

Instruments:

- cardboard box (ca. 20 x 20 cm)
- pencil
- compass
- set square
- scissors
- glue
- colored paper: yellow, orange, red, light green, dark green, light blue, dark blue, violet

Experiment:

- Draw a circle with a roughly 10 cm radius with the compass on the cardboard and cut it out with the scissors.
- Divide the circle into sections as per the above graphic with angles and colors as follows: red 17°, orange 33°, yellow 30°, light green 55°, dark green 82°, light blue 66°, dark blue 56°, violet 21°.
- Cut the proper colors out and paste them onto the cardboard circle in the sequence listed in the Materials section above.
- Drill a hole in the middle of the cardboard circle using the pencil as an axle. Spin the disc and note what happens.

Observations:

Rotation of the disc makes the colors seem to turn gray.

Results:

If the disc is spun fast enough, the speed of rotation exceeds the ability of the eye to compensate. In other words, the human eye cannot keep pace with the dizzyingly swift progression of colors streaming by. The perceived colors are added together to form a mixed color. The resulting "color" seen is white, the result of adding all the other colors together by the overwhelmed receptacles in the eye. This is also why white should not be labeled as a color.

If the disc is not turned fast enough, the edge appears white while the center remains a mixture of colors. This is because the points on the edge must turn faster than those found closer to the center. (The angular velocity - the number of degrees in a circle covered - is exactly the same for all points in a circle, but the linear velocities - the actual distances traveled at varying radii- are necessarily different). The further away from the center a point is, the faster it must travel to remain on a line drawn from the center of the circle to keep pace with another point on that line closer to the center. This means that higher speeds are needed the further one moves from the center. The rotational speed at the circle's edge exceeds the eye's capacity to follow the individual points of color. The same is not true, however, for points closer to the center, because they are moving more slowly.