

Friction happens. Now scientists are learning more about why

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A robot cuts the pattern for a small batch of car tires in Hanover, Germany, Aug. 8, 2007. Photo: AP/Kai-Uwe Knoth

Friction is part of our everyday lives. Friction is the force working against two surfaces rubbing against each other. Sometimes it is helpful. It is what makes a car stop when the driver steps on the brakes. Sometimes it is not helpful. It drags against a car's tires, wearing them out faster.

Scientists have known these things happen for a long time. Yet even scientists do not understand everything about why they happen.

A new study might help scientists to understand more. It looks at the way atoms work in friction. Atoms are the building blocks of matter. An atom is the smallest possible part of something. Atoms are so small that they cannot be seen without the help of special instruments, like microscopes. Scientists measured how the placement of single atoms affects the strength of friction between two materials.

Peering Into The Tiny World Of Atoms

Jay Weymouth is a scientist who worked on the study. He said that everyone knows that the amount of friction depends on direction. "It's easier to pet a cat in one direction than another," he said. What is new is that the scientists were able to measure how much direction affects friction in the tiny world of atoms.

Friction generally increases with pressure. Even things that look smooth, such as glass, have tiny bumps too small to see without help. The bumps on one surface drag on the bumps on a surface being moved across it. This causes heat, and the heat means that the system loses force. Then the motion between the surfaces slows.

For example, when you walk on a sidewalk, the clusters of atoms that make up the rubber soles of your shoes catch on the clusters of atoms that make up the sidewalk, slowing you down. Without friction, you would slip and slide.

While these rules generally hold true, many facts are still mysteries. Scientists understand the main ideas, Weymouth said. "But we're very bad at taking two surfaces and saying what the friction will be."

There Is More To Learn

The scientists hoped the study would help them to learn more.

First, scientists slid a tiny metal point against a surface of silicon crystals. The crystals separated into pairs of atoms. When the point slid over the pairs, they rocked back and forth. The scientists found that the energy made by the rocking could be controlled by dragging the point in the same direction as the pairs.

The things that were learned from the study might help scientists understand enough about friction to control it better. For example, by understanding and controlling friction better, car parts and other machine parts could be made to last much longer.

Quiz

- 1 Read the sentence from paragraph 3 of the article.

Scientists measured how the placement of single atoms affects the strength of friction between two materials.

Which word could be substituted for "affects" above?

- (A) heats
 - (B) changes
 - (C) delays
 - (D) hurts
- 2 Read the following from the section "Peering Into The Tiny World Of Atoms."

For example, when you walk on a sidewalk, the clusters of atoms that make up the rubber soles of your shoes catch on the clusters of atoms that make up the sidewalk, slowing you down.

What is the definition of "clusters" as used above?

- (A) facts
 - (B) metals
 - (C) mysteries
 - (D) groups
- 3 Read the following from paragraph 4 of the article.

He said that everyone knows that the amount of friction depends on direction. "It's easier to pet a cat in one direction than another," he said.

Why did the scientist mention the cat?

- (A) Cats are more affected by friction than other animals.
- (B) He is a scientist who has done most of his research on cats.
- (C) It is an example of why readers should care about friction in their daily lives.
- (D) He is giving an example that readers can picture to help them understand friction.

- 4 Overall, the article is organized around:
- (A) a scientific concept and an experiment
 - (B) a scientific concept and a famous scientist
 - (C) an experiment and a famous scientist
 - (D) an experiment and learning how cars work