

A bicycle wheel spinning on a long axle is supported at one end of the axle by a rope, as shown in *Figure 1*. The external torque caused by the force of gravity on the wheel causes it to precess.[†] When it is supported by a rope at the other end of the axis, it precesses in the opposite sense.



Figure 1

[†] Sutton, *Demonstration Experiments in Physics*, Demonstration M-187, Precession.
Freier and Anderson, *A Demonstration Handbook for Physics*, Demonstration Mu-14, Spin Flipping.

When we spin this bicycle wheel by pulling on a string wrapped around the axle, we give the wheel angular momentum. If we release one of the handles on the wheel and hold it only by the rope on this handle, there will be an unbalanced torque on the wheel due to its weight. How will the wheel react?

The bike wheel precesses.

If we suspend the bike wheel from the other handle, the wheel precesses in the opposite direction.

Equipment

1. Rim-loaded bicycle wheel with handles mounted on its axle, each with a different color rope attached (this bicycle wheel has the start-up disc/peg as described earlier).
2. Start-up spring.
3. Support cradle.