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By Elaine Jarvik
Deseret News staff writer

Science really isn't as hard as it looks, Joe Andrade reminds us. Despite fancy words like dysprosium and meiosis, science is actually quite simplistic. It's basically common sense based on observations of the world.

Scientists, says Andrade, are really 2-year-olds with a good salary.

Andrade is a bioengineer, a professor at the University of Utah and co-director of the U's Center for Integrated Science Education. This year he is also the creator of "Science Without Walls," a science telecourse that begins Tuesday, Oct. 1, on KULC (Channel 9).

A lot of people are afraid of science, says Andrade, and that's partly because of the fragmented way in which most science is taught. The typical high school teaches biology first, then chemistry, then physics, when in fact all three disciplines are interrelated.

BAD HAIR, ENTROPY and ROADSIDE PHYSICS

To demystify what scientists do, Andrade explains the three basic disciplines like this:

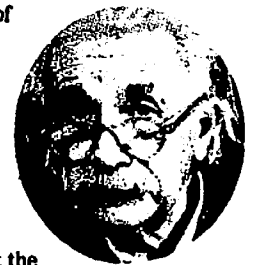
"The purpose of physics is to learn the rules of the game. The game is life on earth. Chemists use the rules to understand the stuff of the physical world. Gas stuff, liquid stuff, solid stuff. Everything relates to stuff. Biologists use the rules and the stuff to try to understand life."

We're actually all "junior physicists," says Andrade. "We've all had to learn the rules of the game, otherwise we don't function." Gravity, inertia, velocity, acceleration, friction — "we all intuitively know what they are because we use them every day." If we didn't, we'd fall over.

"As Einstein said, All of science is nothing but a refinement of everyday thinking." Assuming,

Andrade adds, that the science isn't relativistic quantum mechanics, which he also defines as "little tiny physics at very fast speed."

What we can best understand is what he calls "big physics at slow speed." You and I, he says, "operate down here in the ponderous, New-



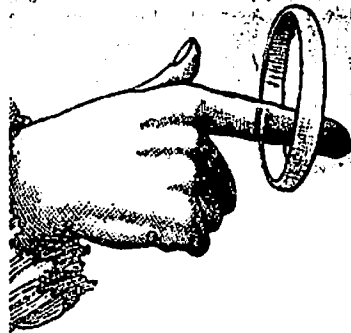
ways in which all the sciences are the same. Better to talk about how scientists observe and investigate and record the world. Better to start with concepts like constancy, systems and disorder.

Disorder — known to you as a messy house and to science as entropy — is one of Andrade's favorite concepts. "Entropy Wins!" proclaims his license plate holder.

Entropy makes an appearance in several of the 40 segments Andrade has taped for "Science Without Walls." The program airs on the university's learning channel in 10 two-hour blocks on Tuesdays from 7 to 9 p.m. (rebroadcast on Thursdays from 7 to 9 p.m.).

Although designed primarily for undergraduate non-science majors, the course is sufficiently entertaining to appeal to anyone who wants to understand the world better.

Bioengineer who creates 1 V series says science is truly not that baffling.



"Scientists are really 2-year-olds with a good salary"



Looking at the world, both big and small, slow and fast, in a rational, objective way is what scientists do. "They ask questions OF the natural world, not ABOUT it. And they expect the natural world can give them answers. Philosophy, on the other hand, asks questions to which the natural world can't respond."

"Science Without Walls" brings science to such disparate everyday phenomena as Teflon and home equity loans, guns and Bobby McFerrin, air bags and bad hair days. And hair in general.

In one segment, Andrade takes a strand of hair to a testing lab in Research Park to point out how even that boring staple of high school chemistry — the Periodic Table — hits home. Human hair contains 60 of the 92 elements.

"We're walking, talking Periodic Tables."

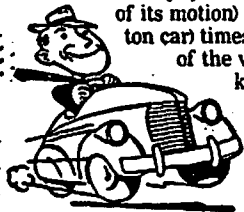
The physics and biology of the interstate

Biology: You're driving on I-80 at 65 mph when suddenly the driver in front of you slams on his brakes. It takes one second for your mind and body to react — to sense what is happening and do something. At 65 mph, that means you will have traveled five car lengths in the time it takes you to touch your brakes.

Physics: At 65 mph, it takes 10 more car lengths for the car to come to a complete stop. That's a total of 15 car lengths, compared with the usual 3 or 4 car lengths (not counting tailgaters) most drivers keep between themselves and the cars in front of them.

More physics: Kinetic energy (the energy an object has because of its motion) is roughly equal to the mass (in this case your 2-ton car) times the square

of the velocity. A car going 75 mph has nearly twice the kinetic energy it would have at 55 mph. And energy doesn't just dissipate. When your car, which had been traveling 75, suddenly stops by ramming into the car in front of it, the energy turns its attention to crumpling metal and crunching bones.



The dirtiest spot in your house

If you're looking for thriving bacteria, you don't have to look farther than the sponge in your kitchen sink. Bacteria need moisture and something to munch on (like a few microscopic remnants from last night's dinner). If you don't believe there are bacteria living on your kitchen sponge, you can try a little experiment.

Put a drop of water from the sponge on special film (you get one as part of the Science Without Walls kit if you're taking the course for University credit), put the film in a warm place for 24 to 48 hours and watch red specks appear. Each speck represents a colony of bacteria.

Most of the bacteria probably are harmless, says "Science Without Walls" professor Joseph Andrade. If they weren't, "they would have already wiped out the world's cooks." But if you've washed raw chicken with the sponge, says Andrade, throw the sponge out.

