

# Breaking Glass

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Episode: Breaking Glass

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Myths: Breaking Glass, Rolling Stone Gathers No Moss, Jet Engine Vacuum  
Myth #1: Can a singer break glass?

The Myth - Can a human voice alone, without the aid of amplification, shatter a wine glass?

Expert(s) - Meyer Sound (Dr. Roger Schwenke); Jamie Vendera, rock singer and voice coach from <http://www.thevoiceconnection.com>

Memorable Moments/Quotes -

Jamie H.: "Jamie, what am I doing wrong?"

Jamie V.: "You've got to shave your mustache!"

Results - Meyer Sound's role was to figure out if sound waves can shatter glass. They recorded the sound from tapping a lead crystal wine glass. Then, they played back the pure fundamental frequency, that they measured from the recording, from the computer. But, nothing happened. Roger concluded that it was not the fundamental frequency that would shatter the glass. So, they decide to play back all the frequencies that were measured from the recording. From the high speed camera and the straw in the glass, they could tell the glass was vibrating a lot ... but not enough. Meyer sound has determined that a board with a two inch hole in the middle will cause "acoustical phenomena" that will allow them to break the glass. It worked perfectly on the first try this time.

Adam and Jamie recalled past stories where the human voice was used to break glass. But none were confirmed to be done by voice alone. Opera singer Caruso claimed to have done it, but after his death, his wife admitted he did not. On a famous Memorex commercial, Ella Fitzgerald broke a glass with the aid of amplifiers. So, if the Mythbusters can break a glass using only the human voice, it would be the first confirmed case.

Jamie Vendera's job is to use his voice to break glass. First, they try with the aid of amplification. Using a speaker and the board with the hole, he broke the glass right away. Now to see if an amateur voice can break a glass. After a few lessons from Jamie Vendera, Jamie (Hyneman) was first up. He got really close to the frequency (the straw was too, but could not break the glass. Jamie V. gave him a few more tips and Jamie H. tried again but his pitch was too low. Next was Adam's turn. On his first try, he, too, was too low. After getting the correct pitch from Jamie V., he broke the glass with no problem. This showed that even an untrained voice could break glass.

Now, the big deal and Mythbusters exclusive, can an unamplified voice break glass? Jamie Vendera holds the glass right in front of face to try to break it with his voice. He tries 12 glasses but to no avail. From the straw vibrating around, they know he has the right tone, but not the right power. He takes a break to try again later. So, Adam steps up to try. He, too, is unable to break it. Now, Jamie V. is ready to try again. After a couple more tries, he does it! It took 556 Hz, 20 attempts, and 105 decibels to break this glass. The Mythbusters have proven it can be done. Myth CONFIRMED!

Myth #2: A rolling stone gathers no moss

Myth - The longest myth in MythBuster history, will a rolling stone not gather moss when a stationary one does?

Experts - Brent Mishler, Professor of Integrated Biology

Memorable Moments/Quotes -

Adam: "This one's been rolling for six months - over a hundred miles. ... That's a loooong hill"

Results - The build team and Brent went out and found some good rock moss. To get the moss growing on a new rock, he suggested a mixture of buttermilk and finely ground moss to be spread on the new stones. Then, the build team selected stones which they cut into equal cylinders for rolling. Their next challenge was to figure out how to build device that will keep the stone rolling and moist. They split a large barrel into two sides. The control side would not turn while the other would. Each side had three cylinder stones on individual tracks. On both sides, one stone will be roughed up, one

stone would be smooth, and one would be collected from the forest and have moss already on it. They used an electric motor to turn the barrel. Matting is put on the barrel to keep it moist and sprayers spray water onto the stones periodically. Then, they used an electric drill to mix up the buttermilk and moss.

After, four weeks, they check the stones. Now they have to determine what the myth means by "gathering" moss. Does it mean just collecting moss, or does it mean growing moss? After a few rolls down a mossy hill, they know that a rolling stone can collect moss, but what about growing?

After a total of six weeks, with no moss growing on the stones with the buttermilk and moss mixture, they realize they did not grind up the moss fine enough with the drill. They know it is because of the moisture and not the environment because the rock that already had moss growing is growing moss well. Six weeks wasted; they have to start to experiment over.

More than six months later, the experiment is over. They know a rolling stone can collect moss by rolling stones down a hill. Now to check the growing experiment. All of the control rocks, that did not move, grew moss. However, none of the rolling stones grew moss. They feel that is what the myth is about, so they proclaim the myth and proverb CONFIRMED! A rolling stone will gather no moss.

Myth #3: Jet engine vacuum

Myth - Can a vacuum be turned into a jet engine if vacuuming gasoline?

Expert(s) - Peter Anderson, the Vacuum Man

Memorable Quotes/Moments -

Tory: "This is exactly what they have at NASA"

Narrator: "Of course, NASA used theirs to build rockets, while Tory's got to build a jet engine. It's going to be one small step for him ... and probably an even smaller step for mankind."

Results - First experiment is to try it myth exactly as they think it might have occurred. They set the vacuum up to suck up gasoline fumes for five minutes. They figure that if it would happen, it would happen within that amount of time. After waiting five minutes from a safe distance, they got nothing. They learn that the motor is isolated from the air flow of the vacuum, to prevent similar explosions from happening. Even with a spark, a spark would be nowhere near the fumes of the gas. So, they remove the safety feature by drilling a hole in the protective wall. However, after another experiment, they did not get an explosion because the air flow still did not go near the engine.

Now to replicate the results of the myth. In Peter's shop, he poured a flammable liquid on a sparking vacuum and got fire. This vacuum would be great to see if they can get a jet engine out of it. However, they would have to modify the vacuum to make it act like a jet engine. Tory bought some things at restaurant supply retailers. Some of the things he bought were a funnel and a small portable propane stove burner. Tory builds his contraption to work very similarly to a jet engine. Now to test it. He hangs it and fills it with gasoline. First try: the igniter does not light the gasoline. So, he takes it out and puts it on the end of the "engine". Second try: Still no flames. Since the igniter is now on the outside, they can see it is sparking, but it is not lighting the fumes. So, they put an open flame on the end. Third try: success. The gasoline lights. Now, Tory turns on the vacuum. On the high speed camera, they can see a hint of thrust ... but not much. Tory equates his contraption to a flame thrower, but not a jet engine. Jamie explains that a jet engine vacuum would not be possible because vacuums and jet engines work on opposite principles - a vacuum creates low pressure to work while a jet engine creates more pressure to work. Myth BUSTED!

Jaime Vendera's interview with Roger Schwenke - [http://www.mythbustersfanclub.com/html/roger\\_schwenke\\_.html](http://www.mythbustersfanclub.com/html/roger_schwenke_.html)