Sonova Quark

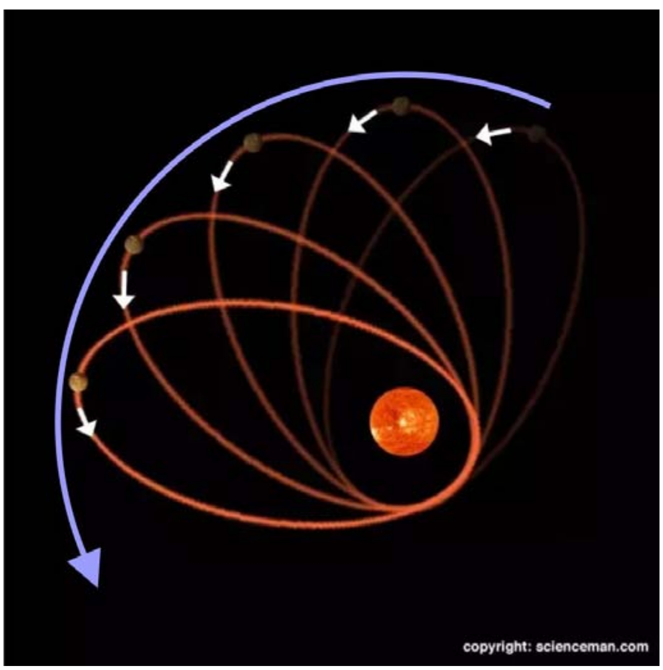
Brought to you by Steven Vincent Johnson and Darlene P. Coltrain, mailing address: 6666 Odana Road, #213, Madison, WI 53719. Email Steve: orionworks@charter.net. Email Darlene: dpcoltrain@gmail.com Web: http://OrionWorks.com. Quark is brought to you by *OrionWorks*. Internal layout is assembled in InDesign CS5. Printing done on a HP Color Laserjet Pro MFP M277dw. Most covers were created using CorelDraw graphics suite and printed on a Cannon PRO-100 Photo Inkjet printer.

This edition was created for ***Turbo Charged Party Animal***, #406
Completed somewhere around May 21, 2020

Turn, Turn, Turn

In Honor of Greg Rhin

As the Orbit Turns: It is remarkable, in my opinion, that back in the 19th century astronomers were capable of making observations so precise that they noticed Mercury's orbit precesses forward, on it's major axis approximately 0.16 degrees every 100 years. That's comes to about one degree of forward precession approximately every 625 years. That's a lot of eye-squinting!



Before I had retired from state service, I found time to teach myself how to program in the languages of Visual basic and c# using Microsoft's Visual Studio Suite, a handy-dandy computer compiler platform. Finally! I had acquired decent computer graphic tools allowing me to plot out a planet's orbital position as it travelled around the sun based on Newton's deceptively simple mathematical formula:

$$\frac{1}{r^2}$$

...where **r** represents the radius (or distance) a planet resides from where the sun is positioned.

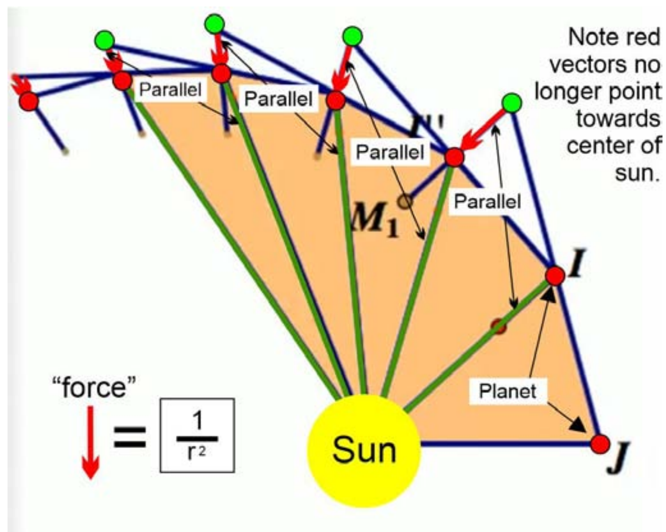
Keep in mind I have simplified Newton's formula. The original expression contains several more letters representing different values that don't change, what we would call *constants*. Because these constant values don't change one can conveniently replace, or substitute, them with a single value of "1", placed in the fraction's numerator position. BTW, this isn't cheating. Performing a substitution is a time honored trick used in algebra and calculus. Using temporary substitutions can help make the medicine go down more easily. For the purposes of this article the above simplified formula works. It's certainly a whole lot easier to understand.

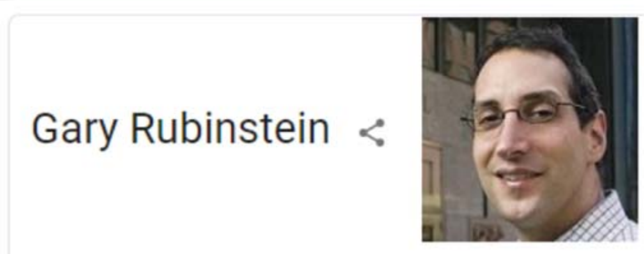
For those of you who still remember how fractions work the above formula tells you that as the numerical value associated with **r** , the *denominator*, gets smaller, (which means: as a planet approaches closer to the star it orbits), the value generated get's larger and larger by the square of the distance. Technically speaking, this numerical value can be thought of as a *force*, the amount of pushing or pulling that alters the current position and direction the planet is “forced” (no pun intended) to take. This value combines a *vector* value, or direction, plus its speed. The combination of these two attributes of physics is called the planet’s *velocity*.

It is important to realize that this *velocity* value is constantly changing. It is constantly speeding up or slowing down. It’s also constantly changing it’s directional vector. Technically speaking, “a change in velocity” is called *acceleration*. We experience acceleration speeding up or slowing down in a car, as well as when we make a sharp turn to avoid smacking into grandma trying to get to the curb before being creamed. All around us, we earthlings constantly feel the affects of *acceleration*. We feel it as gravity religiously holding our feet to the ground. While it might not seem to make logical sense to conjecture that we planet dwellers are in a constant state of acceleration, what Einstein’s work in General Relativity conformed is the curious fact that the effects of acceleration and gravity are indistinguishable from each other. In other words, gravity and acceleration are essentially the same natural phenomenon. We tend to have some difficulty comprehending this realization because as we stand still on the surface of the Earth, we don’t notice ourselves moving about, or changing speed. We seem quite stationary, so how in the tarnation could anyone concoct an outlandish premise that our bodies are constantly in a state of acceleration, of constantly speeding up or slowing down? But that’s General Relativity for ya. Perhaps this parlor trick of Nature can be discussed at greater length in some future TURBO installment. Perhaps getting high first might help the medicine go down, too… but I digress.

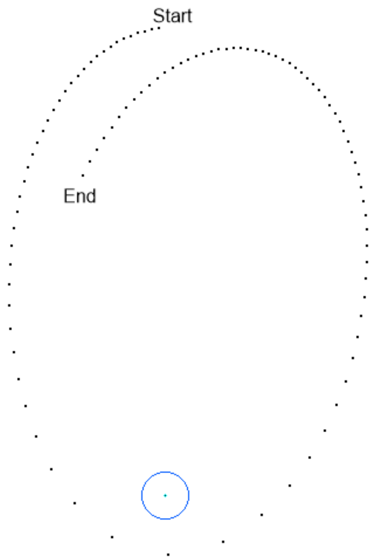
The mathematical & geometrical procedure often used to plot a planet’s orbit around the sun can be visualized with the following modified graphic originally created by a talented mathematician, Gary Rubinstein. I’ve watched countless times some of Gary’s of U-Tube videos, particularly on the subject of animating Newton’s laws of planetary motion. Here’s a still video frame I extracted from one of his lectures. I have modified the frame with the addition red (vector) arrows and accompanying green lines. The red vector arrows visually represent Newton’s force generated by the value of 1 divided by r-squared. Notice the red vector lines get shorter the farther the planet (The red circles) is positioned from the Sun. It means Newton’s force of attraction is getting weaker by they square of the distance. The planet is being attracted, or pulled with less force towards the sun. The green circles anchored at the base of the red vector lines represent where the planet would have been positioned had there been no Newton force applied. In that case another Newton law predicts that the planet (the green circles) would continue to travel with the exact same speed and direction (aka *velocity*) as previously plotted.

Notice each of the green lines, which I attempt to associate with a red vector line are *parallel* to each other. Also notice that each parallel red line associated with a green line is basically ahead of the green line. Because the parallel red line has been shifted ahead of its associated green line, notice that the parallel red line is *NO LONGER POINTING TOWARDS THE CENTER OF THE SUN!* I would tend to speculate that this may be the reason behind what ultimately causes the planet’s mathematically plotted orbit to precess forward in its elliptical orbit around the Sun. It has noting to do with relativity.

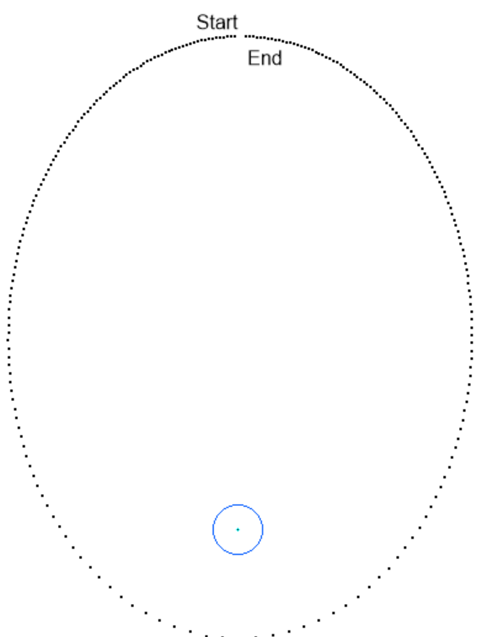




Curiously, when I assembled and executed my computer algorithm the results produced a *backward* precession, not a forward one that Greg got. My speculations for the difference may have something to do with the order in which I applied the various forces and vectors that ultimately generated each successive position of the planet. I hasten to add that this is pure speculation on my



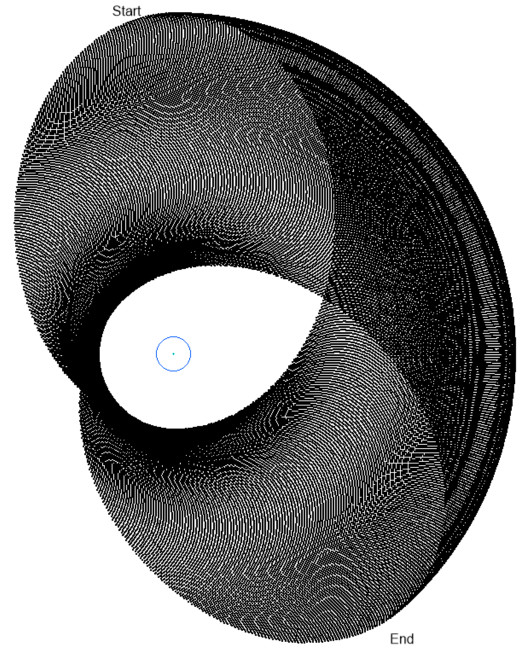
A coarse single orbit plotted using my own computer algorithm. Notice the very obvious backward precession.



A more refined single orbit plotted using my own computer algorithm. Notice the backward precession is almost undetectable.

part. Unfortunately, at present, I don't possess sufficient energy or motivation to pursue the matter in more detail. But Greg might give me incentive.

Setting that issue aside, in these modern times I am able to take advantage of the lightening speed of computer computations. It was easy to generate my curious *backward* precession oddities and study at considerable depth the results. I noticed that if I attempted to generate more refined orbital

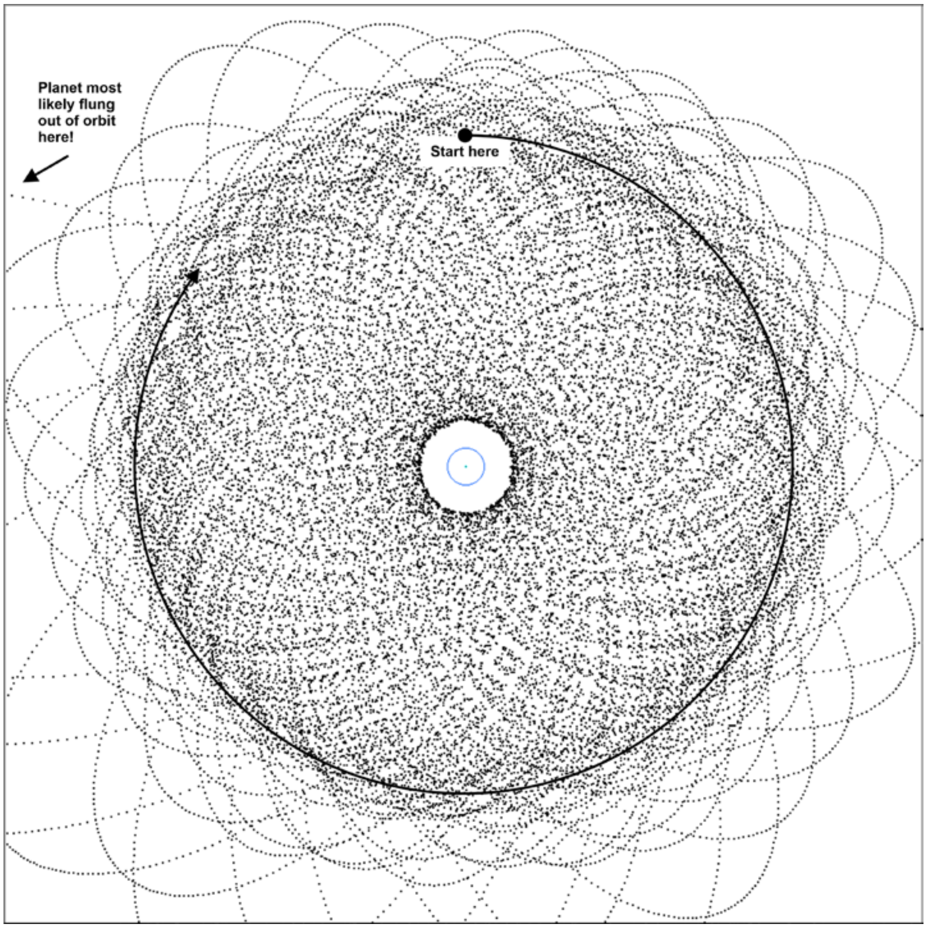


The same more refined single orbit plotted using my own computer algorithm. This time I allowed many more elliptical orbits to complete. Once again the backward precession becomes noticeable.

plots where, for example, I continued to double and redouble the number of planetary positions comprising a complete orbit, the associated red vector line would begin to point more precisely towards the center of the sun. And when that happens I noticed that the previously observed backward precession of the elliptical orbit began to disappear. Keep in mind the backward precession never goes away completely. It simply becomes less noticeable. Theoretically speaking, if one could compute an infinite number of planetary positions, where all the red vector arrows would essentially be pointing directly at the center of the Sun, the previously observed backward elliptical precession would probably disappear altogether.

I suspect the same mathematical methodology would happen to algorithms that result in *forward* precessions, an observation I suspect Greg Rihn likely computed manually with, I presume with paper and pencil... perhaps with the aid of a clunky 1972 vintage calculator.

Over the years, and as I continued to refine my computer programming skills I stumbled across some interesting surprises. For your enjoyment, here is an example of a more coarsely plotted orbit where I iterated through countless elliptical orbital precessions. As time passed the orbit slowly becomes unstable. Observing the process, it was almost as if I was witnessing radioactive decay in



Example of a less refined orbit plotted countless times resulting in multiple backward elliptical orbital precessions. As the computer continues to algebraically iterate through the algorithm the orbit eventually begins to destabilize. Eventually the planet's orbit becomes so erratic that it is literally flung out of the Sun's gravity influence. It's out'a here!

action. In the final stages, as the orbit becomes terminally unstable backward precession can briefly transform into forward precession. Eventually the planet's orbit is literally thrown out of it's once more-or-less stable orbit with the sun.

I will risk going out on a precarious limb here and conjecture that there is more information that can be gleaned from the subject of orbital precession. My own research suggests a possibility of comprehending forward precession based on Einstein's work on General Relativity with the aid of nothing more simple than the application of simple geometry. Besides the well-known 3-D graphic where Einstein shows the phenomenon of gravity as a funnel slowly sucking circulating marbles down the center of a deep hole, I think there may exist some less known geometry that can show elliptical orbits becoming gently warped as a planet travels faster and experiences a dilation of time, particularly as the object traverses closer to the sun. I will try to show the geometry of this "warp" in a future TURBO installment, and let the reader decide for themselves if they think there might be some merit to my conjecture.

OW

Komments #406:

Greg: Thanks for giving me an opportunity to regurgitate an accumulation of pent up plot-speak. Had I attended the same physics class that you were in I likely would have pestered you mercilessly into being your Igor assistant. I'd like to think that you would have taken advantage of my geometry and plotting skills. I would have loved going through the discovery process. I don't know if this is possible but do you still remember the algebraic steps you manually took plotting your planet positions? I'd love to compare notes.

OW

Boxing Zoey