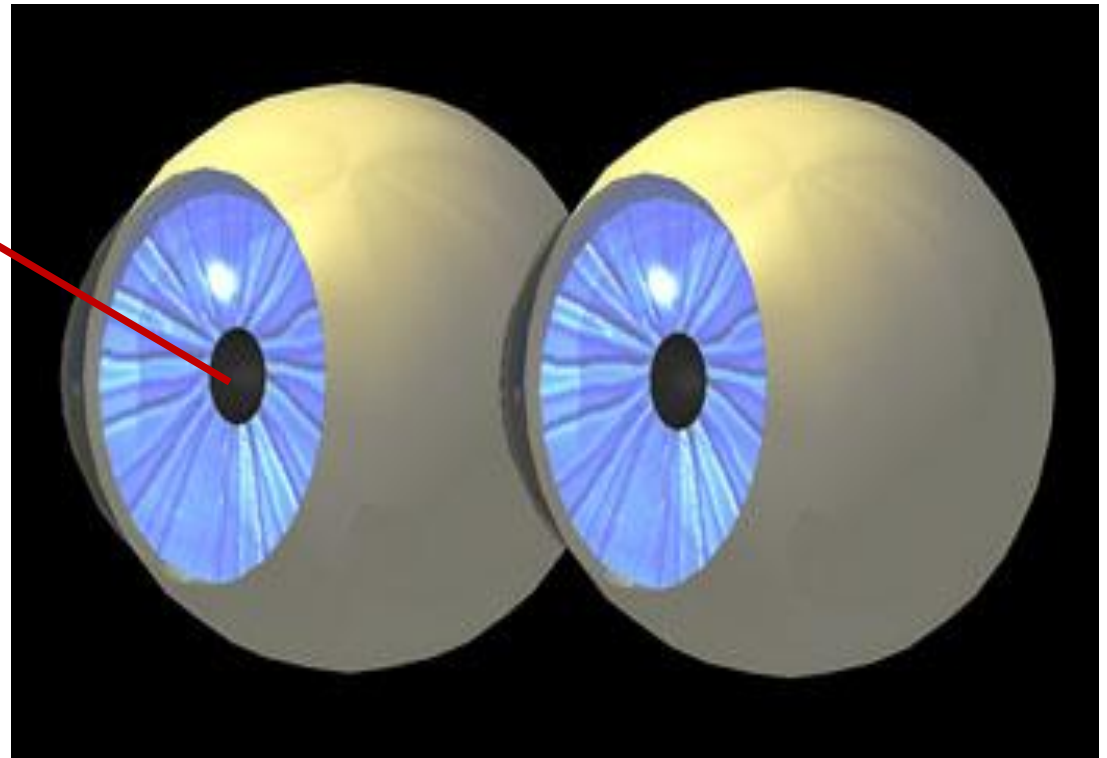
Constricted pupil



Pupil size is controlled by iris muscles

# FUNCTION of Pupil

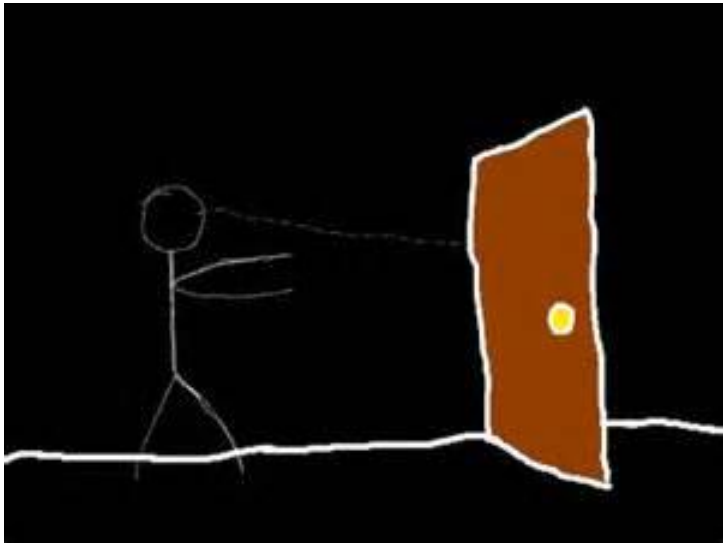
the hole where light enters  
into the eye





# THE EYE: PUPIL

When the eye needs **more light** to enter (when it is dark), **the pupils get larger**; allowing more light to enter the eye



# THE EYE: PUPIL

When the eye needs **less light** to enter (when it is very bright), **the pupils get smaller**; allowing less light to enter the eye

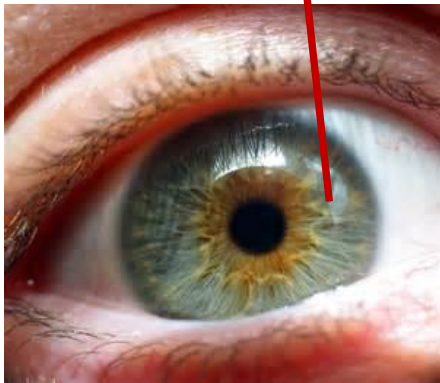
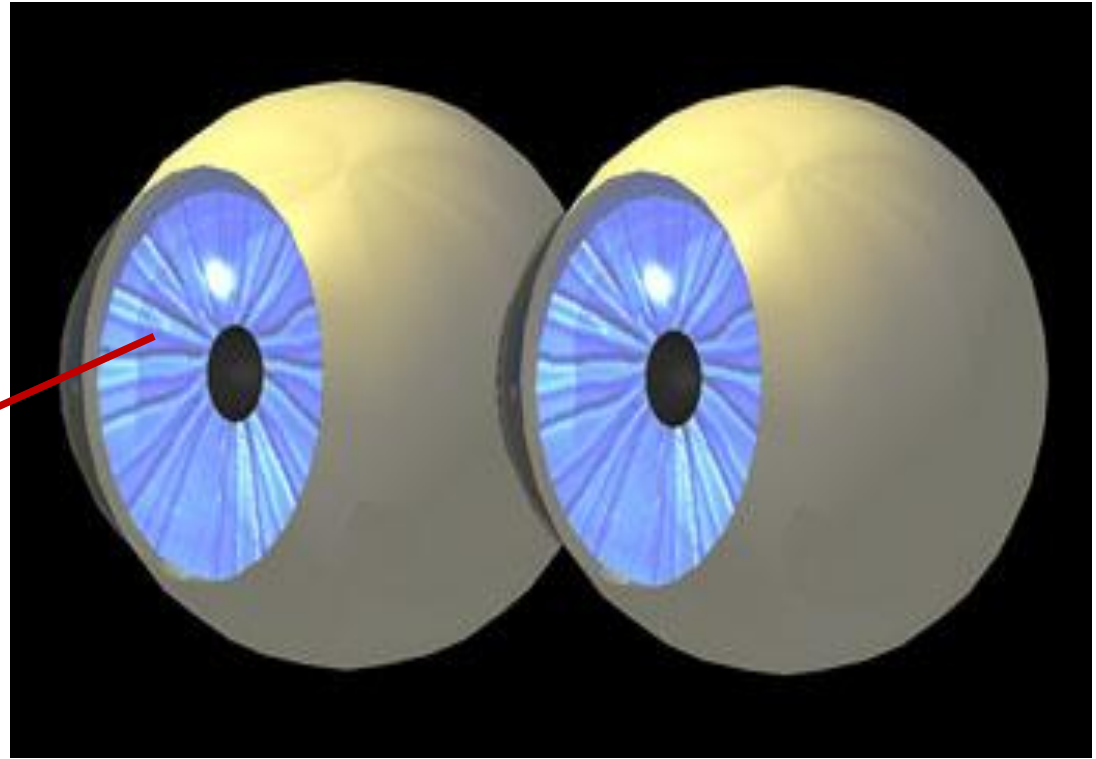


# PARTS: Iris

## IRIS

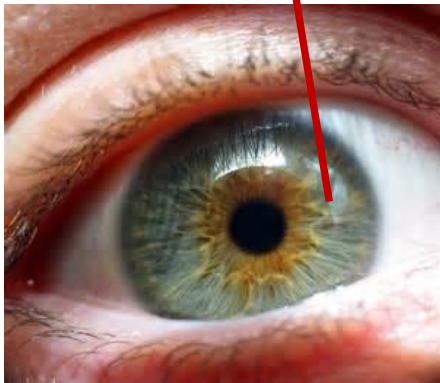
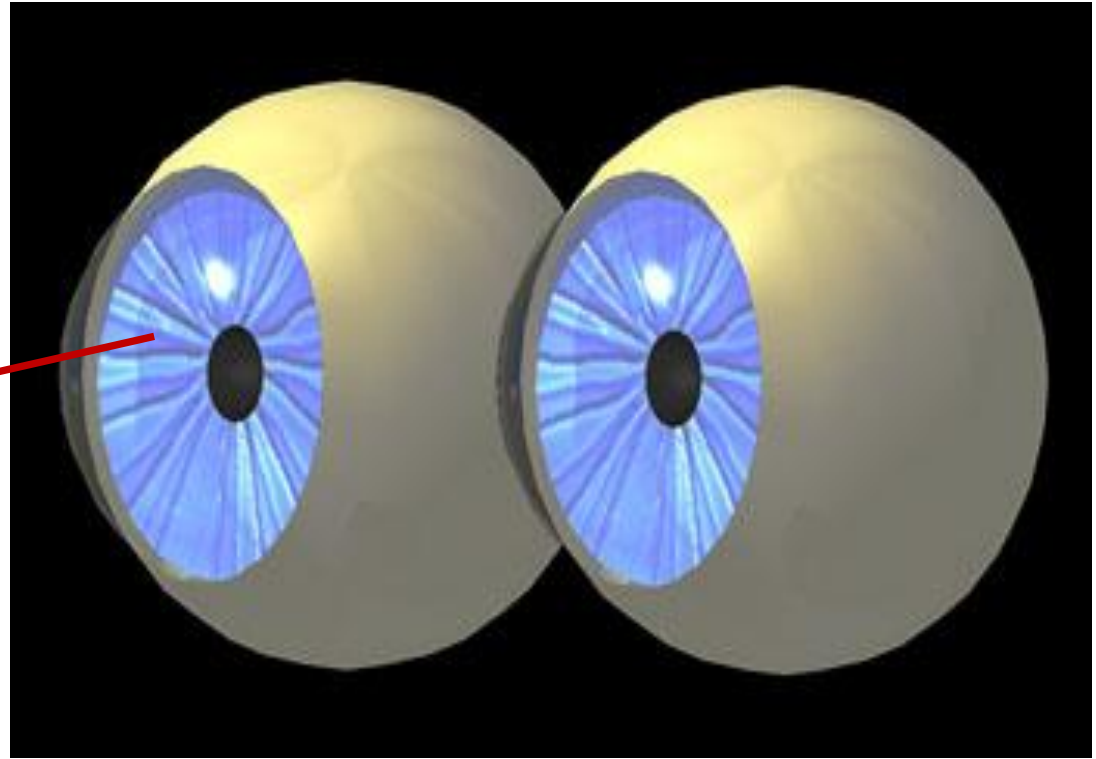
*(colored part)*

- colored part of eye
- controls light entering



The iris is a colored, circular muscle

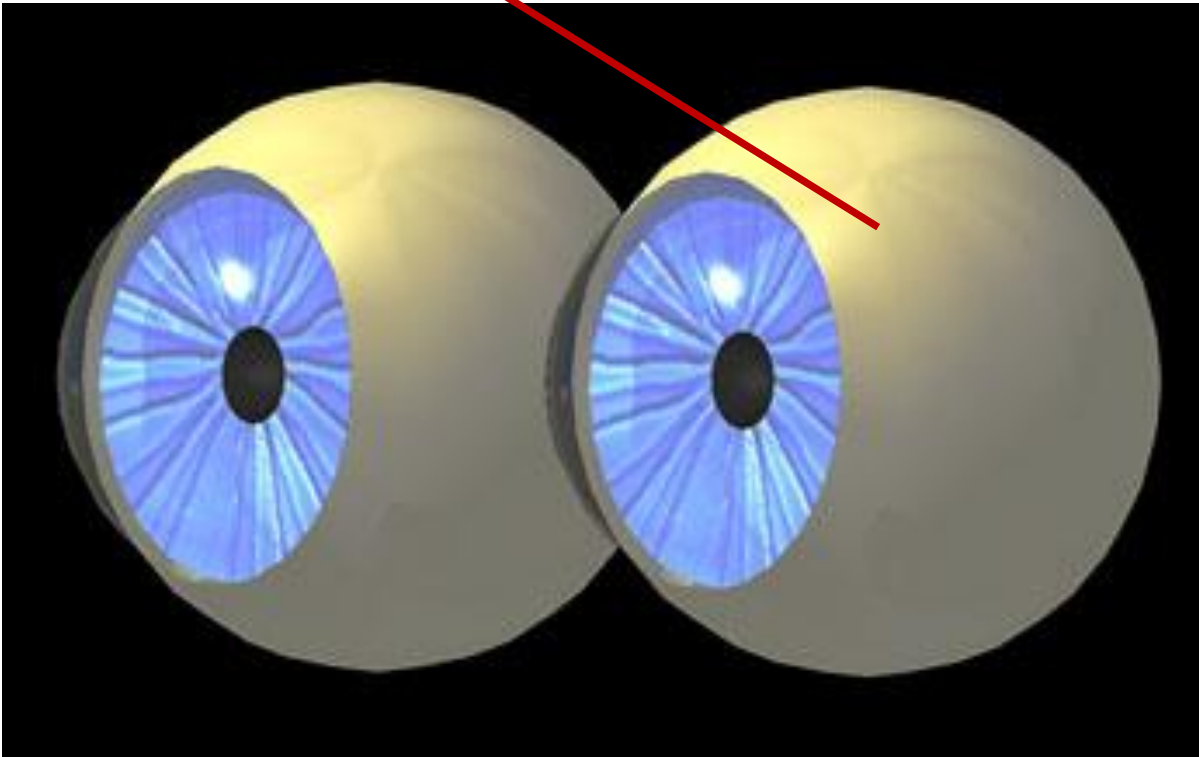
# FUNCTION of Iris



**controls the amount of light entering the eye**

# PARTS: Sclera

**SCLERA** – a tough white skin (made of tissue) that covers all of the eyeball except the cornea.



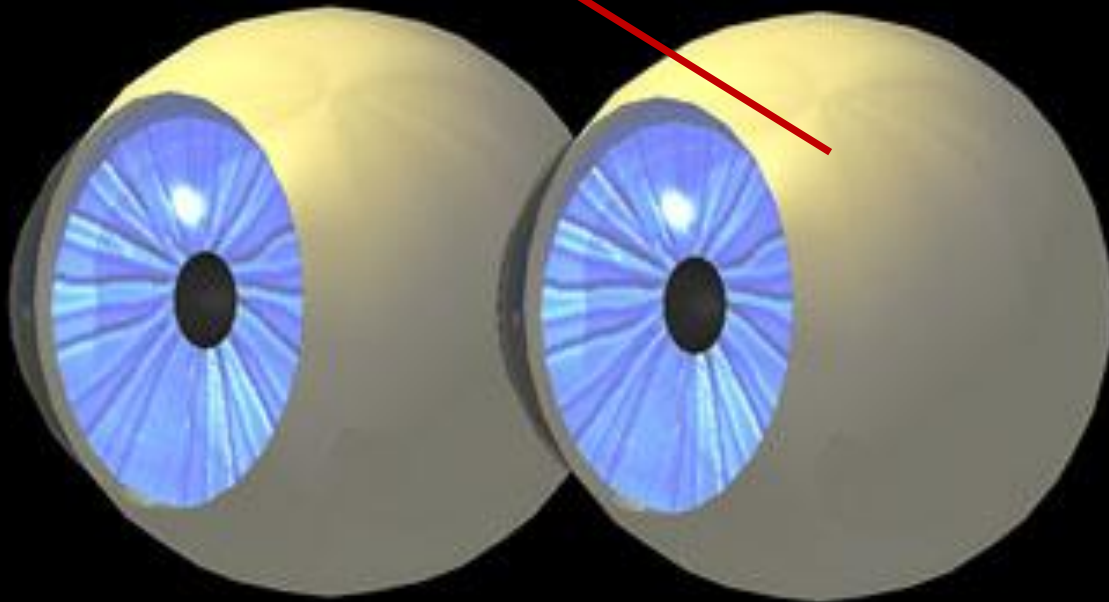
## **SCLERA** *(white part)*

- whites of the eye
- supports eyeball
- provides attachment for muscles

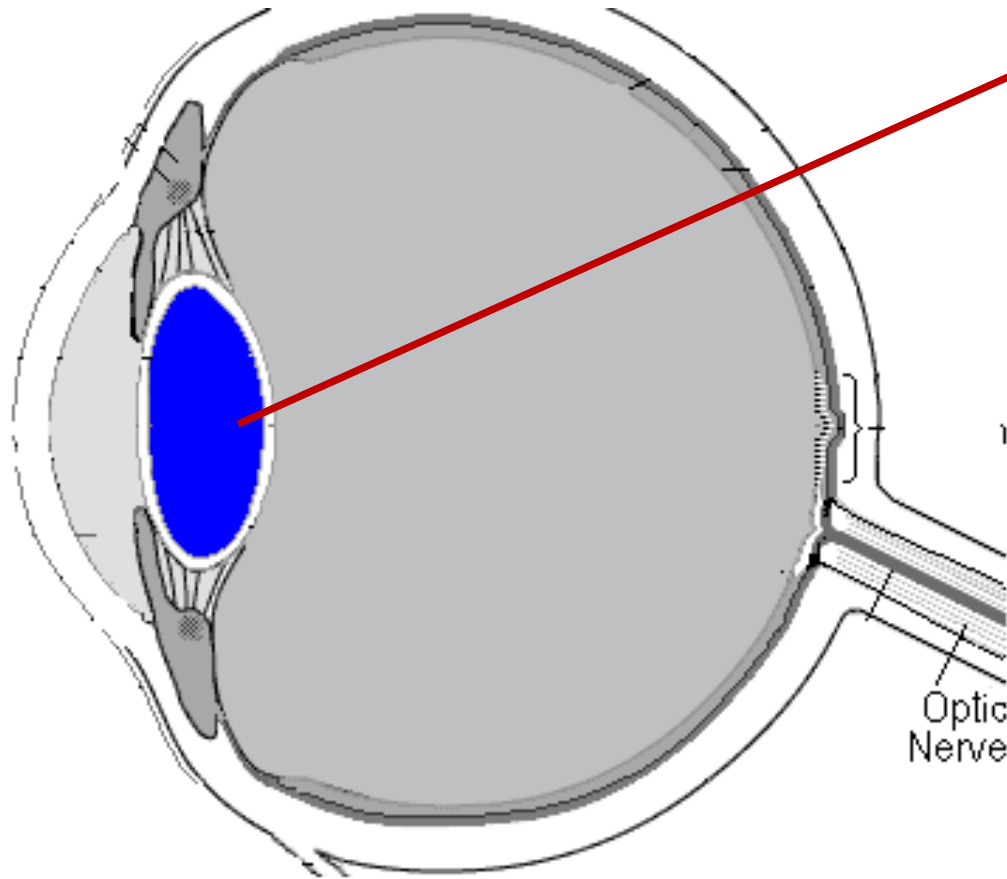
# FUNCTION of Sclera



**supports  
eyeball and  
provides  
attachment  
for muscles**



# PARTS: Lens

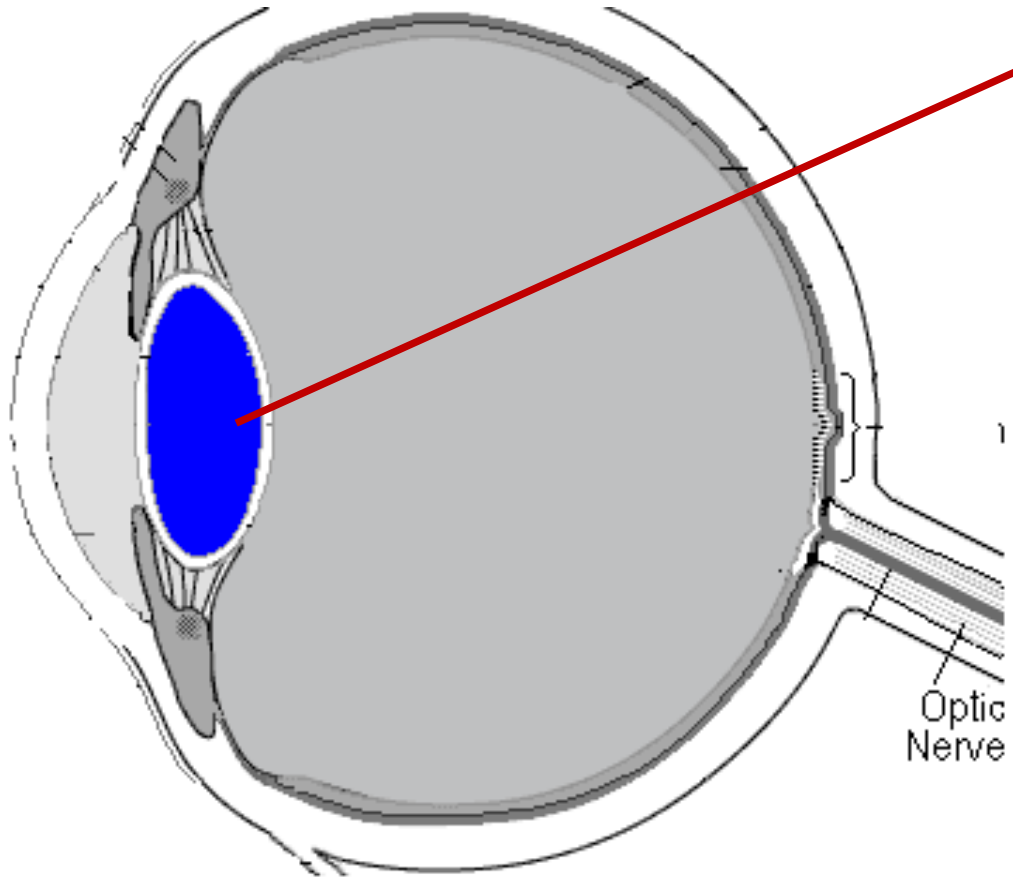


## LENS

*(lens behind pupil)*

- converging lens
- allows us to see objects near and far

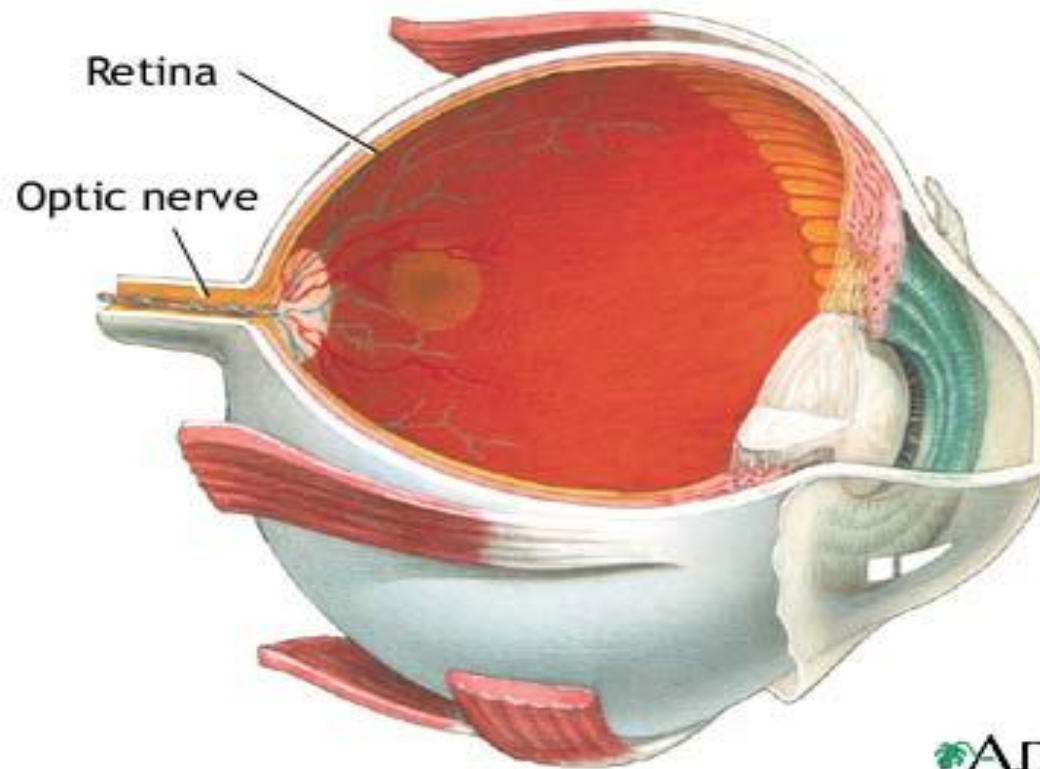
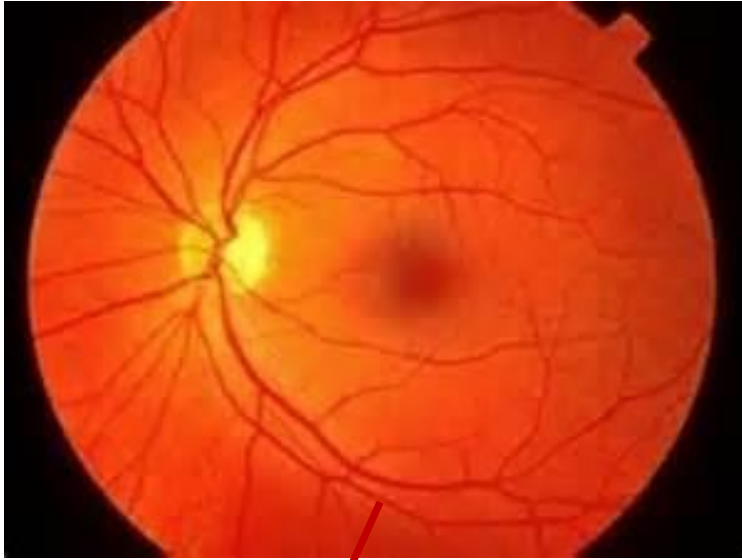
# **FUNCTION of Lens**



**allows us to see  
objects near and  
far**



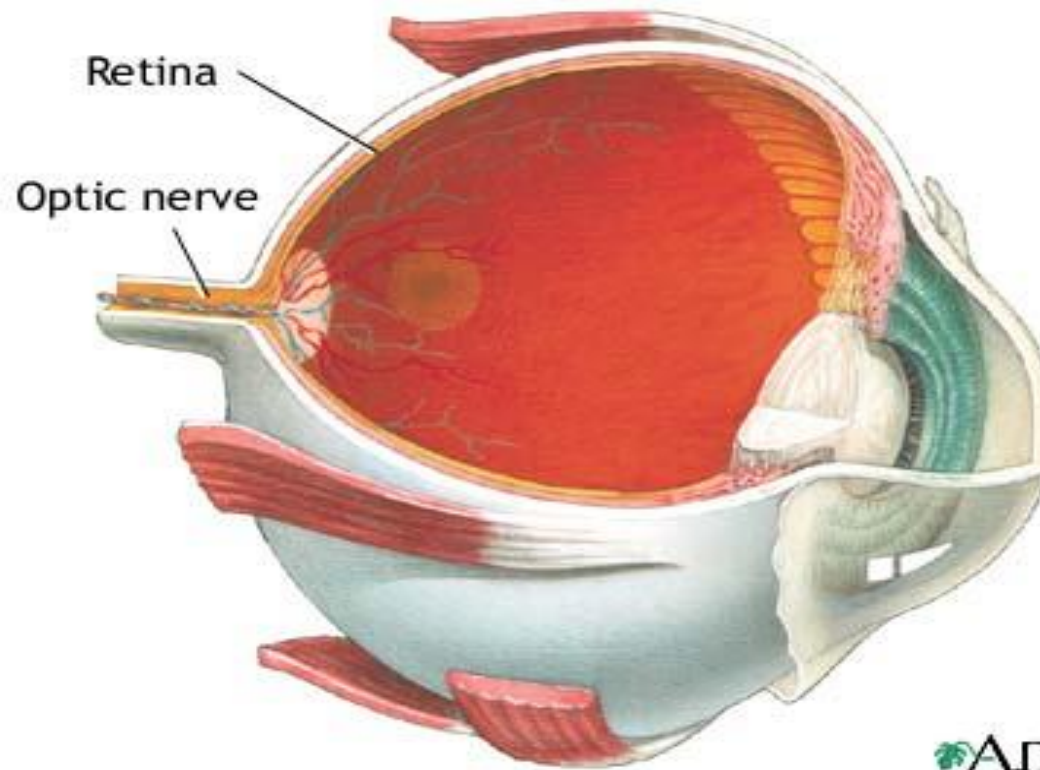
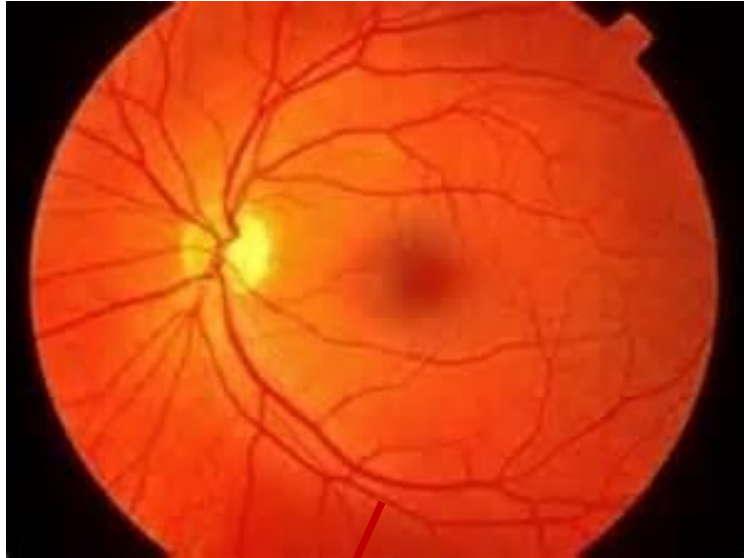
# PARTS: Retina



## RETINA

- internal membrane
- contains light-receptive cells (rods and cones)
- converts light to electrical signals

# **FUNCTION of Retina**

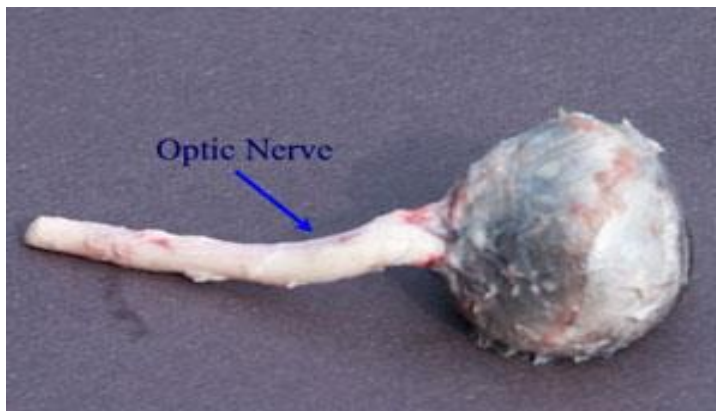
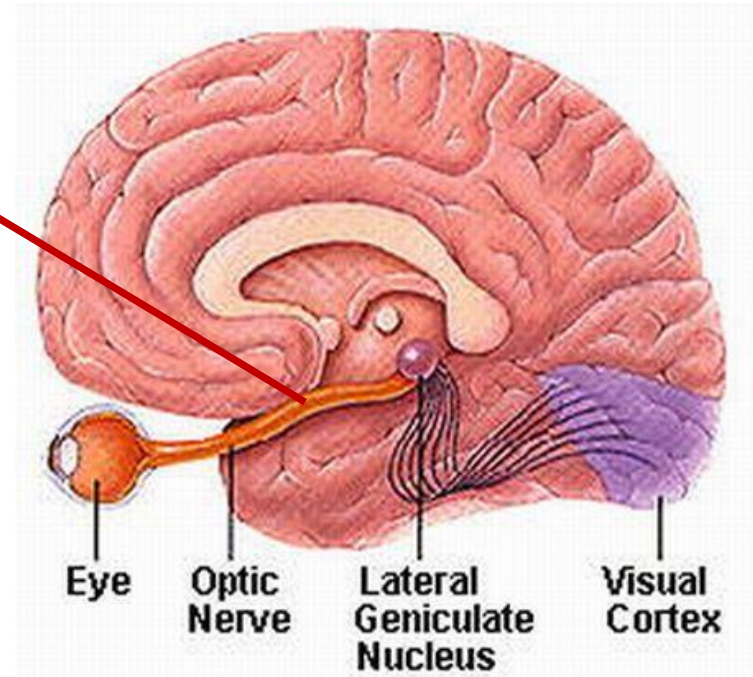


**converts light  
waves to  
electrical signals**

# PARTS: Optic Nerve

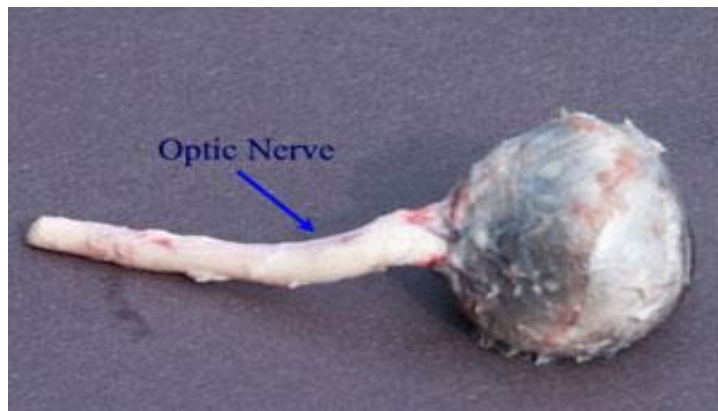
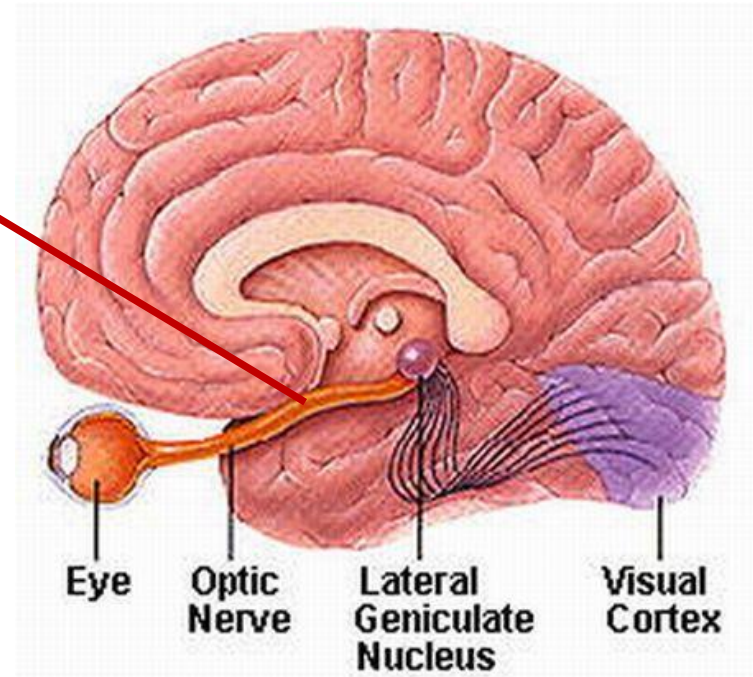
## OPTIC NERVE

- Transmits electrical impulses from retina to the brain
- Creates blind spot
- Brain takes inverted image and flips it so we can see



# FUNCTION of Optic Nerve

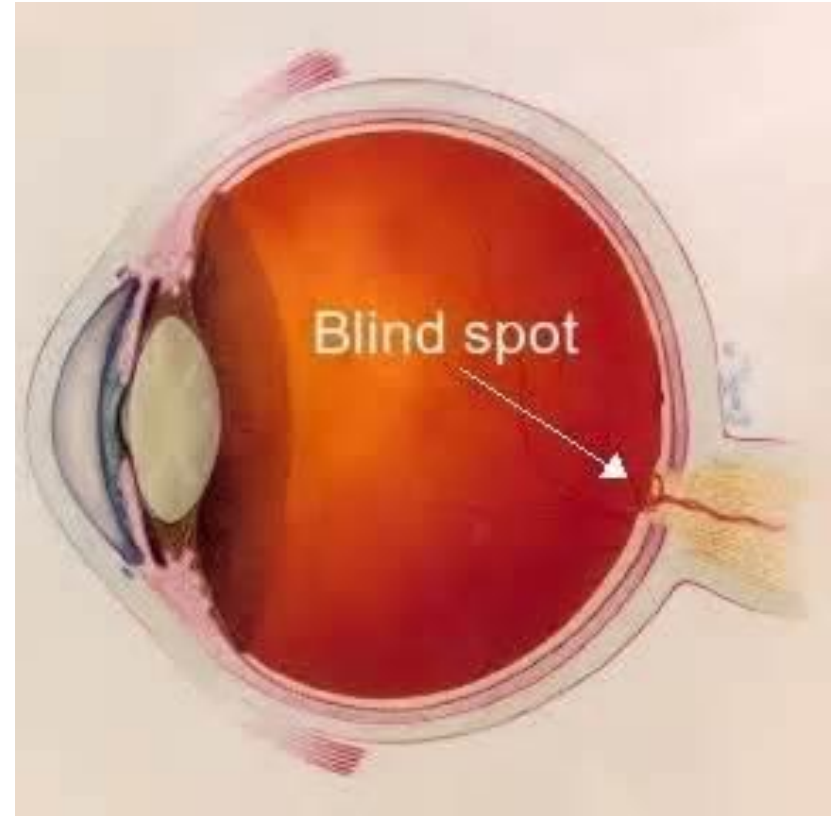
**Transmits electrical signals from retina to the brain**



# PARTS: Blind Spot

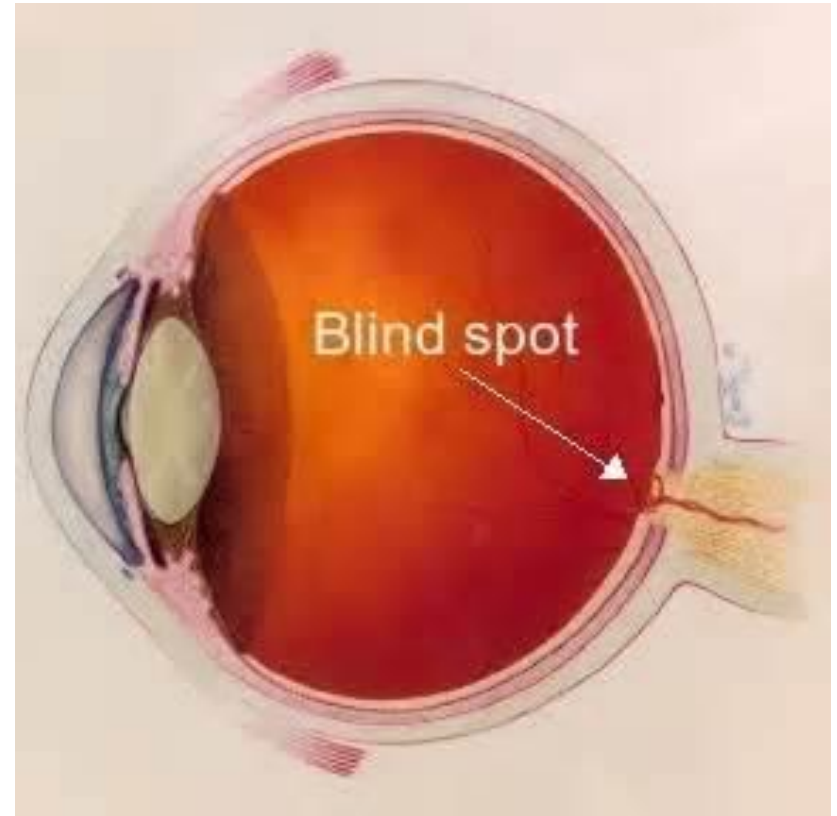
## BLIND SPOT

- On retina where optic nerve leads back into the brain
- No rod or cone cells
- Other eye compensates for this area



# FUNCTION of Blind Spot

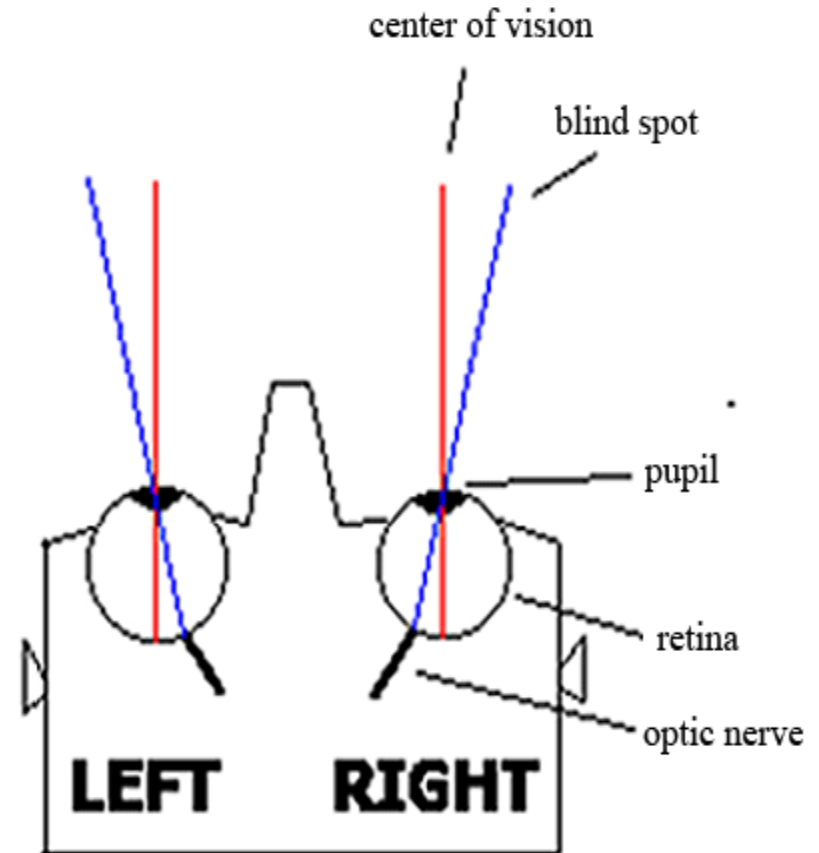
- **Small spot on the back of the retina**
- **Other eye compensates for this area**



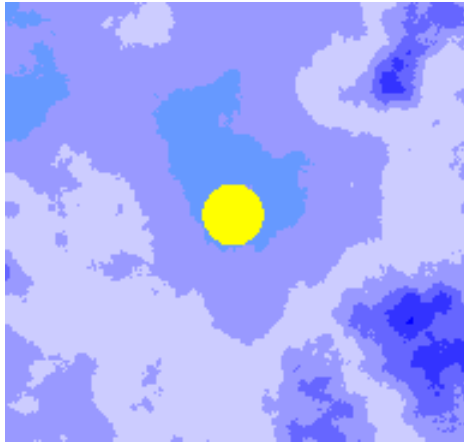
- Try this test to prove you have a blind spot...

# THE EYE: Blind Spot (Fovea)

- On retina where optic nerve leads back into the brain
- No rod or cone cells
- Other eye compensates for this area
- Try this test to prove you have a blind spot...



**PARTS**



1 2 3 4 5 6

## Blind Spot (Optic Disk)

Close your right eye and look directly at the number 3. Can you see the yellow spot in your peripheral vision? Now slowly move towards or away from the screen. At some point, the yellow spot will disappear.



# The Human Eye

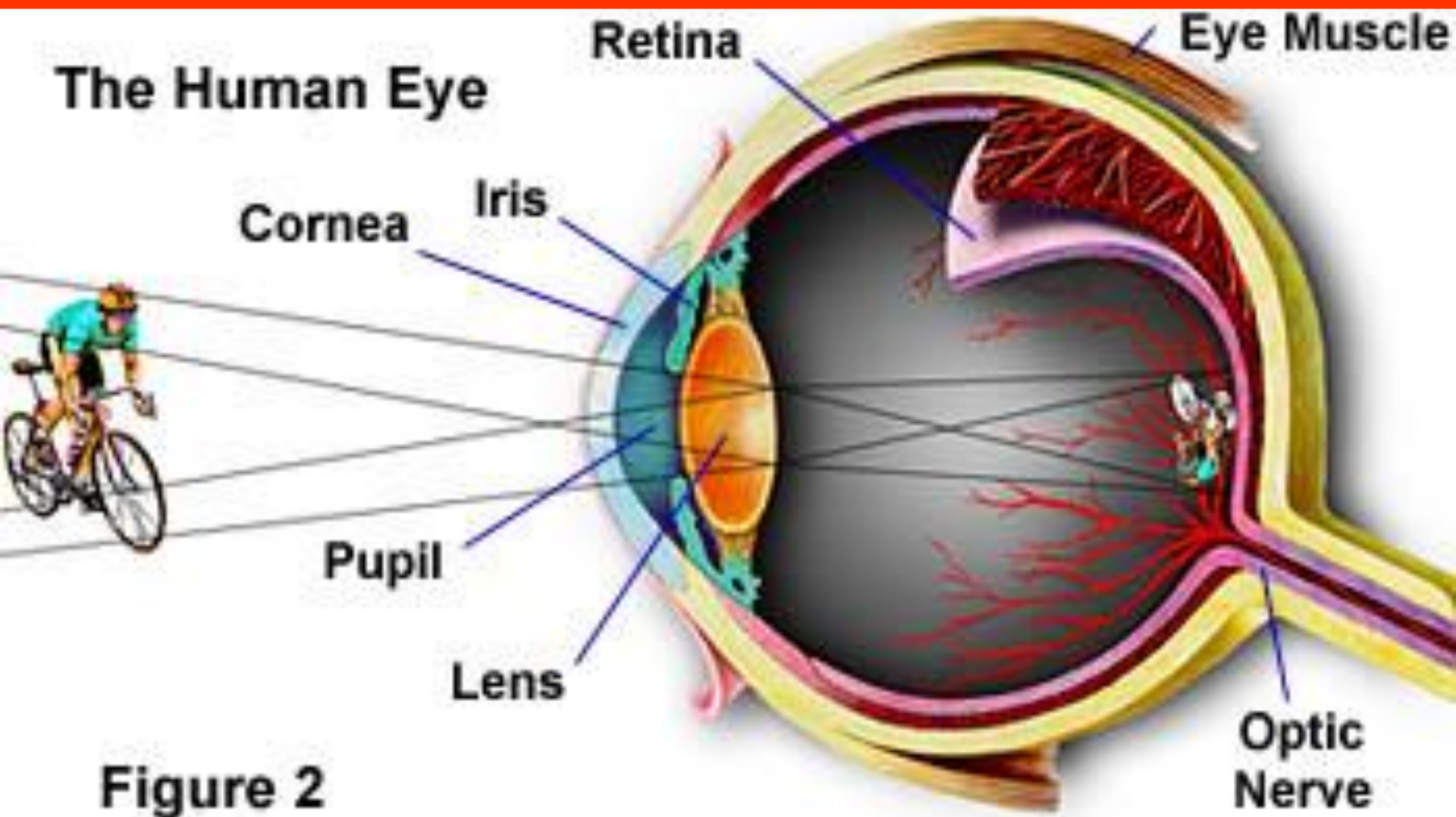
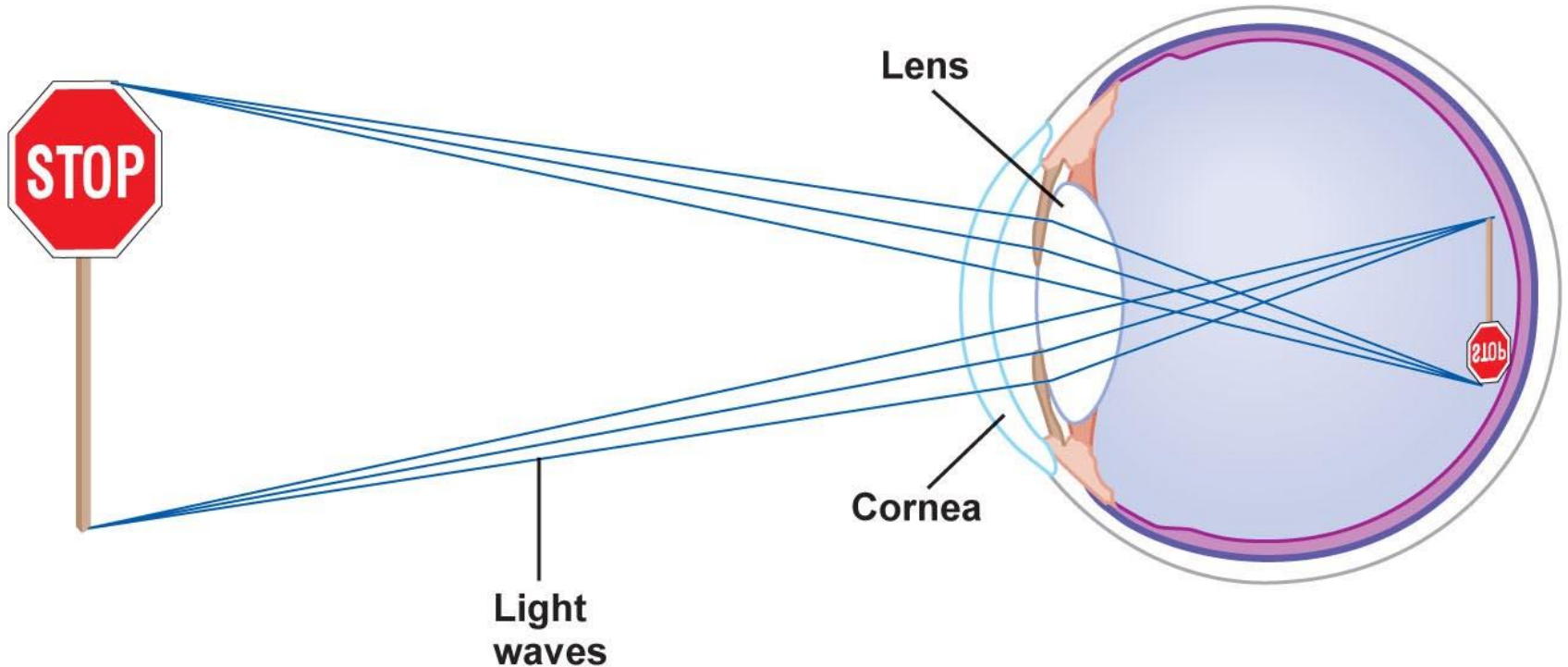


Figure 2

# Your 2 Lenses: Cornea and Lens



© 2011 Pearson Education, Inc.

- There are two lenses in your eye, the cornea and the lens.
- The cornea, the front surface of the eye, does most of the focusing in your eye
- The lens provides adjustable fine-tuning of the focus

# FUNCTIONS:

## How Your Lens Focuses

- Your lens has a *small depth of field*
  - You can't see something close and far with both objects in focus at the same time
- Hold out your thumb about a foot away from your eye
  - Then, alternately focus on thumb and me (right above your thumb)
- Note that you cannot see *both* me *and* your thumb sharply (in focus) at the same time
  - You focus on one or the other by changing the bulge of your lens



thumb is out of focus



teacher is in focus



thumb is in focus

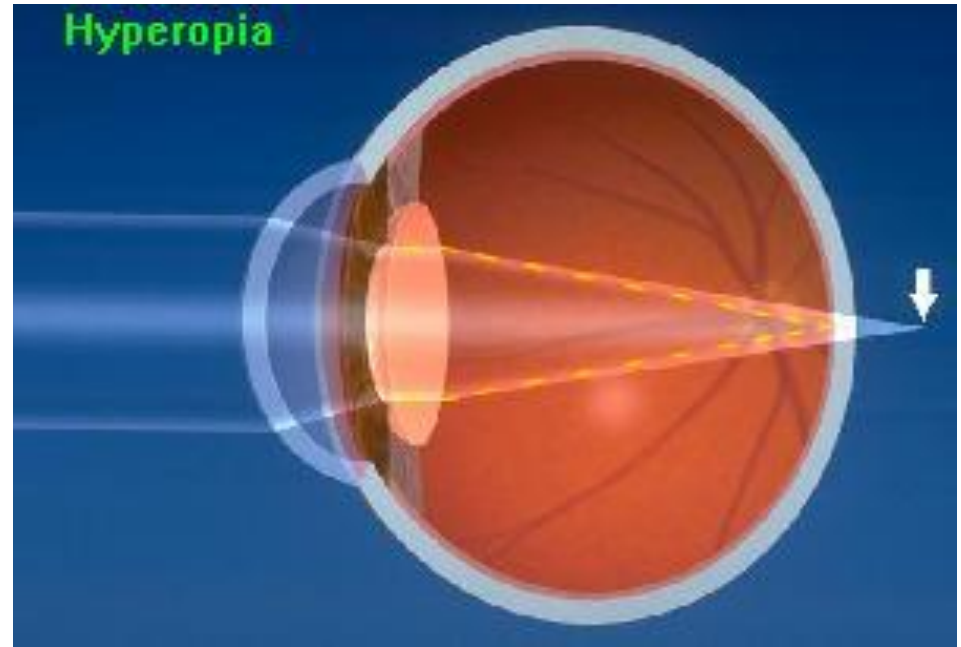


Teacher is out of focus

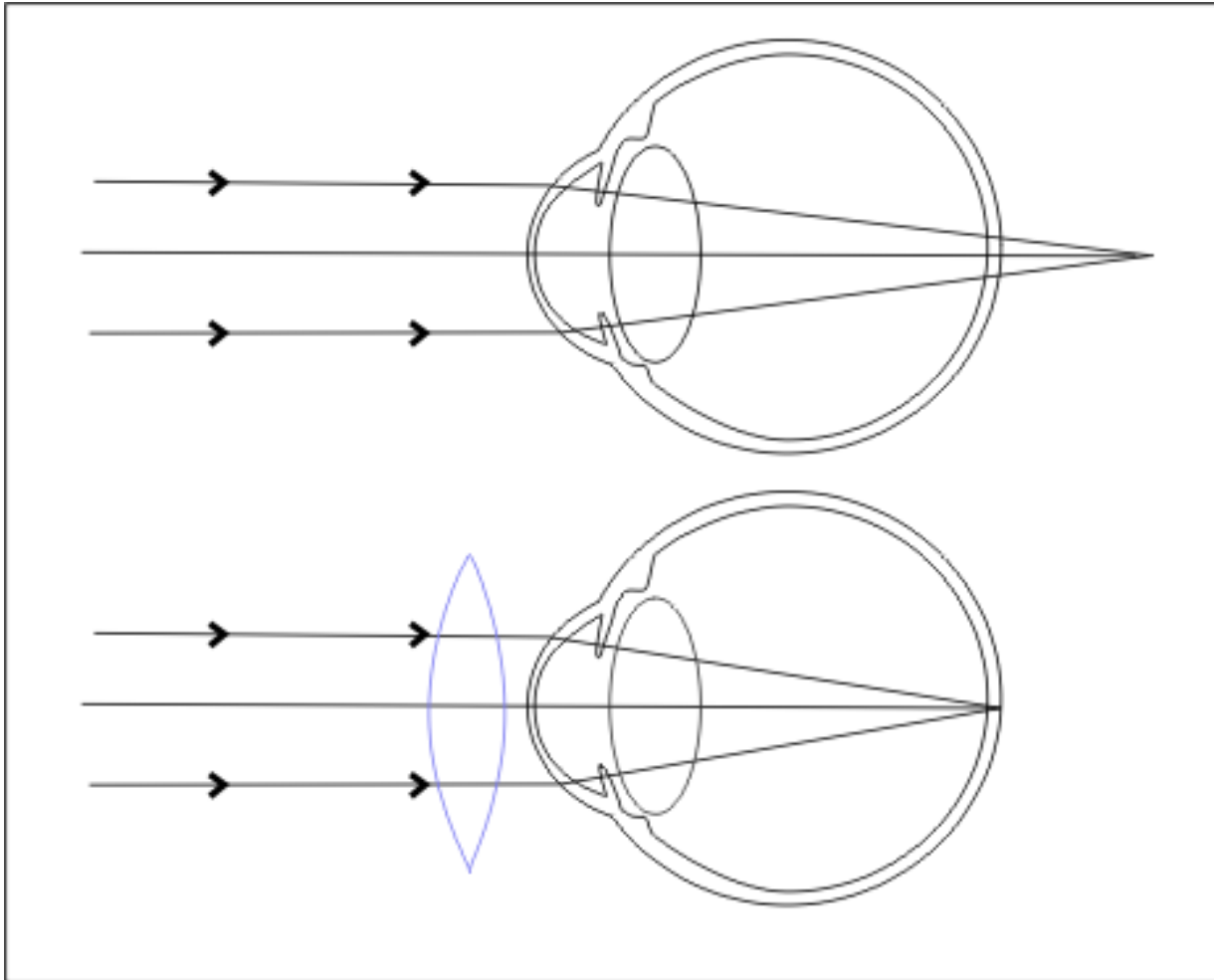
# Focusing Problems

## HYPEROPIA

- Far-sightedness
- Problem seeing close objects
- Distance between lens and retina too small
- Light focused behind retina
- Corrected with converging lenses



# Far-Sighted (Hyperopia)



# Focusing Problems

## PRESBYOPIA

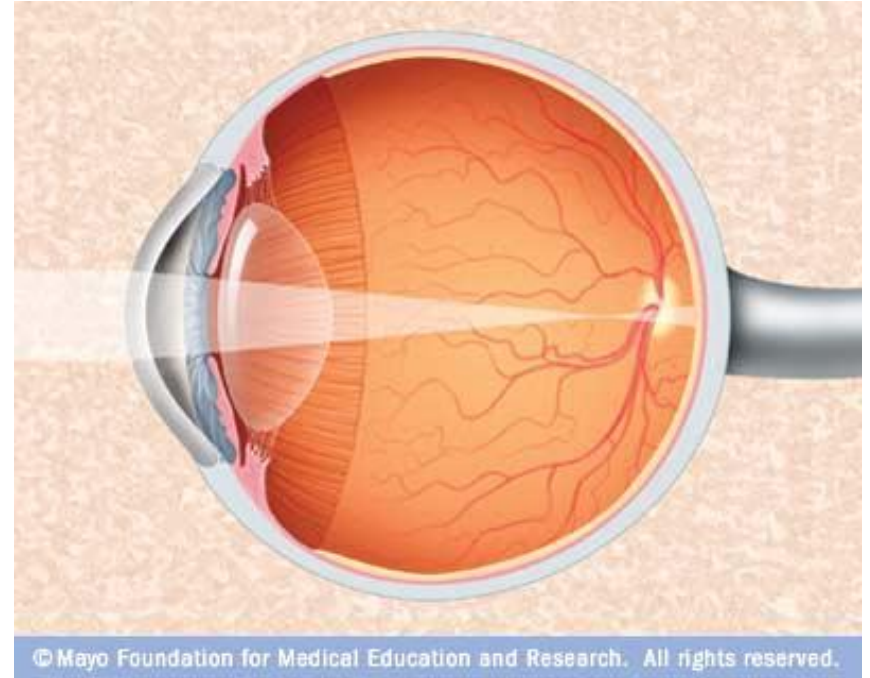
- Form of far-sightedness
- Harder for people to read as they age
- Lens loses elasticity
- Corrected by glasses with converging lenses



# Focusing Problems

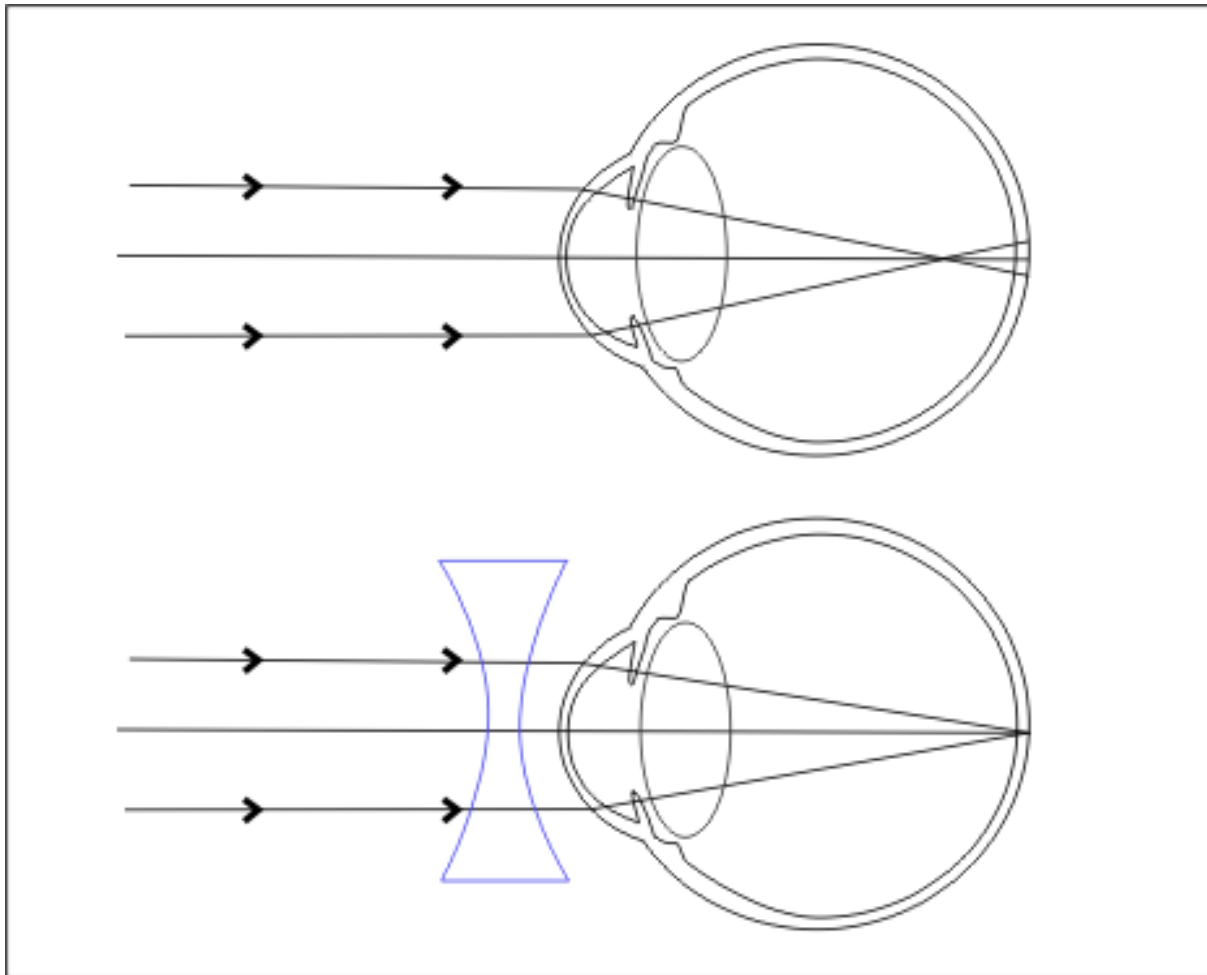
## MYOPIA

- Near-sightedness
- Problem seeing objects far away
- Distance between lens and retina too large
- Light focused in front of retina
- Correct with diverging lenses





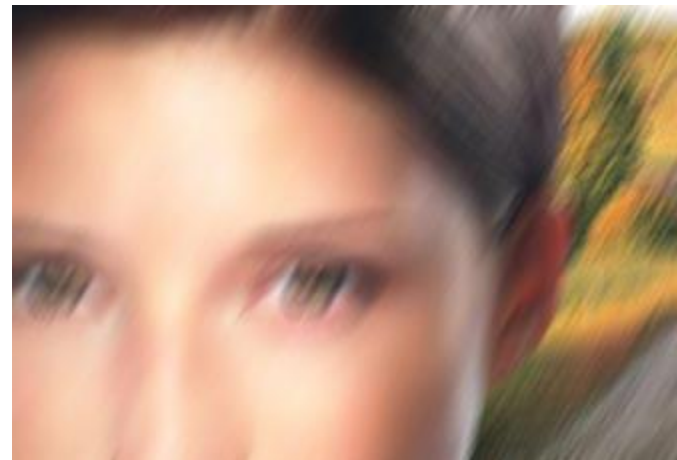
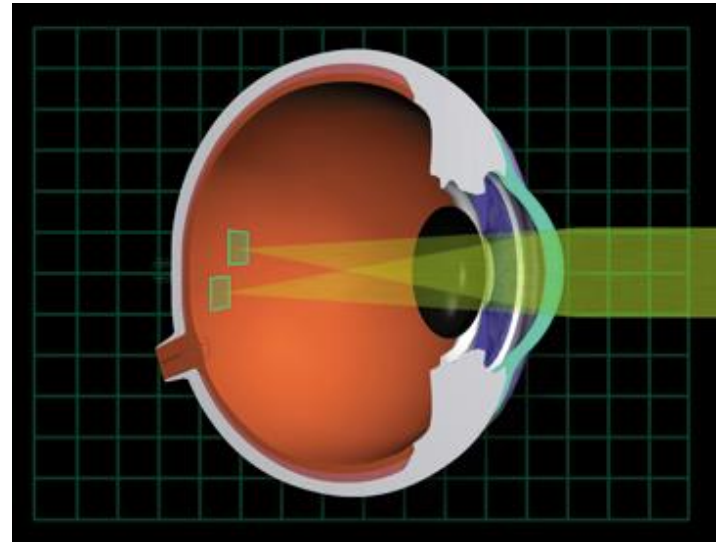
# Near-Sighted (Myopia)



# Diseases of the Eye

## ASTIGMATISM

- Eye cannot focus an object's image on a single point on retina
- Cornea is oval instead of spherical
- Causes blurred vision
- Some types can be corrected with lenses



# Diseases of the Eye

## GLAUCOMA

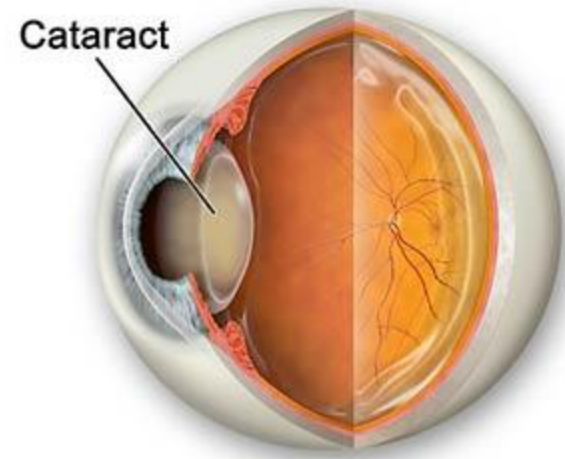
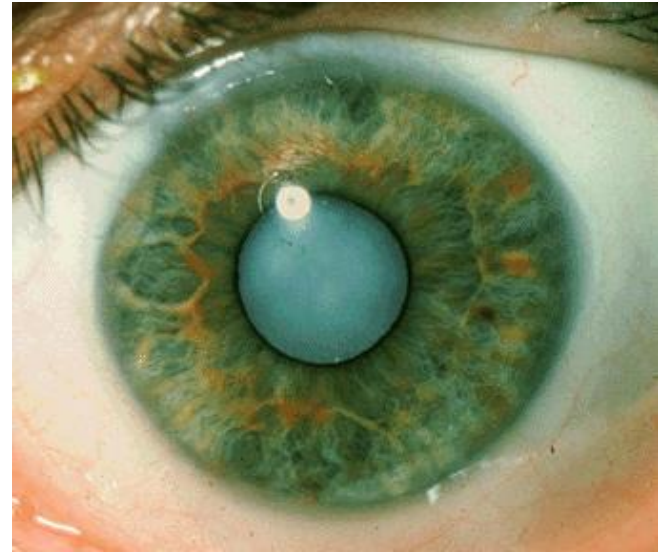
- Group of diseases
- Affects optic nerve - pressure
- Loss of ganglion cells
- Gradual loss of sight and eventual blindness
- Check eyes regularly
- Can be treated



# Diseases of the Eye

## CATARACTS

- Clouding forms in lens due to denaturing of lens protein
- Obstructs passage of light
- Caused by age, chronic exposure to UV, or due to trauma
- Removed by surgery



# Vision Correction

## CONTACT LENSES

- Artificial lens placed over cornea
- Same as glasses
- Corrects for both near and far-sightedness
- Also used for cosmetic purposes (eye colour, Hollywood)



# Videos

“How Eyes Work: An Introduction” (10:48)

<http://www.youtube.com/watch?v=SCn83DHC1Ug>

Bill Nye The Science Guy on the Eyeball (2:12)

<http://www.youtube.com/watch?v=cFVbLnXWn6A>

“How the Human Eye Works”

<http://www.youtube.com/watch?v=fn6v3SkH0LI>

The Human Eye and How it Works (22:59)

<http://www.youtube.com/watch?v=28NysX8JHDo>

# Optical Illusions



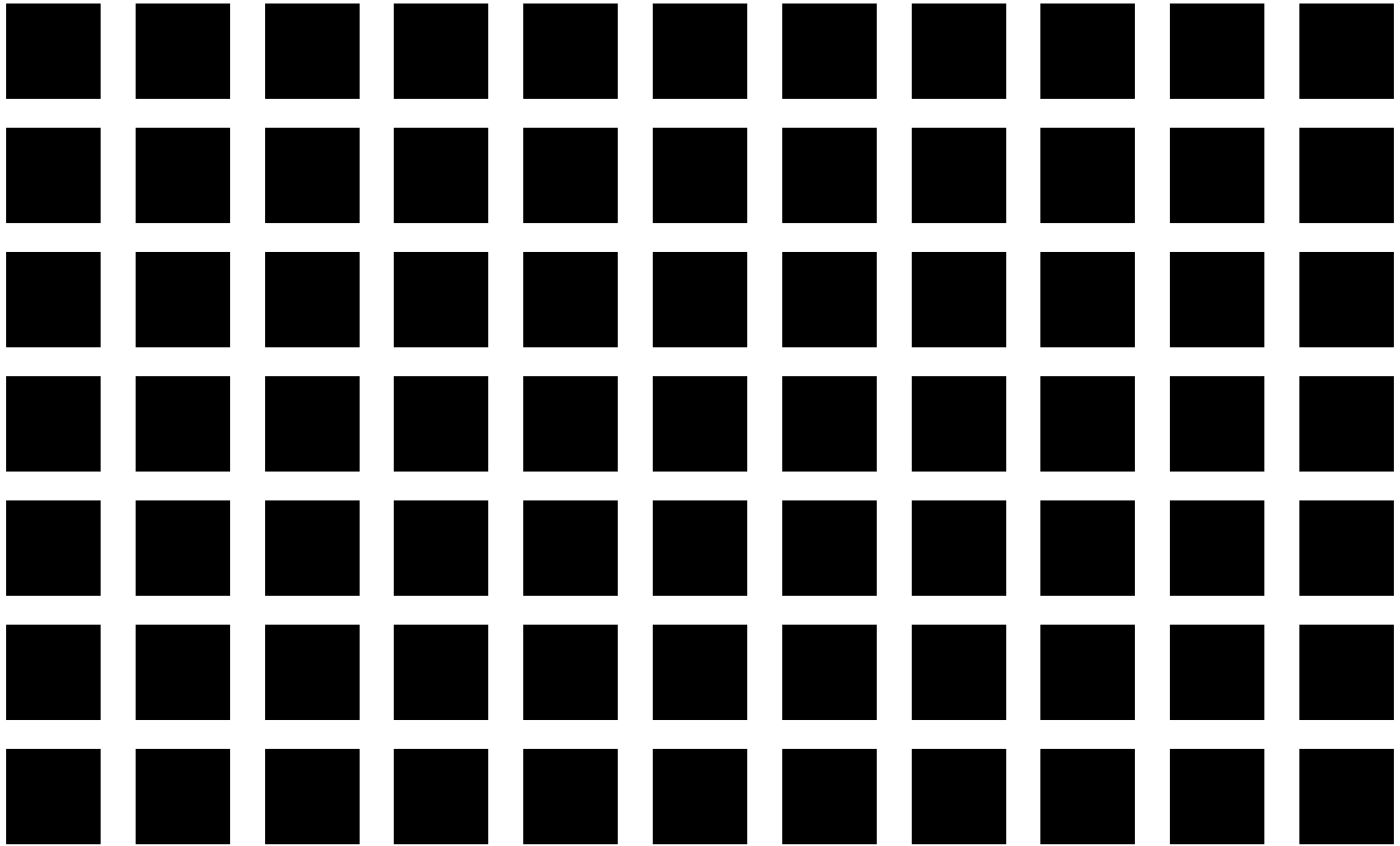
Can your eyes/brain  
be tricked?

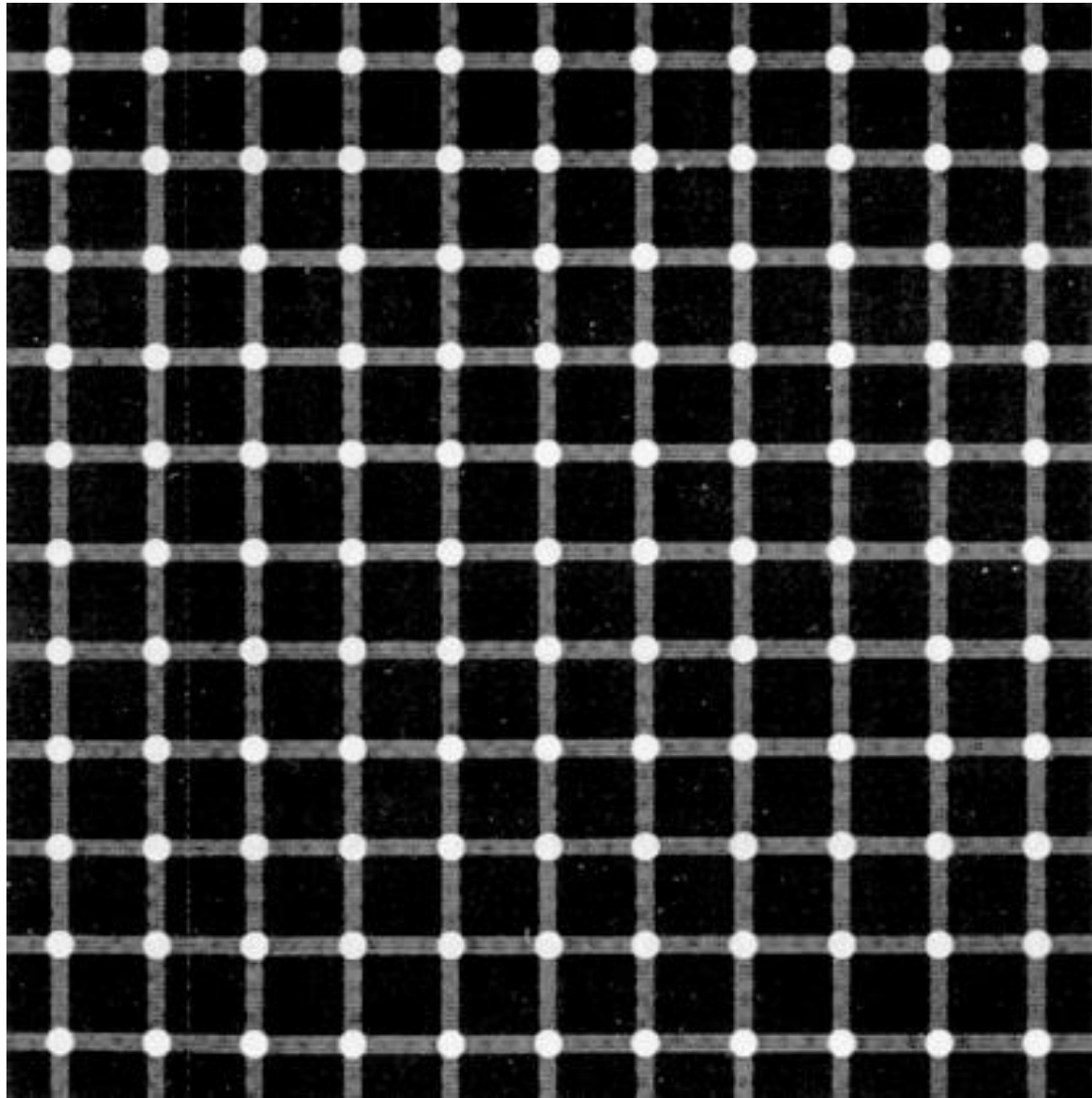


# The Human Eye

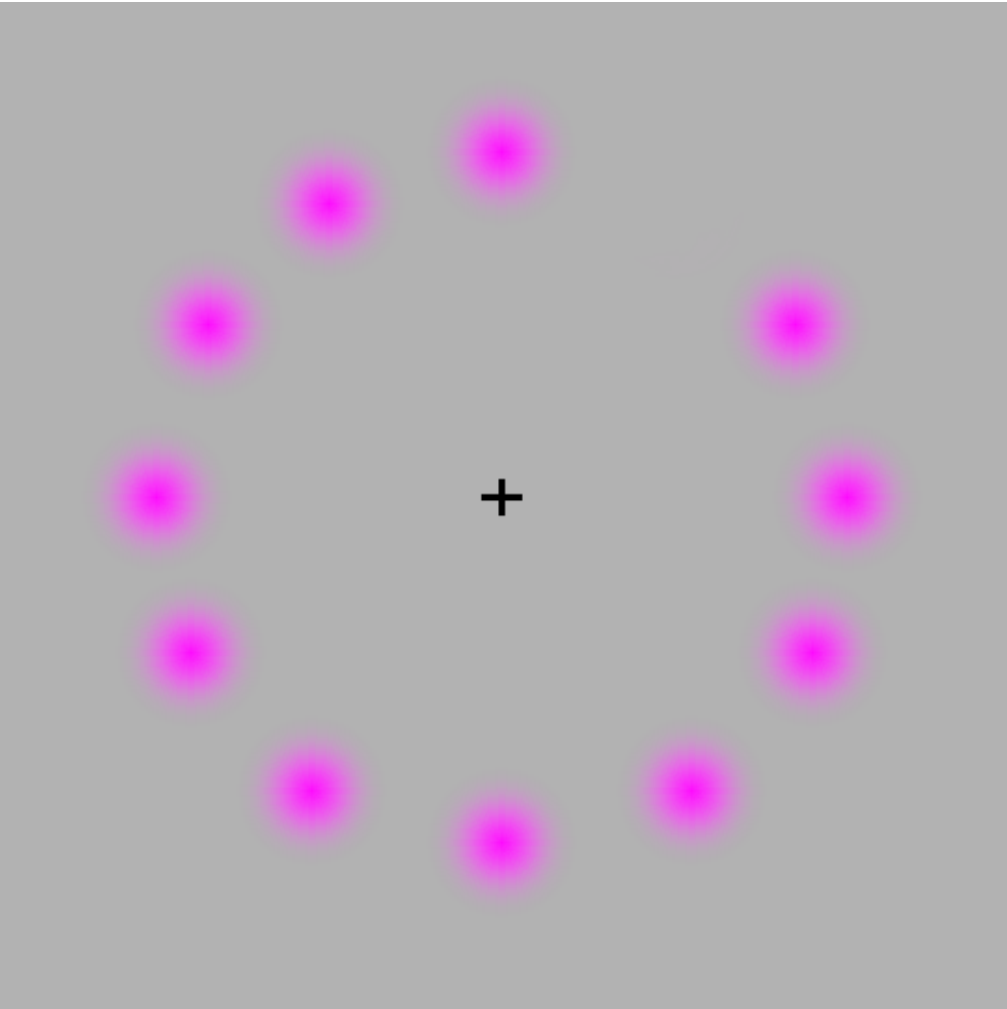
- Your eyes are about to get a workout. Have you stretched your eye muscles yet?
- No? Then do that now!

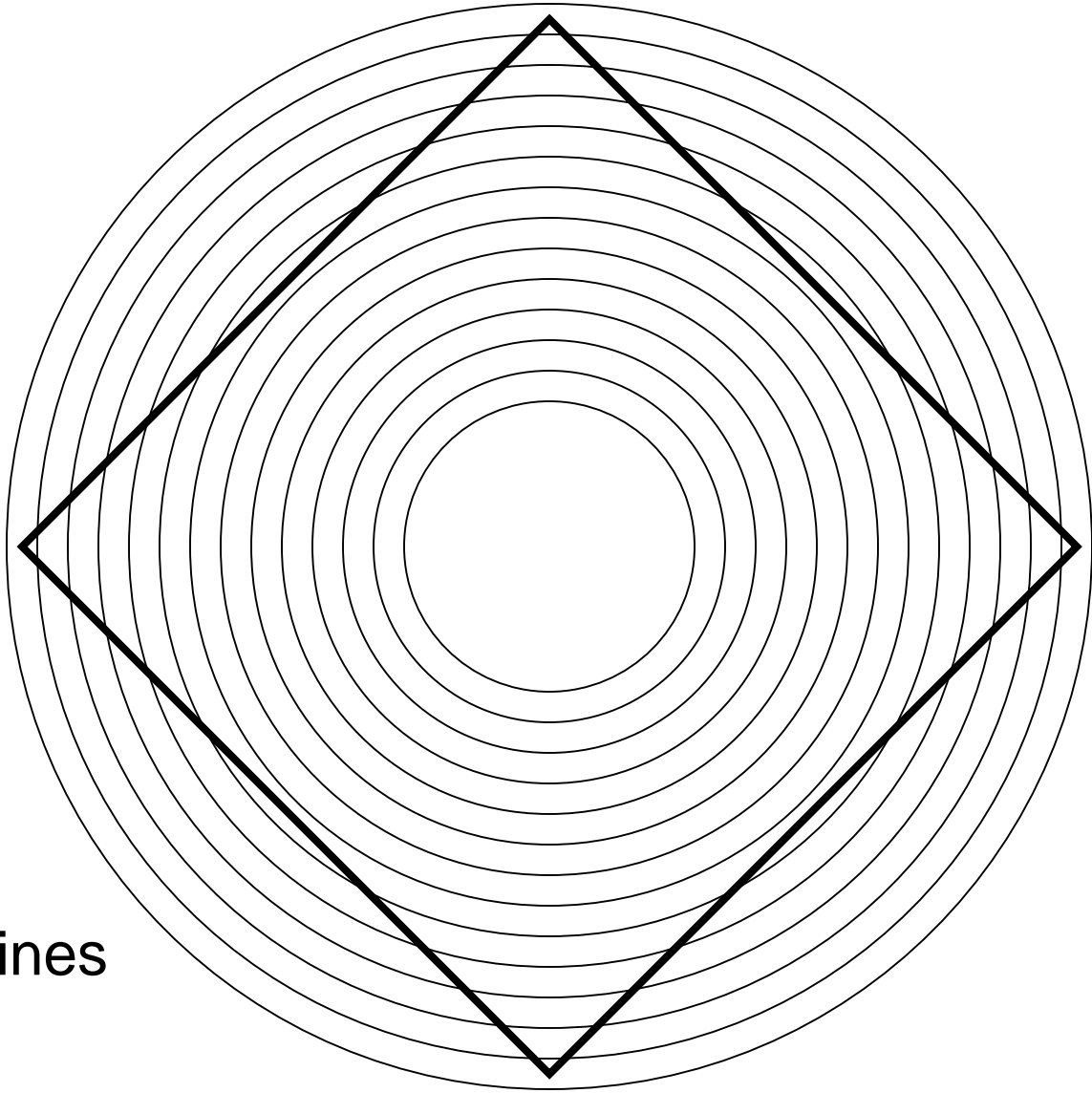
Are you seeing spots?



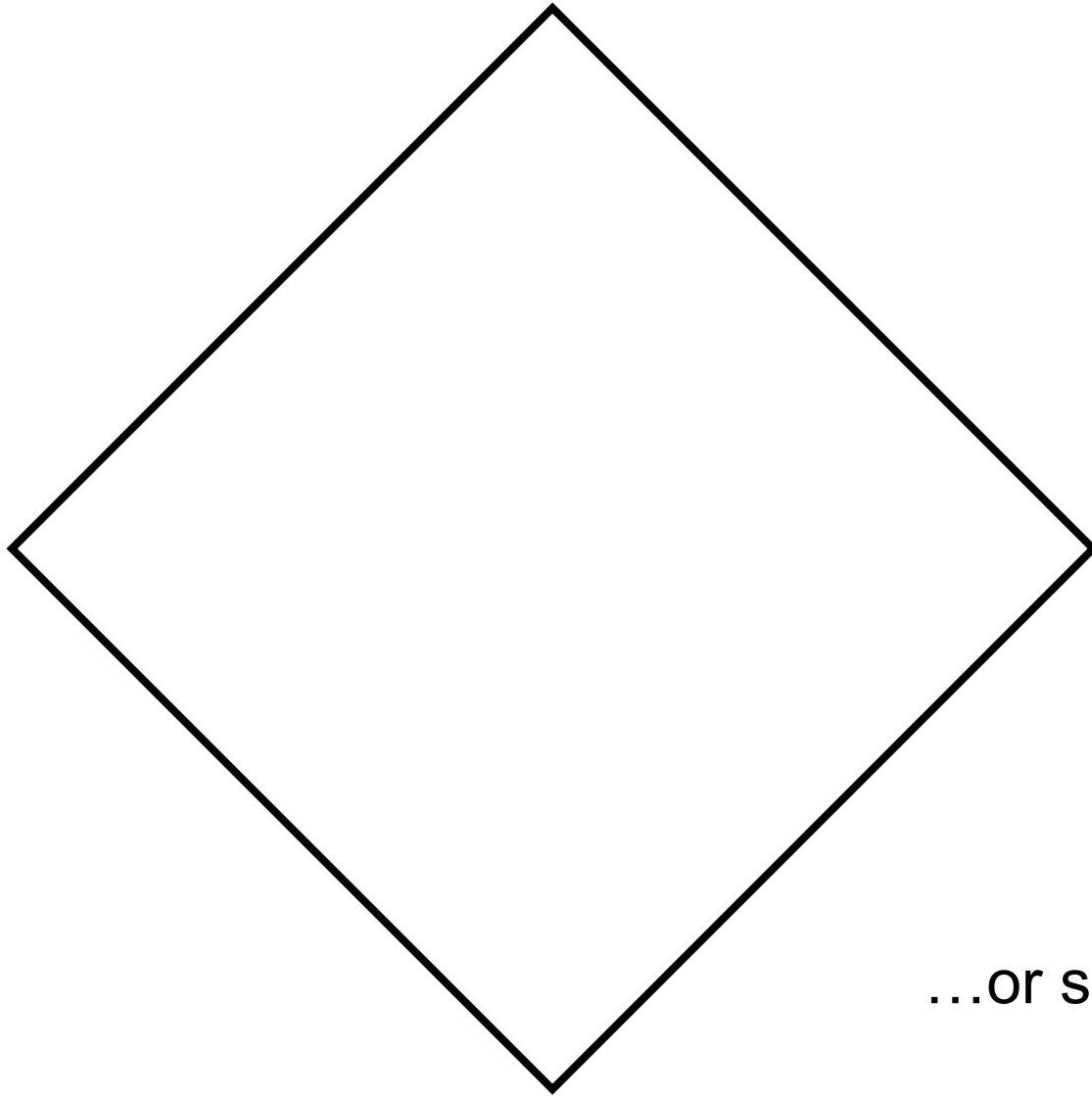


Look at the cross for 10 seconds. What do you see?





Are these lines  
bent....?



...or straight?

What shapes do you see?





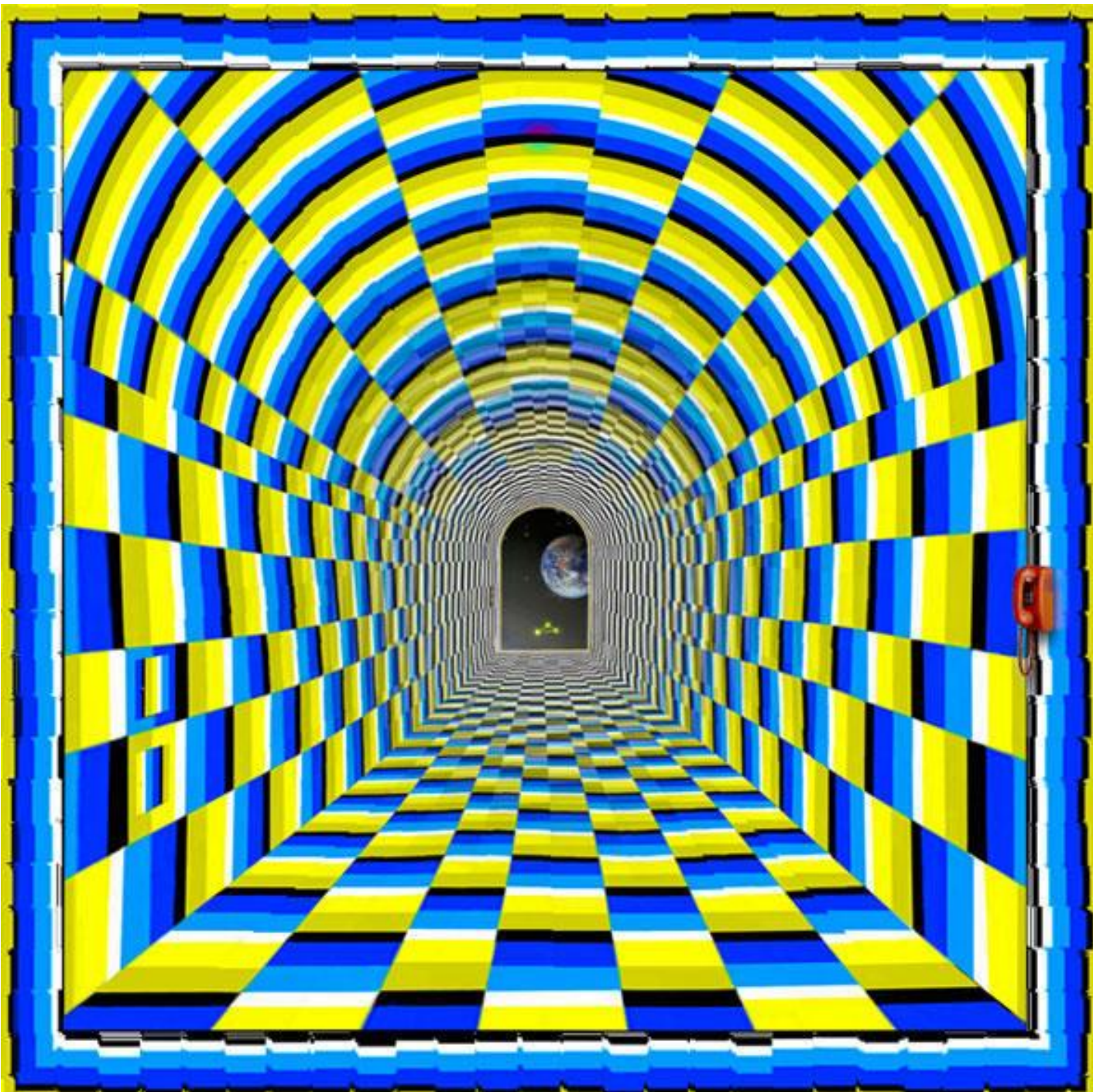


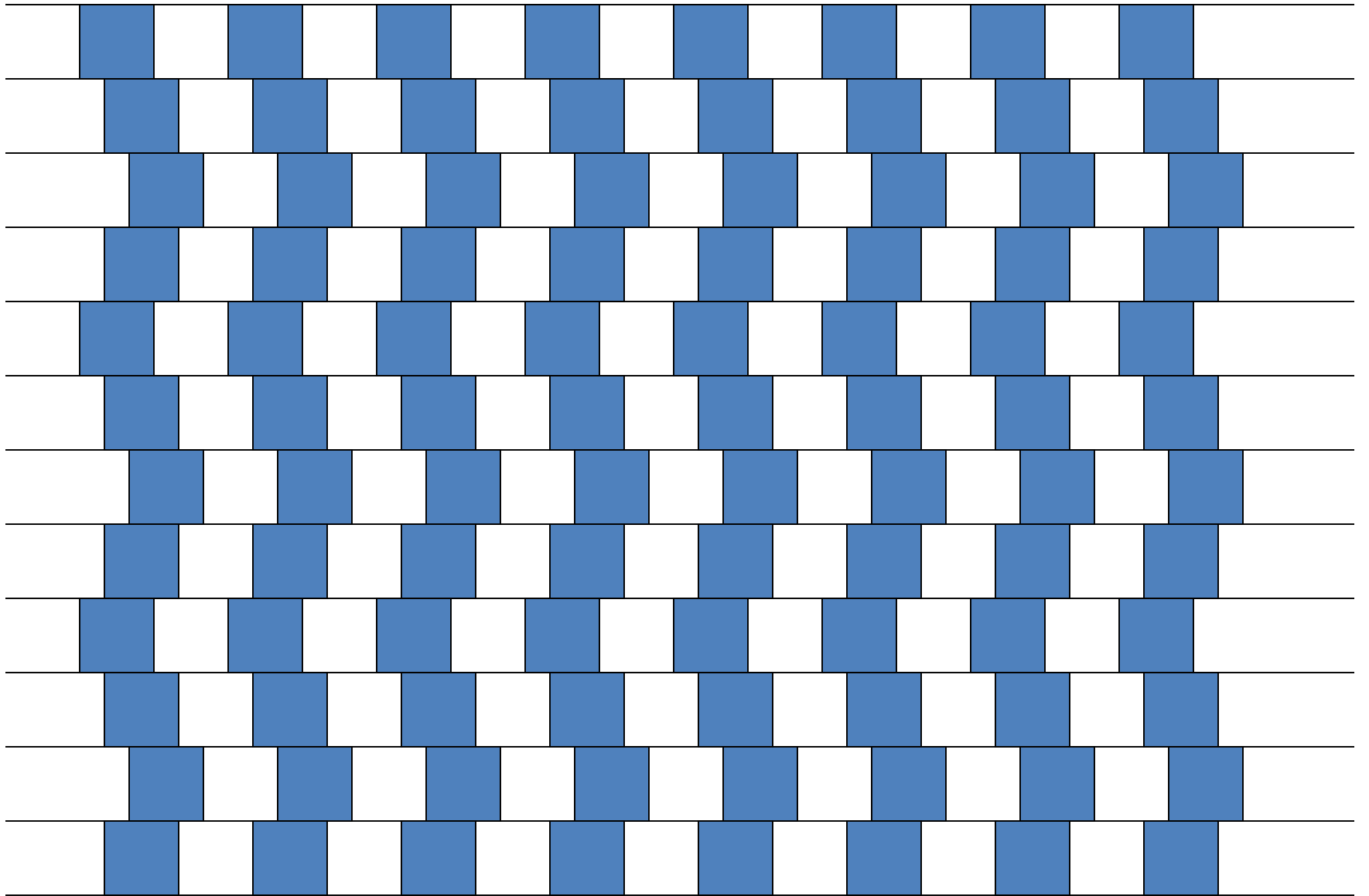
Stare at the red dot for 10 seconds.

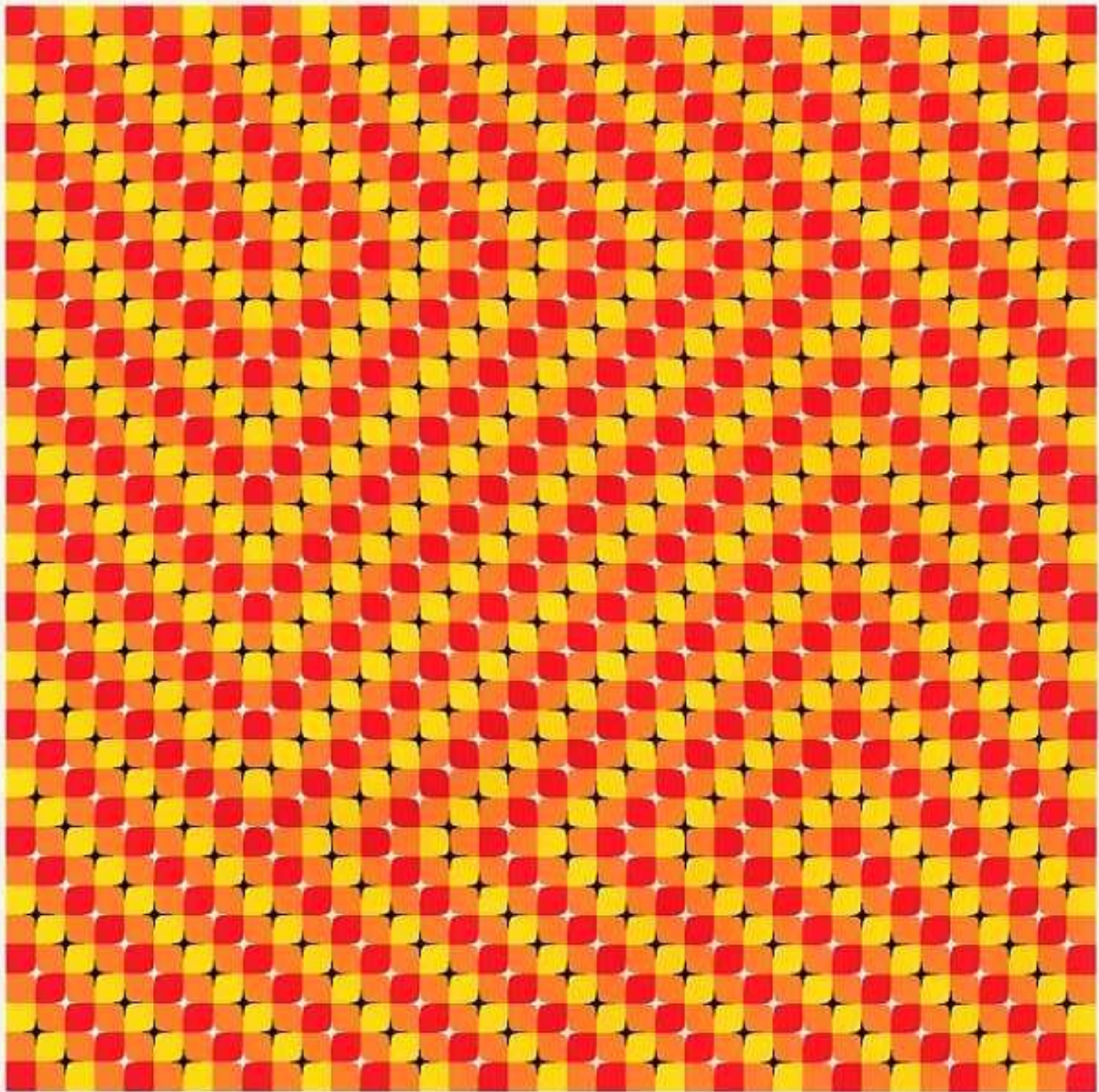




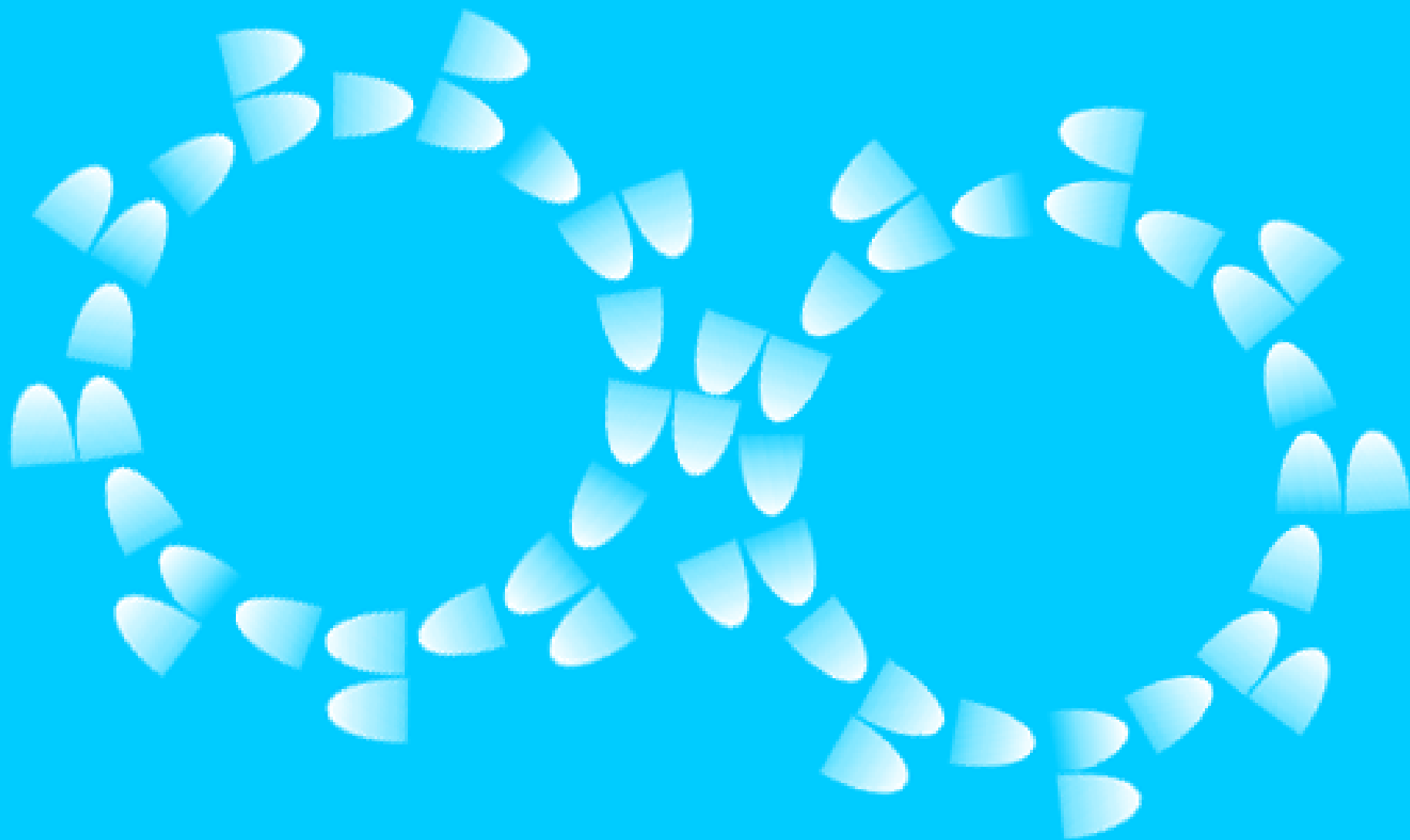






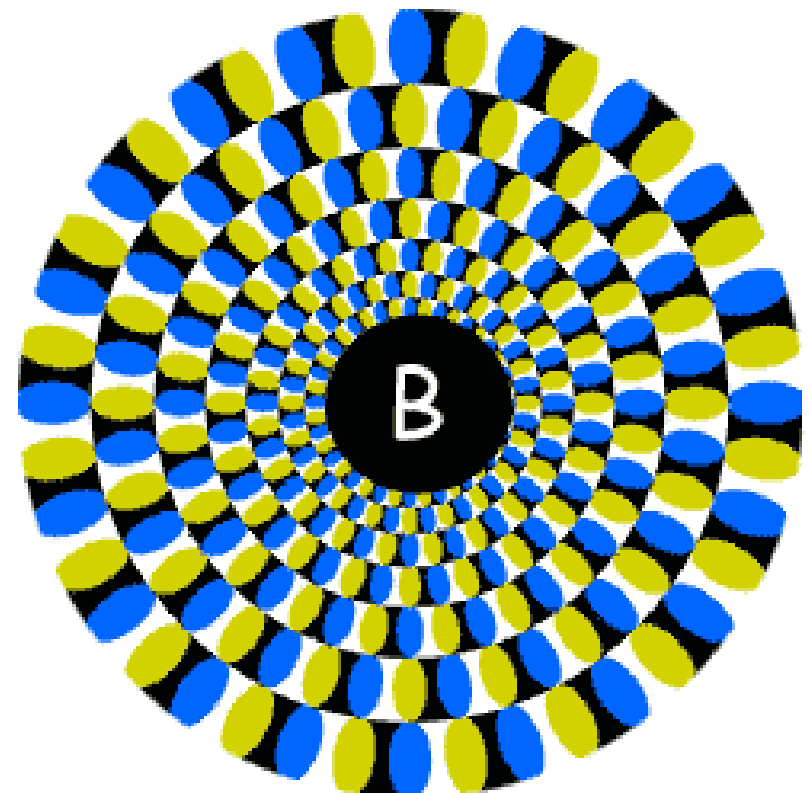
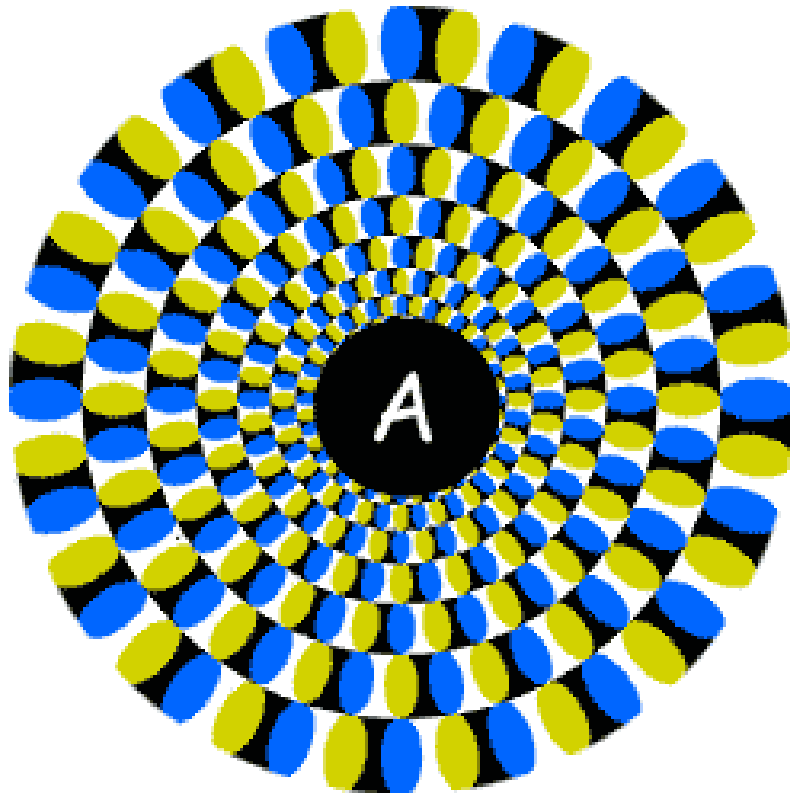


# "Slow Gears"



A simple question.

Which disc is turning faster ... A or B ?





Do you see the rabbit or the duck?











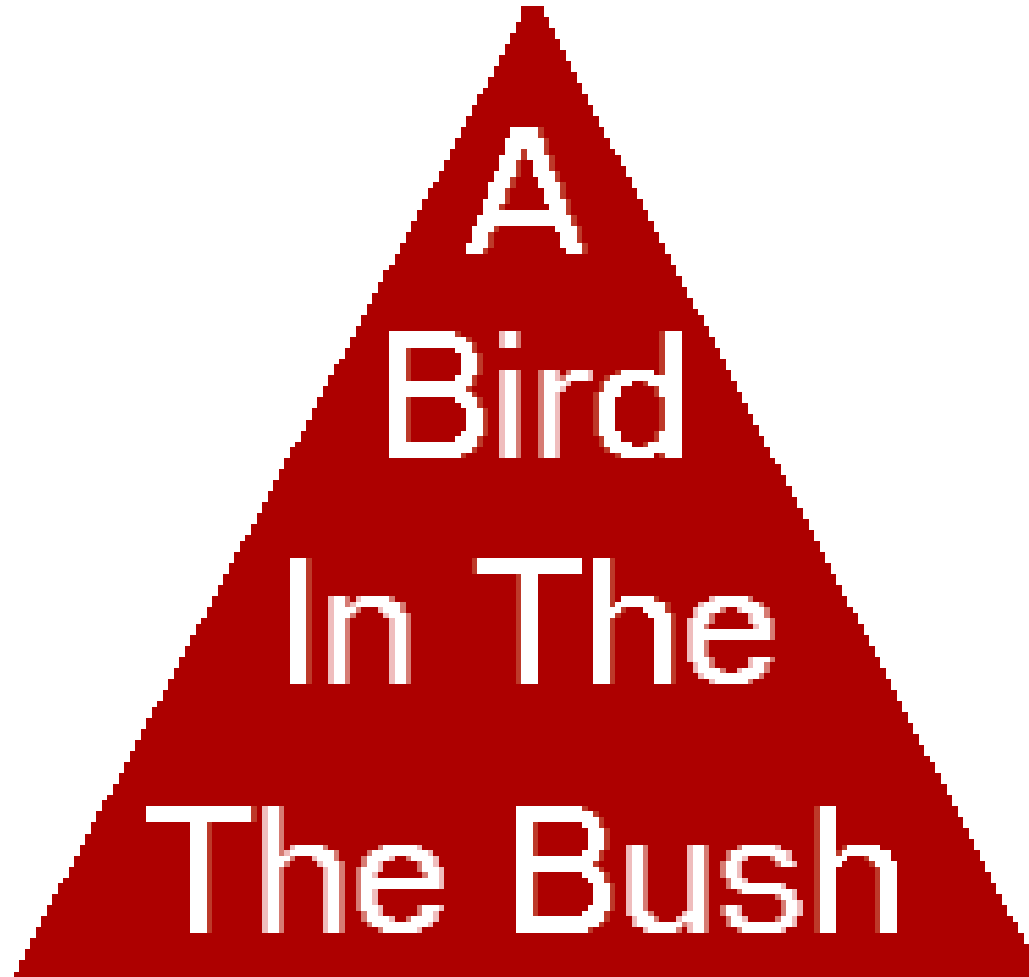
# Reading

What is wrong with  
with this sentence?

---

According to research at Cambridge University, it doesn't matter in what order the letters in a word are, the only important thing is that the first and last letter be at the right place. The rest can be a total mess and you can still read it without a problem. This is because the human mind does not read every letter by itself, but the word as a whole.

**Read This Out Loud.**



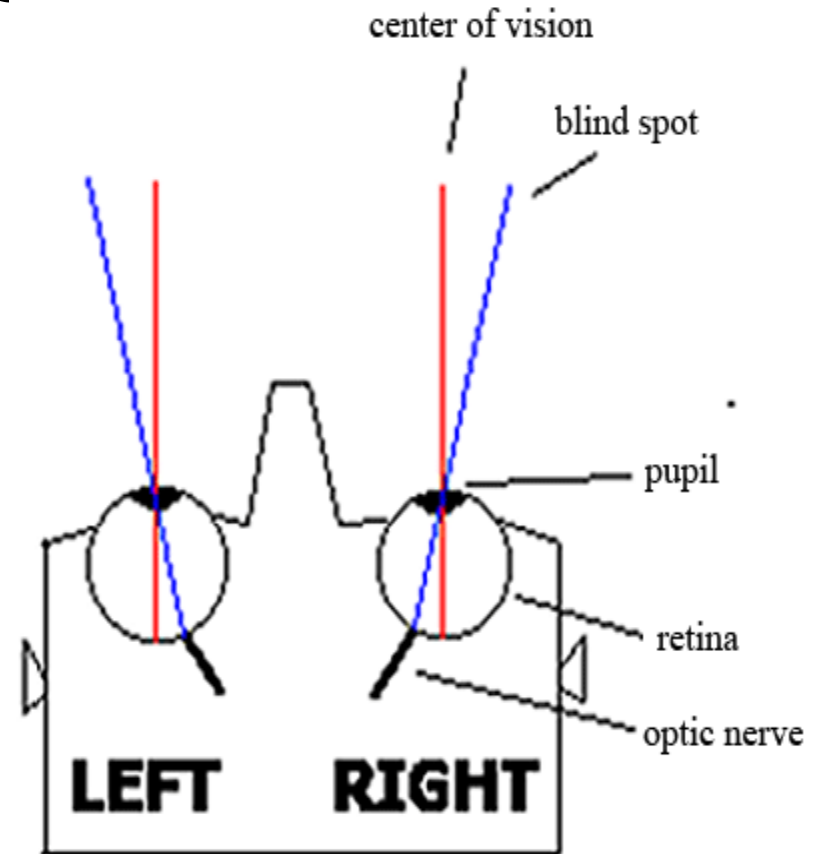
**Are You Sure? Read again.**

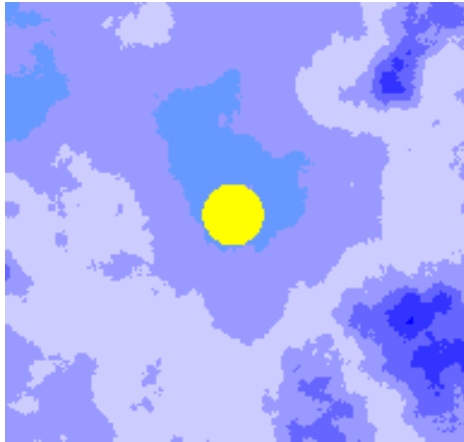




# Blind Spot

- On retina where optic nerve leads back into the brain
- No rod or cone cells
- Other eye compensates for this area
- Try this test to prove you have a blind spot...





1 2 3 4 5 6

## Blind Spot (Optic Disk)

Close your right eye and look directly at the number 3. Can you see the yellow spot in your peripheral vision? Now slowly move towards or away from the screen. At some point, the yellow spot will disappear.



Now stare at the red dot with your right eye from 12 inches, covering your left eye with your left hand. Notice that the gap in the blue bar fills in (completes). Move your left hand to unblock your left eye and the gap re-appears.

Close left eye and approach screen while  
staring at the letters...watch the dot!

---

a	b	c	d	e	f	g	h
i	j	k	l	m	n	o	p
q	r	s	t	u	v	w	x



# Optical Illusion Video Clips

10 Best Optical Illusions of 2014 (10:18)

<http://www.youtube.com/watch?v=VxTFGVp2R-8>

Moving Illusions (10:47)

[http://www.youtube.com/watch?v=lw8idyw\\_N6Q](http://www.youtube.com/watch?v=lw8idyw_N6Q)