A Naïve Theory of Gravity

Before I start, I want you to take a good, long look at the ground. The lovely, safe, solid ground beneath you, before I rip it up like a null-and-void contract. But even before you kiss goodbye the warm, doughy complacency that the earth beneath your feet is *solid*, I want you to ruminate awhile on what it means to explain something… what it means to really *understand*.

Kurt Vonnegut said that any scientist who couldn't explain his work to a eight-year-old was a charlatan. Abso-bloody-lutely. Turn that around, though; when I was eight, I tried to explain something to a scientist, but he just laughed in my face. But you won't laugh, will you?

Gravity is the first natural law we encounter, playing with stacking cups and eventually wearying of the predictability with which they clatter to the kitchen floor. After seven months on Earth, there's nothing more to be said. Stuff falls.

Next comes the question that we've now almost forgotten to ask; Why? It's because there's a huge planet at our feet. All six thousand million million million tonnes of it. But ask a scientist why an object, an apple say, feels this urgent attraction to the Big Rock and what'll you get? An answer long on equations and short on explanation. He (and let's face facts, it'll probably be a *he*) might mention gravitons or Higgs particles, minuscule theoretical particles that theoretically bind theoretical matter theoretically together. Theoretically. But after three decades and trillions of pounds worth of trying, the fact that neither of these particles has been detected might be considered a flaw in the explanation.

The fundamental problem is known as action at a distance. How can the Earth influence the trajectory of the moon across the gulf of space? What elastic joins the apple on the tree to the sward beneath? What is the mechanism?

Step forward Lincolnshire's finest, Sir Isaac, born on Christmas, England's true saviour, we worship you at Newtonmas and ever more. Your inverse square law (halve the distance, quadruple the force) beautifully *describes* the movement of the apple or the trajectory of the planets, but explain? Not really.

Einstein came closer, refining decimal places, to find the tiny errors in Newton's equations, errors that placed the orbit of Mercury out of kilter. Einstein deduced huge swathes of knowledge from thinking about men in plummeting lifts, their cables severed, thrust into instance weightlessness. Einstein saw deeper than any man yet born that gravity and acceleration are one and the same.

Indeed, if you want to describe the acceleration of a plane or train, the most convenient unit is *g*, the constant of acceleration due to gravity- just under ten metres per second per second. What does that mean? It means that if you jump off a tall building....you're a blithering idiot. No, it means that if you jump off a tall building, by the time you've worked out how many doubled letters there are in Mississippi, you'll be plummeting at ten metres per second, a respectable cycling pace. Another second later and you'll be doing twenty metres per second, more than enough for a fine in a built up area. One second more? Thirty metres per second, motorway pace. And so on, until your features are distributed over a wet pavement.

Gravity and acceleration are one and the same, Einstein saw, and used this to refine Mercury's orbit and predict the subtlest deviations of light around the sun, confirmed during the 1919 solar eclipse. But he didn't *quite* work out what it meant closer to home.

This is where you need to be eight. You need to be eight and you need to be me. You have to have the untrammelled mind of the eight-year-old, not yet burdened by a payload of so-called facts. And an overheard conversation set me wondering....

What if the Earth's radius were expanding at a frightening, dizzying rate (to be precise, 10 metres per second per second), not pulling us *down*, but pushing us *up*. That would explain everything. You don't need a clever remote-control mechanism. No action at a distance required.

So why did the apple fall? Answer: it never did. Released from being dragged ever upwards by the bending bough of the tree, it briefly floated in space until Newton, sitting on his parabolically expanding Colsterworth lawn, shot up into the air and headed it sideways with his scratchy wig.

OK, there's a problem, a problem that even an eight-year-old is going to spot. If the Earth were expanding, we'd be able to measure it, right? Yet ever since Eratosthenes, the size of Earth hasn't changed at all, within the margins of error. So, case closed, yes?

No. See, every metre stick we have is part of the world, made of earthly material, and is experiencing the same giddying expansion. So Earth, though expanding wildly, stays exactly the same size relative to us and relative to any measuring stick we care to fashion. Of course, there must, hidden in the aether, be some ideal metre, like Plato's idea-horse and idea-dog, unwavering, reliable – the standard against which all of our transient metres are judged.

So look again at the carpet, tiles, or grass beneath your feet. It is the skin of a manic balloon, propelling you up into space at impossible speeds.

Hold on tight, because you're only going to get faster.