

University of Maryland

Department of Physics Education and Outreach

Physics at Home Activities

Introduction to Aerodynamics Activity #3: Coanda Effect

Learning Objective: The following fun activity is the second in a series of three lessons: the law of Gravity, Bernoulli's principle, and the Coanda effect. The trio is designed to introduce upper elementary school students to physics concepts related to aerodynamics.

Activity #3: The Coanda Effect

1. Materials:

- a. 1 ping pong ball
- b. 1 hair dryer with "no-heat or low-heat" capability

2. Instructions:

- a. Plug in the hair dryer. Now, it is ready to use.
- b. Turn on the hair dryer. *Make sure it is on the no/low heat setting.*
 - i. Turn the hair dryer upside down. The air stream should now be directed at the ceiling.

- c. **What will happen to the ping pong ball when you place it in the stream of air?**

**Let's
predict!**



NOW, do the experiment! Carefully place the ping pong ball in the stream of air about 2 inches above the hair dryer and observe what happens.

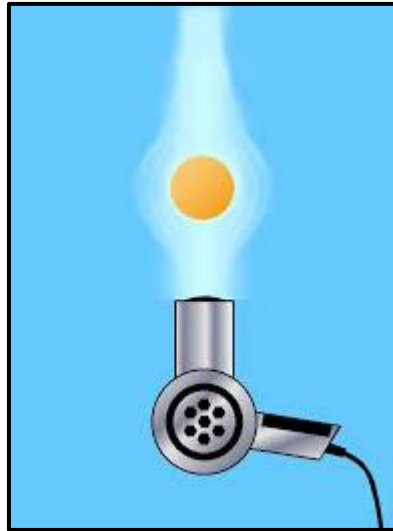
3. What happened?

Was your prediction correct?

When the ping pong ball is placed in the stream of air, it hovers in place! The ball does not fly away or hit the ground!

What's going on?

The Coanda effect explains why this occurs. The stream of air flows evenly around the curves of the ball. It is important to note that all curves of the ping pong ball are identical. This means that the air flow is interacting equally with all curves of the ping pong ball. The even distribution of air applies equal pressure to all sides, which keeps it in the hovering position.



Extension: Try this experiment again. This time, once the ball is hovering, slowly tilt the hair dryer to the right and then slowly to the left. Does the ball stay in place?