UNIVERSITY OF CALIFORNIA, BERKELEY

Lili Fabilli and Eric Hoffer Essay Prize

2012-13 Topic: Gravity

Winners: Lindsay Bergstrom (staff), Timothy Borjian, Pierre Bourbonnais, Kelly Clancy, Gail Ford (staff), and Leah Romm.

Timothy Borjian

How To Make Gravity Controversial

First, you need protesters. Dedicated protesters. Ones who are willing to finagle their way into Michele Bachmann's office, wearing Ronald Reagan Halloween masks and nothing else. What are they protesting exactly? Doesn't matter. The honorable Representative from Minnesota will address this demonstration with outrage on the chamber floor. She'll submit a request, saying that in order to avoid future incidents the House office buildings should be reconstructed so they can float above the ground.

"I guess the laws of gravity aren't a part of homeschool curriculum," commentators on MSNBC will joke. And because they say that, the commentators on Fox News will support the Congresswoman. "These liberal pinheads seem to forget," a tall Irishman, formerly sued for sexual harassment, will pronounce, "that gravity is just a *theory*." And that's when the rumble begins.

Death for three centuries will hardly be a big enough shield to protect Isaac Newton from the slander that will slap his maggot-infested cheeks. "Do your research. Einstein was a self-described socialist and kept a picture of Newton on his study wall. Need I say more?" Ann Coulter will say in the heat of a Twitter war with a third-grader. "'Standing on the shoulders of giants.' Just another way you liberals are trying to demonize the success of job creators."

DEMOCRATS AND REPUBLICANS DIFFER ON REASON FOR WHY EARTH IS IN ORBIT will grace the cover of *The New York Times*. While CNN, fearing the label "biased" as if it's a gang of rabid pit bulls, will bring on two talking heads to debate the issue. Via satellite, a prominent Physics professor will temporarily shelf the pride and dignity bestowed upon a person after winning the Nobel Prize as he will drop a pencil as a simple demonstration of gravity in action.

"Why do you hate freedom?" is how the Tea Party blogger in studio will rebut, frothing at the mouth with fury. "You are *forcing* us to believe something. The founding fathers are rolling in their graves." Wolf Blitzer will become a superfluous moderator as impassioned remarks will fly back and forth like cannon fire—one side saying you are not entitled to your own facts, the other proclaiming that the issue should be left to the states. Then, the trump card will be played.

The creationist pundit, waving around a photograph, will exclaim that someone who tramples all over traditional family values shouldn't impose their beliefs on others. The camera will then zoom in on the photo, which will show the professor in a moment of intimacy: shirtless and kissing another man. Check and mate.

Only after a new Gallup poll shows that 25% of Americans answered "undecided" when asked whether they think the Earth has a gravitational pull will the Nobel Laureate give an eloquent speech, remarking that even though he is resigning his University position, that facts still remain facts. But by then the view count for the video *Scientist Gets Owned LOL* will have reached seven digits and counting, and the damage will already have been done.

And thus, similar to its cousins—evolution and climate change—gravity will join the elite group of scientific facts that also moonlight as political bludgeons.

Pierre Bourbonnais

Gravity

We met under that oak in a cold Canadian autumn when I tried to take my first step, but fell back onto the ground. We met again one night, when cradled in my father's arms, I reached out for the Moon, that iridescent orb that had harbored a million fantasies of cosmonauts and lunar jumps, only to watch her tug back my outstretched arm — like a boundless, pitch-black net, cast to constrict children's dreams.

Too often, Gravity is an obstruction, the sagging of flesh and bone, the inexhaustible force that drags us down. We see her in our shadow — a lone and inescapable stalker, preying on our every movement, prepared to sabotage every attempt for escape. Hardly a day goes by between encounters. Today, I tripped over an uneven step on the way to class and swear I felt her tugging at my feet right before the fall. Someday, she'll bury us all into our graves.

Gravity never sleeps. We thought we had broken free of her for a moment when our ancestors built that cathedral whose spire seemed to almost pierce the heavens, when the Montgolfier brothers took for the sky in their hot air balloon, or when when a man first set foot on the Moon. But for all of our technological headway and mechanical ingenuity, Gravity continues to pull us back, for planes can only fly so high and buildings can only be so tall. Even in the farthest nooks of space, she prowls, binding together galaxies so large we wonder how'd they come about.

So it may come as a surprise that, in spite of her many indiscretions, Gravity is our oldest friend. From the moment matter first collected in the universe, she toiled to build a livable Earth. Like an expecting parent decorating a nursery, she placed the stars into the night sky and positioned the sun so the Earth would be just warm enough. She carved canyons for us live in and shaped mountains to protect us.

Soon, humans arrived. She watched as we grew — as we built our monuments, inching closer to the sky. An overprotective parents, sometimes she had no choice but to hold us back. With her solar system mode and twinkling stars, she had fueled our dreams of exploration — so

much we were threatening to leave our crib. She knows she'll have to let us go someday — man's quest cannot be denied — but if she can, she might as well slow down our leave.

I was walking through Berkeley one night when I looked up and saw a full moon. It was floating there, a milky orb set against the black curtain that is the night sky, just as it had years earlier when she had held me back. Only this time, I could have sworn I saw her crouched in the vacuum of the night. She was dangling the moon from what appeared to be a long, jet black fishing rod, brandishing it ever so slightly.

Kelly Clancy

Gravity

Of the four fundamental forces in nature, gravity is the weakest. It's so weak, in fact, that scientists have yet to measure it: it can only be inferred from the motion of the massive bodies it affects. The graviton, the elementary particle thought to mediate the force of gravitation, has never been detected. Reality is constantly thwarting scientists' expectations of the phenomena: for example, there is a well documented anomaly wherein spacecraft flying by Earth report a brief, inexplicable increase in velocity of 13 millimeters per second. Gravity doesn't fit within the Standard Model of physics, and by our current understanding, it's too weak to hold galaxies together as well as it does. Yet, while stars are bound together more tightly than expected for such a frail force, the universe also appears to be rocketing apart, as though repulsed. The constellations, familiar forms since antiquity, will eventually become unrecognizable as the stars composing them dance towards the farthest edges of the sky. Though physicists must force gravity into their equations on faith, our experience of it is inarguable: to most humans, it is the mundane perpetrator of wrinkles and prat falls. We infer it every time we drop a pen or pour milk into our cereal.

When a body falls to Earth, it exerts an equal but opposite force on the planet. In 1980 my grandfather, crippled by diabetes, jumped from a bridge into the Delaware River. "Jumped, or fell," the obituary politely reported. Assume his body was a sphere. The center of his mass moved in a straight line through curved space time, tugging–infinitesimally–on Earth's trajectory. He did not hit the water, but the rocky riverbed: atomic forces binding molecules of stone repulsed his descent, creating an inelastic collision wherein the force of impact was absorbed by his frame. The mammalian heart is not well supported within the chest–we might model it as an egg cradled by rubber bands stretched across the rigid ribcage. My grandfather's legs were broken, but he would have lived had his heart not been torn from the soft webbing of arteries stringing it in place.

We know from relativity that gravity doesn't just pull on mass–it pulls on time, too–so, as my grandfather neared the surface of the Earth, time slowed imperceptibly. As he fell, the arch of Ursa Major flattened itself out by one billionth of a degree: gravity, try though it may, cannot hold even stars in place for very long. As he fell, every galaxy in the universe fled farther away from Earth in a mathematical arc that gravitation has no power to correct. My grandfather's body was discovered the next morning by a motorist; policemen collected the items flung from his pockets on impact. His face unrecognizable, my grandmother refused to believe it was him until an officer produced his rosary. Outside, spring flurries danced as though suspended midair.

Gail Ford

Gravity and the Theory of Everything

"Gravity," I think, amused. Then, "Which gravity?" as an image of Newton's falling apple is overlaid by an elderly man's face showing a proper seriousness. Oh, good. A puzzle.

I prod with "gravity" and "published since January 2011", and UC Berkeley Library's online catalog replies with one hundred and fifty seven works. Engineers and choreographers, physicists and poets, geologists, mathematicians, oceanographers, the occasional economist, and one musician -- each seeking the perfect balance point between rest and motion, earth and sky.

What keeps us on the planet rather than falling off is not a new question. Aristotle talks of light things (made of fire) tending up, and heavy things (made of earth) tending down, each according to its nature. Lao Tzu says, "Gravity is the root of lightness; stillness, the ruler of movement." These seem at once to be comments on physical laws, and metaphor for that which is right and fitting.

I can't help thinking "dust to dust", and wonder if "gravity" and "grave" are etymologically related. I wander down the intertwined paths of matter and spirit. If Einstein can think his way into energy and matter being one, I shouldn't be surprised that humans shout their joy in terms of buoyancy and hurts as an inability to move.

I read that "quantum gravity" – a theory that would marry the forces ruling planets, solar systems and galaxies to the forces between subatomic particles – would be "the holy grail of physics." I thrill with the mathematicians and physicists as they talk with passion and delight about the possibility that "quantum gravity" would be, in effect, A Theory of Everything.

And I think, what a very human thing it is, this search. How the thought turned word has mass. How ideas attract minds around the world and across time. How theories hold together constellations of thinkers vibrating, pulsing, pulling, waiting. Seeking the story that will make sense of everything.

So in addition to gravity, and the quantum forces, I propose we also include these: attention, curiosity, imagination, and the magnetism of meaning. Could a theory of everything be complete without them?

Leah Romm

gravity, or how I'm still learning to float

The very first thing they taught us about gravity is that it holds on to you when no one else will. There was mention of accelerating at a rate of nine point eight somethings per second per second. I can't remember what the somethings were, but nowadays I think they said "heartbeats" because that's how the heart screams *me* tersely. I went home and laid down to think about gravity. *Sure, you're sleeping alone, and his arm no longer holds you close, but at least you're not floating away.* I fell asleep and dreamt about green chalkboards smeared with inconsistent curiosity. The chalkboards disappeared and I found myself walking through a garden. There was an old man sitting in a chair. He was holding a teapot in one hand and two teacups in another. A second chair appeared, so I came closer and sat down. The old man

handed me a cup and poured a hot, blue liquid into it. "Drink," he said. He had a thick accent, maybe from Germany or Russia or France. "What is it?" I asked him. "Gravitea," he responded. As soon as I took a sip, I felt heavier, almost as if the chair I was sitting in was tug tug tugging me down. I woke up thinking about the word "tug" and how we all know that it's just "gut" spelled backwards. And we all know that when I think of you my stomach sinks because you drag me down. You are the Earth, and I am the Moon still loyally orbiting you.

The next day, they taught us about escape velocity, and I felt small. There was mention of a gravitational constant, but all I could think about was how I constantly gravitate towards the memories of you and me. No matter how quickly I run in the rain, the water droplets and I still end up in the same spot—spilled across the ground. Last night, I dreamt that I was standing at the top of a well, and something pushed me in, or maybe I lost my balance, so I fell fell fell and landed in your sure, strong arms. I tried to look into your eyes, but you disappeared, and suddenly, I was sitting at a desk with a paper in front of me. The instructions at the top of the paper said *Calculate the rate at which you need to run to escape the gravity of this situation.* I was about to whimper, "What situation?" when my father walked into the room and shouted, "GO!" and my right hand began to furiously scribble out formulas that I didn't know I knew.

Gravity is the parent always yelling, "YOU'RE GROUNDED!" as if you needed the cruel reminder.

I panicked. I got out of my desk and ran towards the only exit in the room.

Gravity is the "PULL" sign on the door that you end up pushing anyways.

Waking up has become harder. Even my dreams hold on too tightly.