Curling Science

By Kerri Savage

If you're a curling enthusiast, either a player or spectator, you probably haven't given too much thought as to how a rock curls. You may know your in-turns and out-turns, but did you know the way a curling rock curls has been under scrutiny by scientists?

When a player delivers a stone and puts a turn on it, the rock travels in the direction of that turn and hopefully ends up where the skip wants it. In the example of a right-handed curler, an in-turn, where the stone is turned clockwise, will make the stone travel toward the right of the curling sheet. An out-turn, or counter clockwise turn, has the stone travelling to the left of the sheet.

Here's where things catch a broom hair and turn funny. Take an ordinary drinking glass and turn it upside down. Deliver the glass down a smooth surface with a turn, as you would a curling stone and see where the glass travels. The glass ends up travelling to the opposite side of the table, away from the curl, quite unlike a curling stone!

"I don't know what to say," says Brent Bawel, skip of an Alberta world tour curling team, after viewing the glass demonstration. "It seems counter-intuitive."

But why are curling rocks different? Dr. Mark Shegelski, a full professor of physics at the University of Northern British Columbia was curious enough to find out. A friend introduced him to the game of curling but he soon started to view the game a bit differently than the average curler.

"Being a physicist, I asked, 'why doesn't the rock travel in a straight line?' and there weren't any curlers who could give me the answer, nor other physicists interested in curling," he laughs.

"When I showed the glass demonstration to curlers, they were amazed," says Dr. Shegelski. "To explain why and how a glass curls is easy for a physicist, but a curling rock presented something different."

With curiosity set in the hack, Dr. Shegelski and his colleague, Dr. Erik Jensen, completed a series of experiments to help explain his theory about the differing behaviour of a curling stone. "Think of the overturned glass as the contact ring on a curling stone. When you push an object with a forward motion, it tends to tip forward, so in the case of the glass, the front of the glass pushes down more on the surface of the table than the back does. Therefore the front experiences more friction as it moves down the table," he explains.

If the glass has a clockwise spin, the sideways motion at the front of the glass is to the right, but the Laws of Physics tell us, friction always works in the opposite direction, which would be to the left. At the back of the glass, where it is moving left, the friction is going to the opposing right. But because there is more friction at the front of the glass from the forward motion, it moves the glass; direction of travel is toward the left.

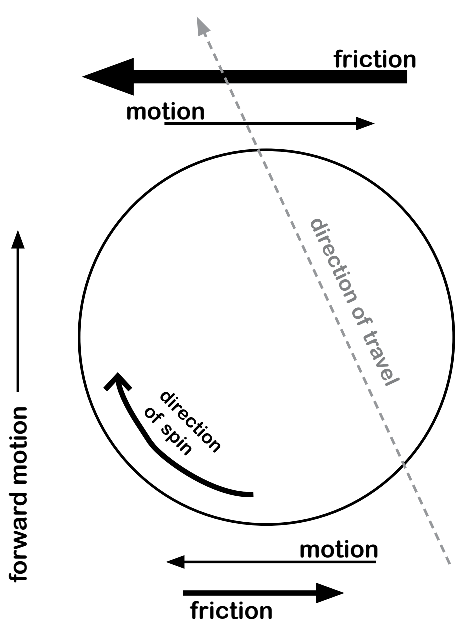
"With the curling rock, the same should hold true," says Dr. Shegelski. "But the difference is that there is less friction experienced on the front of a curling rock, compared to the glass. Here's why: the front of the rock also pushes harder on the ice at the front, but the friction raises the temperature of the ice, causing it to melt slightly."

A thin liquid film forms at the front of the rock, which lessens the friction. The back of the rock does not melt the ice as much, so the friction created at the back of the curling rock is actually greater than that at the front of the rock, which causes the rock to travel to the right when it has a clockwise turn – the opposite of the glass!

Though his speciality is in quantum physics, Dr. Shegelski is well-known for his study of the curling rock. "I get e-mails from as far away as Sweden," he says. "What was simply an interest in the physics of a sport seemed to completely take over my inbox!"

A new stand-alone exhibit, called the Hurry Hard, is available to display in your community. This interactive, digital exhibit can be placed in arenas, libraries and malls. To reserve the Hurry Hard, call 403.220.0077.

Glass on table



Stone on ice