Stationary Spin

Solid objects, such as coins and pop bottles, resist changes in their movement. But did you know that liquids and other fluids also have inertia? Here's a setup that shows how a liquid tends to stay put.

Materials
A mug Water
Vegetable oil Food coloring

To Do
Fill a mug halfway with water. Carefully pour oil into the cup so that the surface of the water becomes covered by a thin layer of oil. Place four drops of food coloring onto the oil. The drops should be positioned at the corners of an imaginary square, as shown in the illustration.

While the mug remains on the table, grasp it from above. Quickly turn your wrist so that the mug spins about a quarter turn. What happens to the droplets?

Can you explain your observations?

The Science
Oil and water don’t mix. When the oil was added to the mug, it floated upon the water’s surface. When the drops of food coloring were added, they did not flow into the water layer below. Since food coloring does not mix with oil, the dye remained as round droplets.

Although the mug spun through a quarter turn, the drops (and the mug’s other liquids) remained mostly stationary. It was the inertia of these substances that kept them from moving.