

It is a good thing we use all our senses when we are outdoors. Sometimes our eyes play tricks on us. Try these exercises and see what we mean.

## What Colour Was That Bird?

For this exercise to work well, follow the colour suggestions to begin with. Once you know how it works you can experiment with other colours.

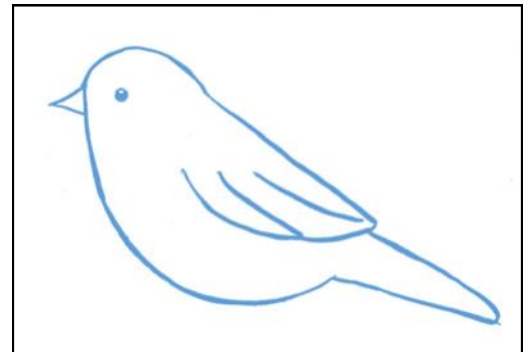
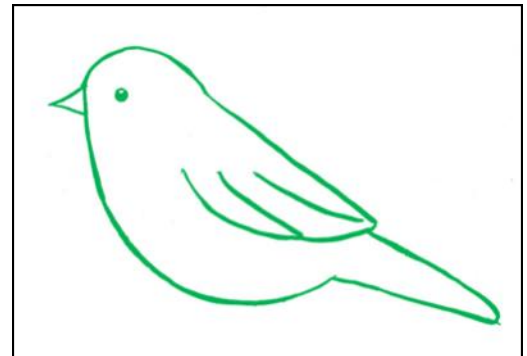
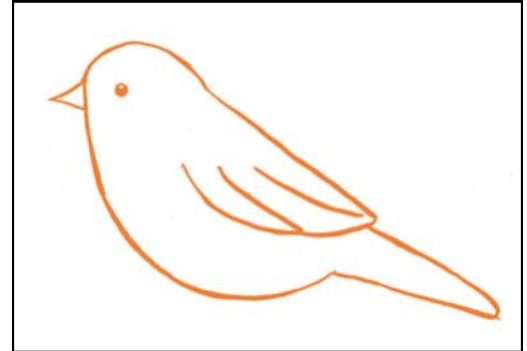
### Supplies:

- \* 2 sheets white paper
- \* red, green, blue and black markers or pencil crayons
- \* scissors

### Procedure:

- Brightly colour 3 birds, 1 in red, 1 in green and 1 in blue. Colour the eye black and cut out the birds. Or make your own birds from red, green or blue coloured paper.
- Put one of your coloured birds on a blank sheet of white paper in front of you. Have a second sheet of white paper ready beside the first.
- Stare at the bird in front of you for 15 seconds. Then quickly look at the white paper. You should see a different coloured bird there. Try the other birds.
- Cut out the circle with the bird cage on the next page, or draw your own on white paper. Stare at a bird then look at the cage.
- What happens when you stare at the little bird in front of you and then look at a white surface cross the room?

The image you see is called an "afterimage". An image of what you are looking at stays in your eye for a few moments after you stop looking at it. Light sensitive cells, the rods and cones, cover your retina, the lining at the back of your eyes. Rods let you see in low light, in shades of gray. Cones let you see color in bright light. You have 3 types of cones, each one picks up a particular colour. The white paper reflects white light which is made up of all the colours. Staring at the red bird gives the red cones a workout. When you look suddenly from the red bird to the white paper, the red cones, tired of red light, let the other cones fill in with blue and green. An afterimage does not last long as the



Birds see colours in the ultraviolet spectrum as well as all the colours we can see. A bird sees the ultraviolet "colours" in another bird's plumage. We must use a black light to see these colours. Often feathers we see as white are very colourful under ultraviolet light.

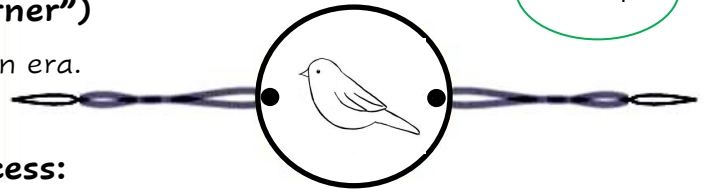


# Make a Thaumatrope

(or "wonder turner")

8 & Up

The thaumatrope is a child's toy from the Victorian era. On one side of the disc is a bird, and on the other is an empty birdcage. When you twirl the disc an optical illusion appears.

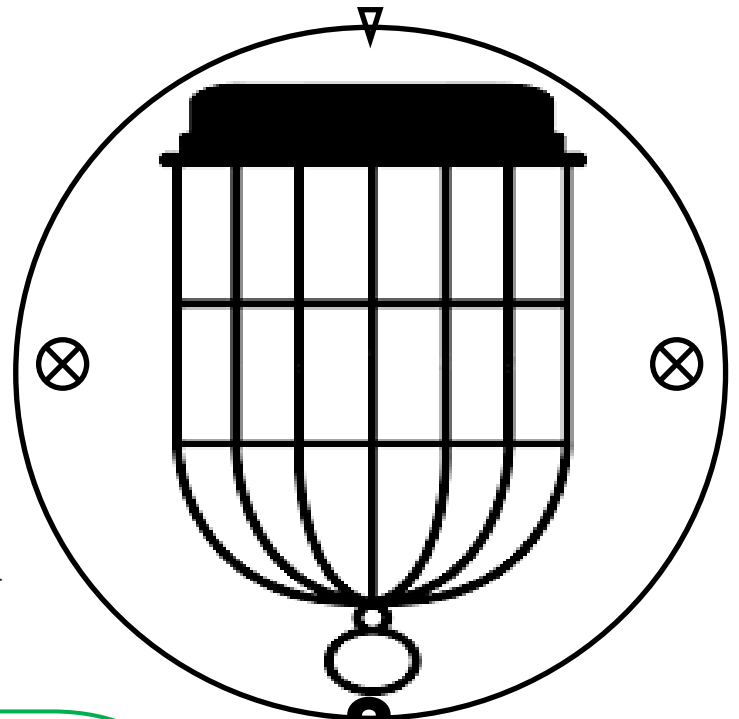
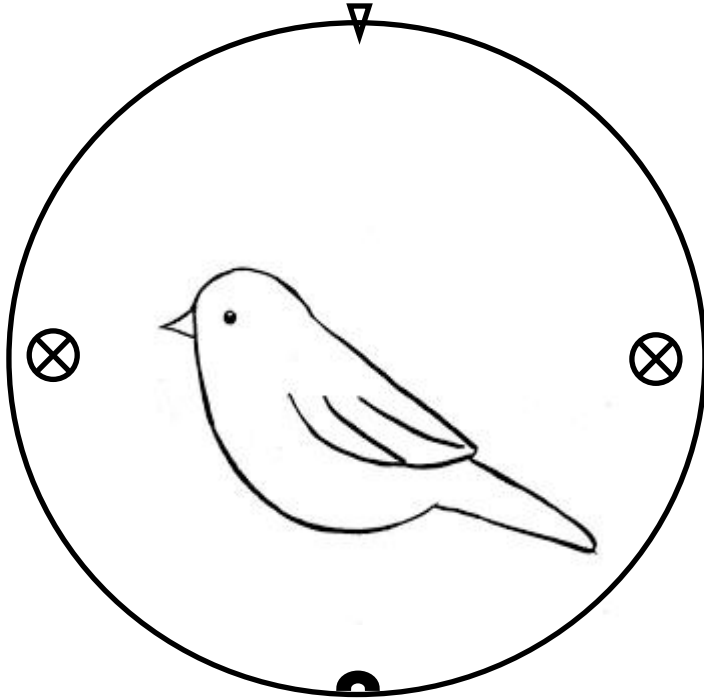


## Supplies:

- crayons, art supplies
- scissors
- glue or glue stick
- boxboard (cereal box)
- Hole punch or awl
- 50 cm of string and yarn

## Process:

- ⇒ Colour the bird below.
- ⇒ Cut out both the bird and bird cage circles.
- ⇒ Trace one circle on the cereal boxboard and cut it out. This will strengthen the disc.
- ⇒ Glue the bird circle to one side of the boxboard disc. Carefully match the symbols (▽ and ◐) and glue the birdcage circle to the other side of the disc. **It is important that one of the images be upside-down.**
- ⇒ Punch a hole on each side of the disc at the ⊗ mark with the hole punch or awl.
- ⇒ Cut the string into two 25 cm lengths. Thread 1 string through 1 hole and tie the ends to form a loop. Repeat for other hole. See the model above.
- ⇒ To spin the disc, hold each string between the thumb and first finger and roll or twirl the string (as if you are putting a pinch of salt in a soup pot)



## How does it work?

Your eyes hold the image of what you are looking at for a split second after it is gone, (visual persistence). Once the bird disappears, its image is still in your eyes when the birdcage appears. You see both images together. This is how movies work, with one still frame (picture) after another piling up in your eyes, making them appear to move. Experiment with different pictures or a little poem or message, with a line on each side.



Birds process what they see faster than humans. A TV movie is made of still pictures flashing past at 30 pictures a second. At this speed our eyes see the still pictures as moving. A bird would need to see 100 pictures a second for the "moving picture" effect. This fast vision allows bird to fly quickly through a forest and not crash into a tree.

For little hands, glue the images, lollipop style, to the end of a pencil. Roll the pencil between your hands to spin the images.