Laws of physics, math debunk Hollywood portrayals of ghosts, vampires

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As the weather cools and Halloween approaches, chilling creaks in the stairs, bloodcurdling screams from the attic and other paranormal activity become more believable -- but not to UCF physics professor Costas Efthimiou.

The laws of physics and math debunk popular myths about ghosts and vampires, according to a paper published by Efthimiou and Sohang Gandhi, a UCF graduate now studying at Cornell University.

Using Isaac Newton's Laws of Motion, Efthimiou demonstrates that ghosts would not be able to walk and pass through walls. Basic math disproves the legend of humans turning into vampires after they are bitten, Efthimiou explains, because the entire human population in 1600 would have been wiped out in less than three years.

"These popular myths make for a lot of Halloween fun and great movies with special effects, but they just don't hold up to the strict tests of science," Efthimiou said.

In movies such as "Ghost," starring Patrick Swayze and Demi Moore, ghosts often walk like humans, pass through walls and pick up objects. But that portrayal cannot be accurate, Efthimiou says. For ghosts to have the ability to walk like humans, they would need to put a force upon the floor, which would exert an equal and opposite force in return. But ghosts' ability to pass through walls and have humans walk right through them demonstrates that they cannot apply any force.

Movies such as "Blade," featuring Wesley Snipes, suggest that vampires feed on human blood and that once a human has been bitten, he or she turns into a vampire and begins feeding on other humans. To disprove the existence of vampires, Efthimiou relied on a basic math principle known as geometric progression.

Efthimiou supposed that the first vampire arrived Jan. 1, 1600, when the human population was 536,870,911. Assuming that the vampire fed once a month and the victim turned into a vampire, there would be two vampires and 536,870,910 humans on Feb. 1. There would be four vampires on March 1 and eight on April 1. If this trend continued, all of the original humans would become vampires within two and a half years and the vampires' food source would disappear.

Efthimiou did not take into consideration mortality rates, which would have increased the speed at which the human population would have been vanquished. And even factoring in a birth rate would not change the outcome.

"In the long run, humans cannot survive under these conditions, even if our population were doubling each month," Efthimiou said. "And doubling is clearly way beyond the human capacity of reproduction."

Efthimiou also provides a practical explanation for "voodoo zombiefication," which suggests that zombies "come about by a voodoo hex being placed by a sorcerer on one of his enemies." He reviewed the case of a Haitian adolescent who was pronounced dead by a local doctor after a week of dramatic convulsions.

After the boy was buried, he returned in an incoherent state, and Haitians pronounced that a sorcerer had raised him from the dead in the state of a zombie.

Science, however, has a less-supernatural explanation. A highly-toxic substance called tetrodotoxin is found in a breed of puffer fish native to Haitian waters. Contact with this substance generally results in a rapid death. However, in some cases, the right dose of the toxin will result in a state that mimics death and slows vital signs to a level that is unable to be measured. Eventually, the victim snaps out of the death-like coma and returns to his or her regular condition.

Scientific analysis has shown that oxygen deprivation is consistent with the boy's brain damage and his incoherent state.

"It would seem that zombiefication is nothing more than a skillful act of poisoning," Efthimiou said.

The full paper can be viewed at www.arxiv.org/abs/physics/0608059

Source: University of Central Florida