Entropyman.org Explains Why Pots 'Unbreak' on the Nanoscale (Video)

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Edward Feng, a researcher at Sandia Livermore National Laboratory, has created a new Web site called Entropyman.org to explain the Second Law of Thermodynamics

(PhysOrg.com) -- A man lifts his hand in the air, and broken pieces of ceramic lying on the sidewalk spring up into his hand, coming together to form a flower pot. He lifts his hands again, and more broken pieces spring together to make a square ceramic tile.

It may just be a neat camera trick, but the Web site explains that - in terms of Newton's laws - nothing was supernatural or wrong about that picture. Rather, the reason why we don't see broken objects "unbreaking" in everyday life is due to the Second Law of Thermodynamics.

If you've ever wondered just what the Second Law means - beyond the fuzzy idea about disorder always increasing - you may want to check out the rest of Entropyman.org. The site is the brainchild of Edward Feng, a former Miller Fellow at UC Berkeley who now works at Sandia Livermore National Laboratory, specializing in statistical mechanics. Feng designed Entropyman.org as an outreach project to explain to a general audience how entropy works.

"I created this outreach project to explain the principles behind the biggest advance in my field over the last decade," Feng told *PhysOrg.com*. "This theory explains how life is different on the nanoscale and a pot can unbreak. This can happen because of the smallness of the pot. These principles are the foundation for my research with Gavin Crooks on time's arrow and other topics in statistical mechanics."

As Feng explained, the background to this project began at the Miller Symposium, a yearly get together for the Miller Institute.

"There was a session on how newspapers were losing funding for science stories, and the culprit was the internet," he said. "Well, I thought this was a little harsh. Besides, wasn't the internet a new medium to convey science, with pictures and movies? That's when I decided to embark on this project. With financial support from the Miller Institute, I hired a film maker, and the rest is history."

Entropyman.org discusses how single molecules, such as an RNA molecule, can stretch and shrink. Because RNA molecules are so small, they result in a much smaller entropy increase than larger objects. The larger the entropy increase, the less likely the object will take a time-reversed path with a decrease in entropy. Because a ceramic pot or tile has a large entropy gain when breaking, the ratio of increasing entropy to decreasing entropy is very high, so an entropy decrease is much less

likely to be observed. In other words, it's extremely unlikely that a broken pot will put itself back together, while a molecule could.

Explaining these concepts in terms of bank accounts, wedding rings, and the Eiffel Tower, Entropyman.org hopes to enable general readers to understand why pots spontaneously self-assemble on the nanoscale and, while it's possible that your room will become clean while you lounge on the couch, it is incredibly unlikely.

To see the site, visit http://entropyman.org.