

**The
Zen
of
Gravity**

“Thou shalt not disfigure the soul.”

Dune, Frank Herbert

The Zen of Gravity

william h. clark ii



SPQR Media

Knoxville

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Part One

The Psyche

1

A New Hope

The Force permeates all of creation from the smallest microcosm to the most massive intergalactic structure. It's stronger in living things but also infuses earth, wind, and fire by virtue of their molecular and/or crystal structure, however transient or long-lasting it might be. You don't need a moral religious backbone or a bountiful supply of midichlorians for the Force to be strong in you. In fact, chlorine-based molecules are acidic, and except for perhaps a short-lived burst of the Force, a pH less than 7 causes the body to leach calcium from the bones to neutralize the acidity.

All of the world's religions and spiritualities have a small bit of the Force in their philosophy. It's what makes faith work. It's what gives the faithful their supernatural powers to persevere and overcome persecution. These mainstream religions fight one another constantly to preserve their precious parcel of Force. Frankly, that's very un-Force-like.

The power of the Force in the real world is the power of the math. These religions, for example, are like the family of curves in Figure 1.1. These curves represent different solutions to a single set of equations. Observe how they all have the same general shape, shifted slightly. Another general solution to the set of equations is called the envelope curve. This envelope curve represents the Force: every curve (religion) shares a little section of the Force, more or less an equal amount thereof.

The only way to find an envelope curve is to graph all the other solution curves to see if there's a hidden pattern among and between them. You can't find the envelope curve using statistical

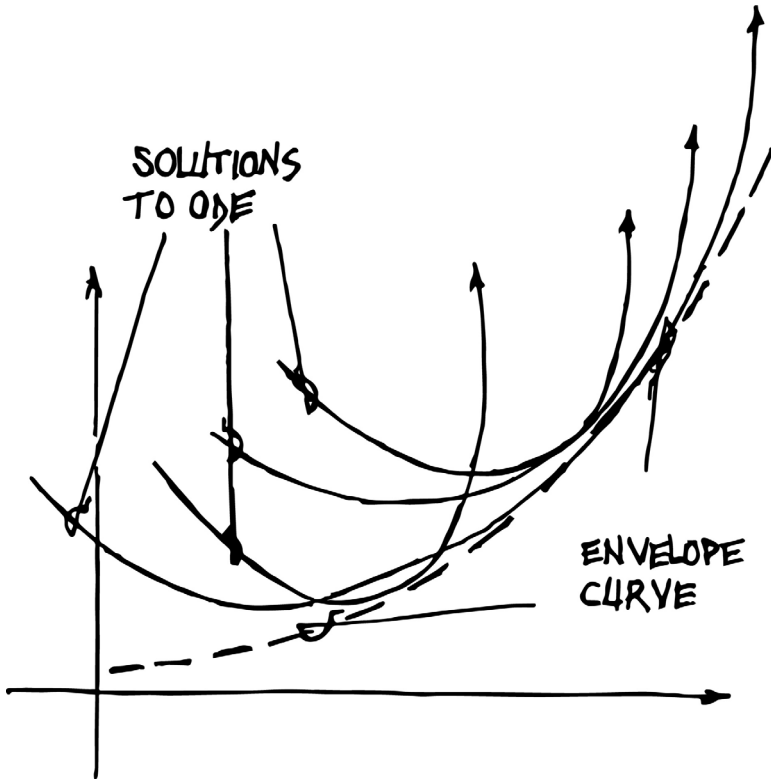


Figure 1.1 **The Envelope Curve**

methods or trial and error or even dumb luck. Religions are based on all three, which is why they have force but not Force.

Religions love to use their force – unseen, unseeable, yet with the power to move mountains – to not only enthrall their believers but to impose upon them a rigid, codified way of life. Granted, discipline, fortitude, and endurance are essential to accessing the Force within, but we’re talking physical and mental discipline, or moral courage in defense of universal values, not the strength to defend archaic, outdated mores and attitudes.

All major religions evolved during a period in human history when the prevailing belief among humanity was to worship nature.

These religions – Judaism, Christianity, and Islam – had to portray nature as the penultimate evil (the evil serpent in the Garden of Eden, for example) to win converts. They continue to represent nature as evil because that's how they keep convincing people that human beings are godlike and above all that. In our selfie-obsessed age of narcissism, people need that sugar rush.

In the modern world, the role of religion is to relieve the collective human conscience of the excruciating psychic pain at the destruction of nature all around us: first in our history by the destruction of forests, then of entire habitats; then the widespread pillaging of natural resources that destroys entire ecosystems, and now global warming that threatens the world entire. Religion is there for everybody, to ease the pain of all those humans who aren't in denial (a clever fake news trick of the psyche to convince a person that a painful truth is a lie) and to make it all right as part of God's plan.

A philosophy that attributes the Force to all of nature, and especially to all living things, is according to all modern religions the Dark Side of the Force. This attribution is relatively consistent with the mathematics you will find herein (well, not math, just diagrams of mathematical systems like we did with Figure 1.1).

Most of the math is taken from celestial mechanics, the first science (astronomy, studying the night sky) but now all but extinct. There are very, very few experts in celestial mechanics anymore, and no universities that award graduate degrees in the field. We are, literally the Dark Side.

THE END OF SCIENCE

To give you some perspective on the situation in science, you're referred to a New York Times bestseller from 1996, *The End of Science*. The author interviewed virtually every leading researcher in several important sciences, and they all came to the same conclusion: science can progress no further. The book was divided into several chapters:

- The End of Progress
- The End of Philosophy
- The End of Physics

Plus, the end of cosmology, biology, social science, and neuroscience. The reason is that all scientific investigations are based on statistical methods (in the modern day we even have bitcoin currencies, statistical money). Statistics has its limit, and we're there. There has been virtually no progress in theoretical physics for almost ten years now. It's beyond a crisis. Crisis has a subtext of hope; there's no hope now in theoretical physics.

This wasn't just a bestseller; it was a runaway bestseller. It was so popular that it was reprinted in 2015. Back at the turn of the century, the entire scientific community signed off on the conclusion of the author (and all the big brains interviewed). Since then, not one person of note has yet to object to the conclusion of that book. Science is dead by universal consensus.

So, yes, according to the status quo, any new approach to science that says science is NOT at an end is by definition the dark side.

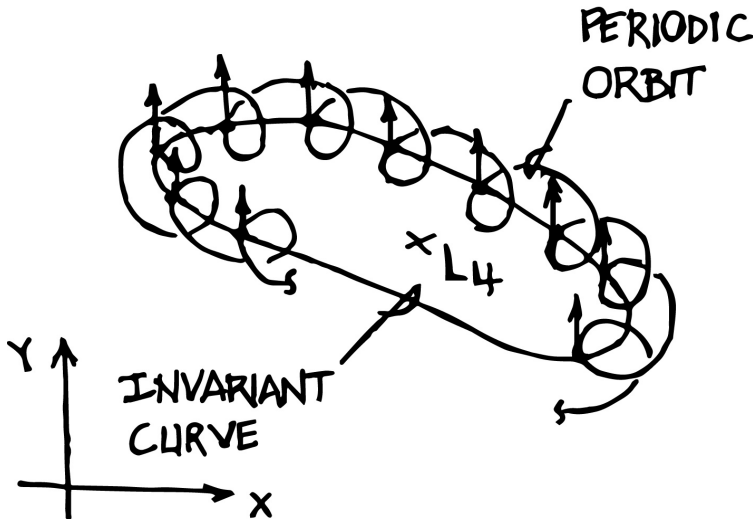


Figure 1.2 Another Envelope Curve

The distinction between the science in this book and all their sciences (and, actually, we'll posit exciting new avenues forward in all the above dead fields) is not even as subtle as all that. Celestial mechanics isn't just the dark side of science or even the black sheep of science, but the Dark Side.

Celestial mechanics is a study of astronomical phenomenon using pure mathematics, all of which can be traced directly back to Newton's Law of Gravitation. Before Einstein and Relativity, celestial mechanics had half-way decent explanations for all the so-called "proofs" of Relativity: bending of light by the sun, precession in Mercury's orbit, the time paradox in orbiting satellites, and others. Our explanations were based on classical, Newtonian physics; no bizarre, unnatural tensor calculus or the warping of the space-time continuum.

Back in 1960, a major scientific meeting on dynamical astronomy that was held to decide if the celestial mechanics explanations of the so-called relativity phenomena were correct or Einstein's General Theory of Relativity. Their decision was the death knoll for celestial mechanics. And the death sentence has been all but carried out. A war transpired in the ensuing years but the field has suffered terrible losses, and the victory of the evil Jedi is all but complete and absolute.

Then suddenly, in only the last couple of years, a number of experiments have proven the bizarre phenomenon of quantum entanglement. Two subatomic particles created at the same time and then separated by ten thousand miles; when one particle changes state the other also changes state at the exact same time. There is no physical connection between them, no nothing. The change doesn't even take the speed of light to happen. It co-occurs, in the exact same nanosecond, as close to instantaneous as our instruments can measure.

What's the Force, if not quantum entanglement?

2

A Conception Dynamic

Our story begins at conception. Each load of sperm contains roughly a billion little sperm cells. A thousand of these sperms reach the fallopian tubes. Two hundred sperms reach the egg. One of these sperms manages to penetrate the egg to conceive life. Arguably the process ensures that the fittest sperm is the one that joins with the egg, the sperm with the strongest Force. Or, if you're a biologist who has signed off on the Statistics Manifesto, it's a matter of random chance.

Is it chance or is it by design?

Consider how this whole fertilization process is a very delicate balance between the swimming strength and skill of the sperm and the geometry of the womb. It seems quite providential that given every woman's uterus is different; a longer path for the sperm for taller, larger women (or women who have given birth before); a more convoluted path for overweight women; flexible walls of the womb for younger women, less flexible for older women; and a thousand other variables. Yet across all this continuum of geometries, only one sperm has the energy left over after surviving Thermopylae to be the first to penetrate the egg. Once the egg is fertilized, the shell hardens, and no more sperms can get through.

Survival of the fittest, mind you, is the golden rule of nature. Every natural system follows this prime directive of the cosmos. By definition, then, if only one out of a billion sperms succeeds, then it's the fittest of the lot. This ensures that the male offspring of the whole fertilization process has the fastest, fittest sperms – to overcome even more complications in the female reproductive tract

caused by the pill, vaginal mesh, a worn-out lining in the vagina from too much sex, a bad diet, excessive use of alcohol or drugs and sundry other predilections of the modern era that place new challenges in the path of the little sperms. (Not to mention all the unhealthy things men eat and do that diminish the vitality of their spermatozoa; the one successful sperm is called a spermatozoon.)

Another way to look at all this is to introduce extremes. Put one Superman sperm in a lot of a billion standard sperms (*Untermensch* vs. *ubermensch* as Nietzsche spoke), and guess who becomes the 'zoon? Perhaps the same applies to a strong, confident man's sperm in a race against a wimpy, effeminate male. Surely the tadpole sperms share their basic personality traits, like assertiveness, drive, and ambition. One more reason to put a tiger in your tank, especially if you're trying to mate with a healthy, active, independent woman. Indeed, she wouldn't have offspring with anybody of lesser qualities.

Conversely, if you're a regular guy, your sperm won't have a chance in hell of penetrating the wall of Supergirl's ovum to form a zygote. As far as that goes, given her Super-human physiology no matter how long your sex lasts your ejaculation will still be hopelessly premature. Moreover, the odds are high that you'll never get her to climax.

Be that as it may, even if the Force doesn't play a role in the fertilization process right now, as human biology evolves under the influence of all the chemicals toxifying the womb environment, making conception less and less likely, the Force will soon be needed to unfurl the checkered flag. Even more so because the male reproductive system is just as challenged – by Rogaine, milk and a hundred other products laced with female hormones – so that the quintessential load of sperm has a lower sperm count even for healthy, young males.

This whole discussion doesn't even touch on the whole male-female relationship thing. Nobody can deny that a certain gentle, romantic persuasion is needed even to reach the point of desiring offspring. A hundred things are in the way: jobs, finances,

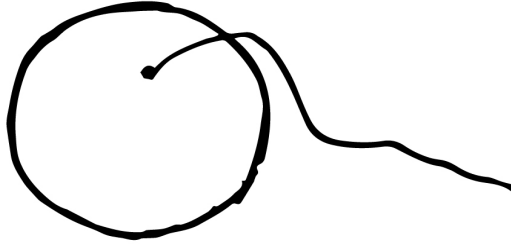


Figure 2.1 **The Moment of Conception**

commitment issues, materialism, even narcissism in the modern selfie-Facebook age. The pill and condoms have all but eliminated the traditional risks from getting all caught up in the moment, getting overwhelmed by the seven senses, and having sex on the beach under the full moon.

What's a poor sperm (or lonely egg) to do, for goodness sakes?

Alas, if there really is a modicum of Force involved in the sperm's life journey, then we're screwed as a species. Because that means sperm is a freedom-loving kind of a guy, and after a hundred sprints off the starting line (corralled by a condom and doomed to a quick death with never even a hope of success), away goes that extra spark of incentive. Domesticated animals don't even try to escape their enclosure anymore, and maybe likewise with civilized, domesticated sperms.

GET IN TOUCH WITH YOUR INNER BUFFALO

Soon only the buffaloes of the male species will be capable of fertilizing a woman. Buffalos are impossible to keep inside a fence of any kind, and never stop trying to escape. Of course, over time and through selective breeding and gene therapy, the freedom instinct has been bred out of buffaloes. Now they can be happily

kept in 6x6 foot pens for their entire life so that fat urbanites can consume their low-fat, low-cholesterol meat to excess.

So, why risk it? Get your buffalo on, guys, and get in touch with your inner Force. With the masculinizing of women by the pill, making them less satisfied with regular sex and harder to climax, you need new skills not just to seduce a gal but to satisfy her once you're locked in the heat of the night. Ditto for women because Rogaine and all the female hormones in the food chain have feminized the male libido and made your guy harder to corner and keep aroused (erect). Then you add the whole #metoo movement to the mix, and it's enough to erectile dysfunction even the healthiest bulls corralled in the pasture.

All things being equal, a little extra self-confidence never did anybody any harm. If it increases the odds for successful relationships, then the Force is just what the doctor ordered. We'll get into all that complicated relationship dynamics later. For now, we need to carry on with the storyline and pick up where we left off, right after sperm meets egg.

A TWO BODY PROBLEM

Now, the critical aspect of conception is the instant when a sperm penetrates the egg. In order to avoid getting knocked up by more sperms, the egg shell hardens to keep all the rest of the suitors out of her holy of holies. Unlike the depiction in Figure 2.1, the egg is a whole lot bigger than the sperm. The egg is roughly thirty times bigger than the length of the sperm tadpole from head to tail. The head of the sperm is a tenth of the total length, so that makes the egg 300 times larger than the head of the sperm.

As long as we're on the topic of scale, it's worth mentioning here, for future reference, that what we have is a Two Body Problem. One very large body and one much, much smaller body. In celestial mechanics, of course, it's Earth and a satellite or a planet and the sun. The key concept here is that in the Three Body Problem there are two large bodies and, again, one very small one, and so

forth for a Four Body Problem or a Ten Body Problem (a spacecraft zipping through the solar system). There's always one much, much smaller body.

COORDINATE AXES

Back on topic, the first thing an engineer would do to study the conception scenario is to slap a coordinate system on it. Since the egg is attached to the wall of the womb, the logical origin for our coordinate system is the center of the egg, that part of our problem that's fixed in space. An astrophysicist would object to this because the wall of the womb is not at all fixed in absolute space, but gyrating like all get out during the violence of sexual intercourse. That puts a lot of relativistic variables into the mix, which we want to get rid of by choosing our coordinate system carefully.

Let's just assume that the egg and womb and wad of sperm are all moving together, and apply a moving coordinate system to the situation. (Or just assume that the dynamical systems are at rest, exhausted from their fit of ecstasy, lying spent on their king-size bed, trying to catch their breath. Any sperm worth a damn would wait for this moment to make his move anyway.)

Now, the geometry of the egg is a sphere. A point on this sphere can be represented schematically any number of ways, but since we're just starting off in our study, we should choose something simple, fundamental. A sphere is basically a circle in 3D, rotated about its geometric center. Circles are associated with several trigonometric functions, all of which are represented in Figure 2.2. Observe how the point B is central to this infrastructure scheme: we set up our coordinate system so that B is the point on the sphere where sperm meets egg.

Thinking of this conception thing as an engineering process, the maximum force that the sperm can exert on the sphere is if it's swimming perpendicular to the surface of the egg. This perpendicular is to a line tangent to the sphere at the point of

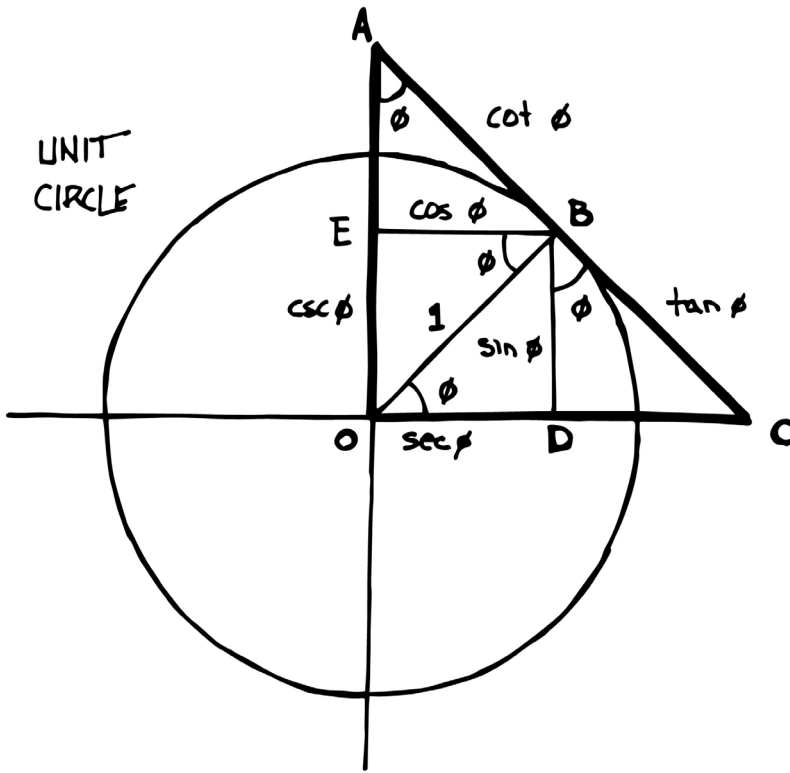


Figure 2.2 **The Trigonometric Functions**

contact B as shown. Clearly, any sperms that come at the sphere along the extended axis from A or C (toward B) will not be able to exert much energy penetrating the egg, and it will just sheer off and disappear into deep space. (At which point it's out of the equation because it doesn't have the energy left to do a U-turn for another try.) Likewise, for any sperm approaching along any angle less than 90 degrees to the perpendicular of the ABC line segment, bouncing off into never-ever land and failure. It's the sperm most closely aligned to the B-to-origin line (reaching the egg closest to the point B) that wins the grand prize, fertilizes the egg, and fathers an offspring.

Observe that the strongest possible structure is a sphere, another mathematical principle. Nature doesn't want all 200 sperms that reach the egg to penetrate it, but just one, otherwise you have a messy pregnancy and reduced odds of healthy offspring. It's the survival of the fittest all over again.

Of course, Figure 2.2 isn't the only possible coordinate system. A more suitable coordinate system from the sperm's point of view is illustrated in Figure 2.3. Here we see the egg square in the sights of the leading sperm, who keeps the circle squared on the axes as it approaches. Holding the circle centered at the origin (it's projected impact point) means first contact is precisely perpendicular to the surface of the egg, and at the maximum force to penetrate the egg and transform the union into a zygote. Now that's Force for you.

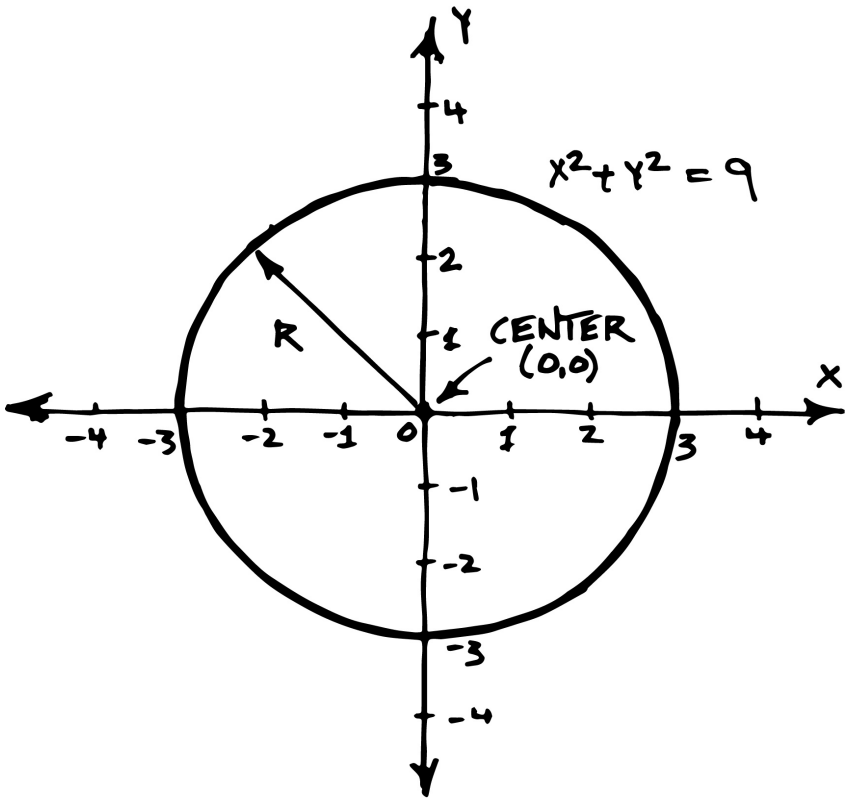


Figure 2.3 Target Front and Center

Which implies that sperms from men who are good at mathematics outperform the sperm of the math-challenged male, assuming of course that a smidgen of this knowledge is passed along to the genes in the sperm. This is, of course, a matter for exacting scientific analysis (via a double-blind study so that the results don't favor the scientist doing the experiment (who, naturally, will bias the results in his favor because he's among the math elites.))

IN MATH DO WE TRUST

This is not to prejudice the presentation to imply that people who are good with math have a stronger Force. However, everybody needs a good understanding of at least probabilities to judge exactly how highly qualified a relationship target you should strive for. Otherwise, you waste all your time seeking the impossible and get absolutely nowhere. The founding principle of nature is to preserve the species and to perpetuate the self. It's one of the primary drives in human nature, and all of nature, in fact. Those with the strongest drive are the survivors at every level of natural selection and humans who know the math to optimize their chances also up their chances of procreating successfully.

Which is a most satisfactory conjecture, given that this is fundamentally a book about math and using the power of math to understand the world and to better your chances of succeeding in your world at every level and in every venture. So, yes, math is good for the Force. Math exercises your brain muscles, keeps you from wasting your money on lottery tickets so that you can spend it on special details for the object of your desires (or your kids, as the case may be). A basic grasp of math keeps you out of excessive debt, directs you into a half-way lucrative career, lets you wear nice clothes and otherwise accouter your lifestyle for maximum appeal to the opposite sex. So, get with the program and put math to work in all aspects of your life.

3

A New Model of the Psyche

Not long after a sperm fertilizes the egg, you have cell division, and the evolution of a brand-new human being begins in earnest. To continue the emphasis on math and basic geometry, a good model of this evolution of our zygote is the ellipse. Consider Figure 3.1, showing how to construct an ellipse: fix a length of string at the two foci, pull it tight with a pencil, and move the pencil around in a circular motion.

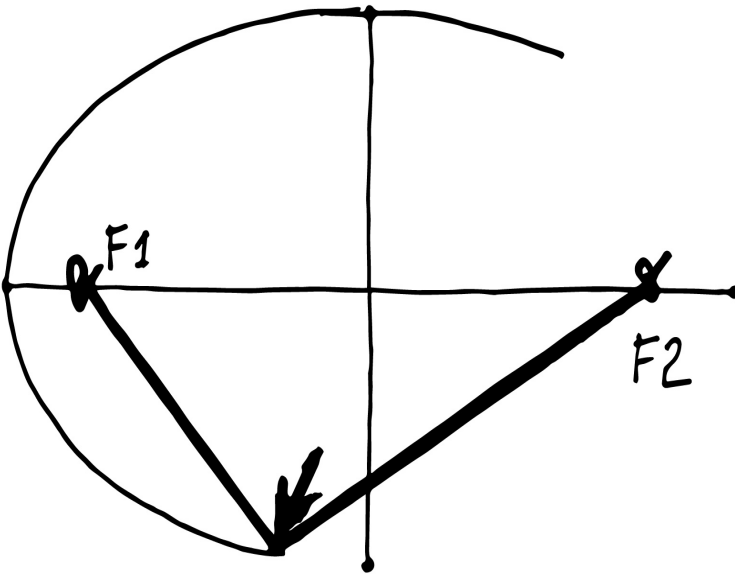


Figure 3.1 **Constructing an Ellipse**

In astronomy, a planet orbits the sun along an elliptical path where the sun is at one focus. This can be generalized as a Two Body Problem (2BP), which describes a satellite orbiting Earth, a moon orbiting its planet, and so forth. There isn't anything at the other "empty focus." This ellipse analogy fits the egg-sperm model nicely, with the giant egg still centered on the origin and the 300-times-smaller spermatozoa at a focus. As the zygote matures and cell division occurs the figure transforms so that each of the two foci becomes the center of a new mitochondrion.

INVERSE-SQUARED FORCES

If you want to apply hard math to our new 2BP, gravity is the force that keeps the small planet/moon/satellite in orbit around the much more massive central body. Of course, our Force isn't gravity (at least at our present scale it isn't), but that doesn't necessarily imply the absence of any force. The governing equation for electrostatics is also an inverse-squared force (proportional to $1/r^2$ where r is the distance between the bodies), hence the original Bohr Model of the atom: an electron orbiting a much larger nucleus. Sound in a gas, also light and other electromagnetic phenomena, are all inverse-squared forces and have this same influence upon objects, inducing this elliptical type of motion. None of these forces apply strictly to our growing zygote; however, all such forces do exist in our problem, if only subtly and indirectly.

Before Newton's Law of Gravitation (published in 1686), the general consensus among scientists and natural philosophers was that gravity was an inverse force, proportional to $1/r$. A spring is one example of an inverse force: the length of the spring is directly proportional to the amount of force stretching it.

Figure 3.2 is a plot of a $1/r$ force called Cassini curves, after the Italian mathematician who studied them circa 1680. Observe that in the immediate vicinity of the two foci, motion of a small object influenced by this $1/r$ force is elliptical. The lines intersecting the

foci are called orthogonal trajectories because they cross the main force lines at a 90-degree angle (orthogonal).

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CASSINI'S CURVES

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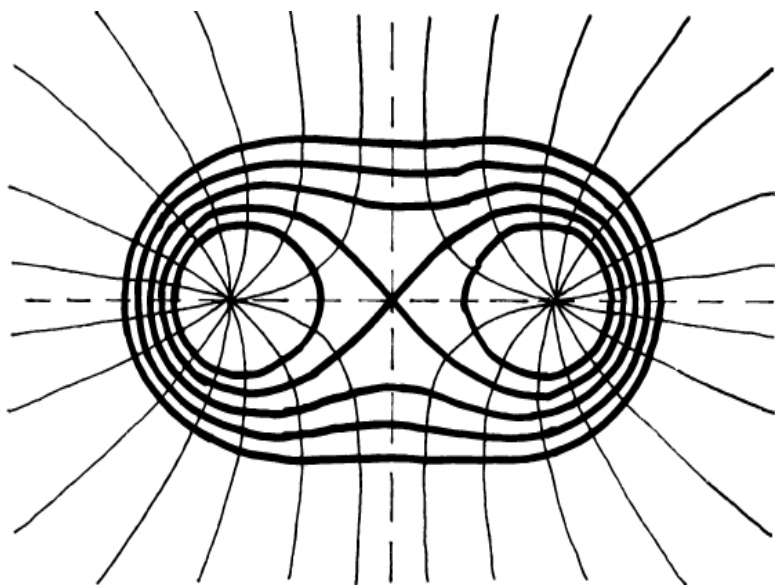


Figure 3.2 **Cassini Curves**

influenced by this $1/r$ force is elliptical. The lines intersecting the foci are called orthogonal trajectories because they cross the main force lines at a 90-degree angle (orthogonal). Notice the illusion of a vortex or well at the two foci.

The interesting thing about these Cassini curves, at least within a short range of the two foci as shown in Figure 3.2, is that you also find these same curves in what we call the Three Body Problem (two large bodies, e.g., planets + one much smaller body moving around them, such as a spacecraft). Once you go beyond this scale, the curves don't match up, but in close proximity to the two primary bodies, you couldn't say for sure if this is a $1/r$ or a $1/r^2$ force graphic. And, well, we're at exactly that scale now in our presentation.

In orbital mechanics, all of the closed curves in Figure 3.2 are called zero velocity curves. In the 3BP (here both bodies are equal in mass) any object on one of these trajectories will remain

there indefinitely, absent any external influences. The figure-8 shaped loop between the two primary bodies is called a free return trajectory. All of the Apollo missions to the moon were on such a flight path (Earth and moon were the two primary bodies), so that when Apollo 13 lost power on the far side of the moon they were able to drift back to Earth where they used their last ounce of fuel to manage to drop out of their figure-8 orbit into a re-entry of Earth's atmosphere.

The two primaries in Figure 3.2 could also be two nuclei, with electrons in circular orbits around each one and also (perhaps) more electrons in the outer "bonding" orbitals holding the two nuclei in a fixed structure like a crystal matrix. In this case, the orthogonal curves are field lines of the electromagnetic field.

Reference our ongoing discussion of the Force, the most exciting aspect of this discussion is that the Cassini curves exist in both a $1/r$ problem and a $1/r^2$ problem. And so, even though there's no gravity force or electrostatic force in our zygote problem, this doesn't exclude a $1/r$ force forming the Cassini curves and the associated (dashed) field lines. The latter of which very nicely paint a target on the egg so that the one spermatozoon that achieved fertilization could have been most sensed while in route through the obstacle course of insemination. The Force, indeed.

CONIC SECTIONS

We'll need a more complicated model as the embryo develops, but a model that includes the ellipse as a special case because that's where we started, and we want the overall model to be consistent through the evolution of the individual's life. A logical selection is that of conic sections, illustrated in Figure 3.3. Here we see that an ellipse is formed by passing a plane through the cone, with the eccentricity of the ellipse increasing as the angle of the plane to the horizontal increases. Once the angle of the intersecting plane increases beyond the angle of the sides of the cone you get a parabola, and when the plane is vertical you have a hyperbola.

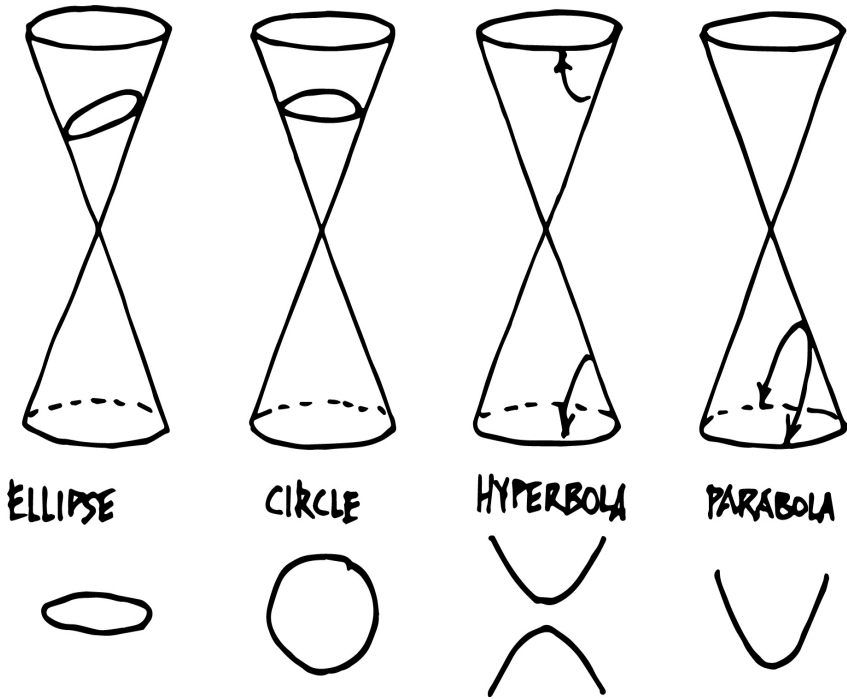


Figure 3.3 **Conic Sections**

Observe that the circle is a special case of an ellipse where both foci are coincident. Imagine a vertical line forming the axis of the cone. This line is at the center of all circles formed by horizontal sections. This line is also the main foci of all ellipses. This is the kind of continuity we're looking for, from the spherical egg to the elliptical zygote growing by cell division. Think of the dynamics of our mitochondria as becoming elongated and then splitting into two, similar to how the ellipse transitions gradually into a hyperbola.

As the embryo develops and gradually takes on the characteristic physiology of an infant, our focus changes from simple cell-division

dynamics to the evolution of the human psyche, from whence the Force originates (both in imagination and, as the case may eventually be, in physical reality). So, our nascent model also needs to grow into something more complicated, something that will encompass the fundamental aspects of the psyche: the id, ego, superego, and the subconscious. The detachment of the parabola from the symmetry of the ellipse and hyperbola suggests a subconscious which is separate from the other constituents of the psyche.

Consider the construct of the envelope curve presented in the first chapter. Applying that idea to conic sections, the surface of the cone would be the envelope curve. Actually, if you add up all the ellipses formed by a continuum of sections, you get the cone; likewise, for all the parabolas and, again, if you sum up all the hyperbolas. Although there's a practical limit in building out the complete surface of the cone (especially as distance from the origin increases) to the ellipses, as you get closer and closer to the angle of the cone. A similar limit exists for the parabolas, but not for the hyperbolas. This suggests a limit versus the real plane for the different conics.

THE ICEBERG PSYCHE MODEL

Let us now look at the standard model of the psyche called the "iceberg theory" reproduced in Figure 3.4. Here we have (1) a triangular shape (conic in 3D), (2) three distinct components, and (3) a demarcation between the conscious "tip of the iceberg" mind and the subconscious, the roughly ninety percent of the ice that's below the surface.

How does this iceberg model jive with our mathematical model? Not too bad.

The ego is predominantly above the surface and easily quantified (ellipses), the id is quite far under the surface in the subconscious and somewhat unreachable (parabolas), and the superego goes all the way from top to bottom (hyperbolas). All of which are nicely

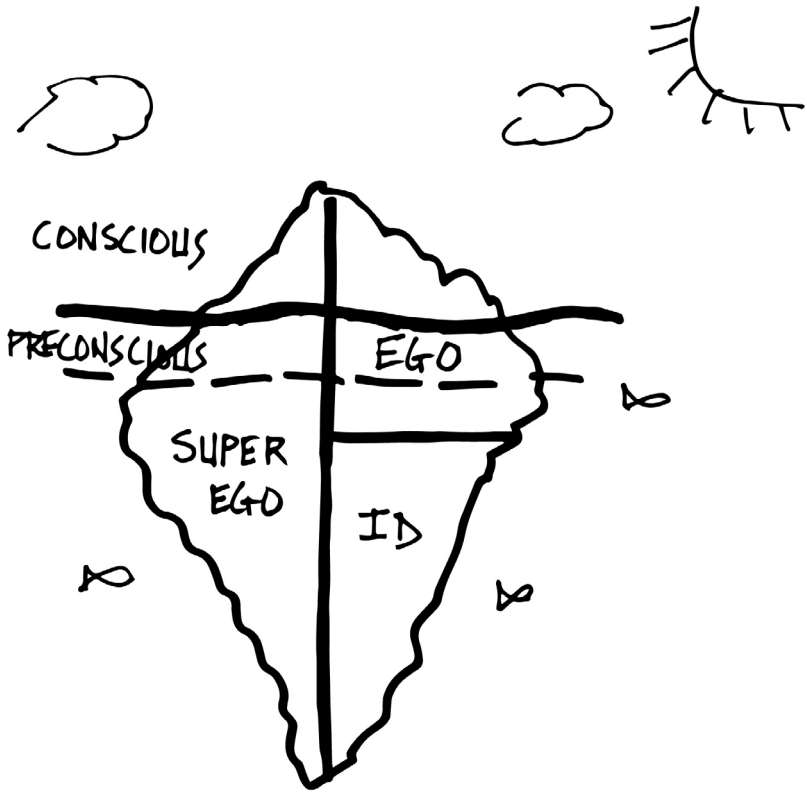


Figure 3.4 **The Iceberg Model of the Psyche**

packaged together in the mind in an intangible entity called the psyche, alias the envelope curve or the physical cone.

This psyche model will not happen in our life-cycle analysis for a long time, of course, but we now know that if we move forward with our mathematical ellipse/conic geometry analogies then as the model becomes more sophisticated, we can be confident that it can incorporate the necessary complexity of the human psyche.

Notice that the psyche is itself an envelope curve. It's not physically a part of the brain or any structure thereof, but an intangible aspect of the whole. Conceptually, the psyche is literally

a “ghost in the machine” that happens because of a chemical or electromagnetic or some sort of coherent resonance among all the moving parts. If you could quantify all the physical parts and functions of the brain, then the psyche would form a part of each, individual part but not be a physical part itself; alias an envelope curve (once removed from the physical plane).

What happens if we change to conic sections that have a fatter or narrower cone? Well, if the density of the ocean water increases/decreases the block of ice will have more/less above the surface. That is, the (buoyant) Force upward on the ice is equal to the weight of the fluid displaced. I suppose there are analogies for sunlight melting more of the exposed ice and violent waves occasionally inundating the ice and even warmer waters melting the ice. All of which I’m sure most people can relate to at one level, as the stresses and anxieties of the world threaten your mental stability practically every day.

One person’s tsunami is another person’s mental breakdown. Some people cope better than others. How do they do it?

RELIGION AND THE PSYCHE

Mental health professionals rely mostly on medications anymore – creating an artificial horizon or forcing the waters to be calm all the time or even modulating the sunlight or air temperature, wind, water temp, salinity, and so forth. If you’re truly a mental health disaster, they treat your psyche they just do root canal therapy with caustic chemicals that pretty much freeze up everything (or melt the iceberg entirely). Is that where civilization is leading humanity? (Is that what happens when we domesticate animals and force them to live in tiny cages all their born days?)

Is there another way, something internal you can do (e.g., traditional talk therapy)? Can you tap your internal Force to weather the storms and vagaries of life without having to resort to psychoactive medications – or even alcohol, drugs, caffeine, or

conspicuous consumption? Is it possible to go through life with a Rocky Mountain high (absent the cannabis)?

World religions try to do this by fortifying your soul. You might think of the soul, in our iceberg model, as the surface of the ocean. That demarcation is the one tangible aspect of our model (well, relatively tangible, realizing that the whole damn mode is imaginary), and it makes sense that, as the original psychologist in the evolution of human history, religious practitioners would glom onto what's most accessible in the psyche and try to help people manage their lives to "keep from being inundated" by life's tribulations or to "weather the storm" or to "look on the bright, sunny side of things."

THE SOUL AS A FIREWALL

As the boundary between the conscious and the subconscious, this idea of designating the surface of the ocean as the soul is sublime and elegant. A person with a healthy spirituality is fortified against all the pressures of the modern world – bullying, prejudice, discrimination, envy, peer pressure, not to mention rampant materialism, fake news, political manipulations, and crime. A robust soul keeps the subconscious protected, helps you resist temptation, blocks sunlight from warming up the water and melting away your inner resolve, and maintains the buoyancy when the waters are troubled.

The soul, in this context, is a firewall that protects the psyche from all the evils of the world. This is parallel to the whole idea of Force: an inner strength that sets you apart, that puts your feet on the golden brick road to achieve your dreams. It at once connects you to the world at large but keeps the world from changing your convictions, your goals, your resolve, or your ambitions. Like we posited in Chapter One, the Force is an envelope curve for many different spiritualities, a source code that you can integrate into your life even if you lack a strong affinity to any specific spirituality (or even if you do).

These critical issues, good or bad, certainly justify the inclusion of a soul to our psyche model. You can call it a firewall or a filter or a defense mechanism against all the ruthless invasive forces people face in the modern day that have never before been present. Calling it a soul doesn't mean it's religious in nature, but only refers to the traditional role of the soul to bring out the best in people and to urge us to strive for honor and nobility (instead of glam, Facebook likes, and selfies with your fav celebrity). In fact, all the "soul" really is right now is a specific frame of reference; and that, too, jives with traditional religion as a unique way to look at the world. Thus, the soul stays in the model, with the reservation that if the mathematics do not support it as we move forward, it's disposable.

4

Psyche + Math = Soul

To add a little more depth and context (not to mention math) to the discussion, let's go through the same material as in the previous chapter again. This time we'll do it from the perspective of celestial mechanics. We began with a presentation of an ellipse and how to construct it from a length of string attached to the two foci. In the Two Body Problem (2BP) the sun is at one focus, and a planet moves around the sun in an elliptical orbit as illustrated in Figure 4.1

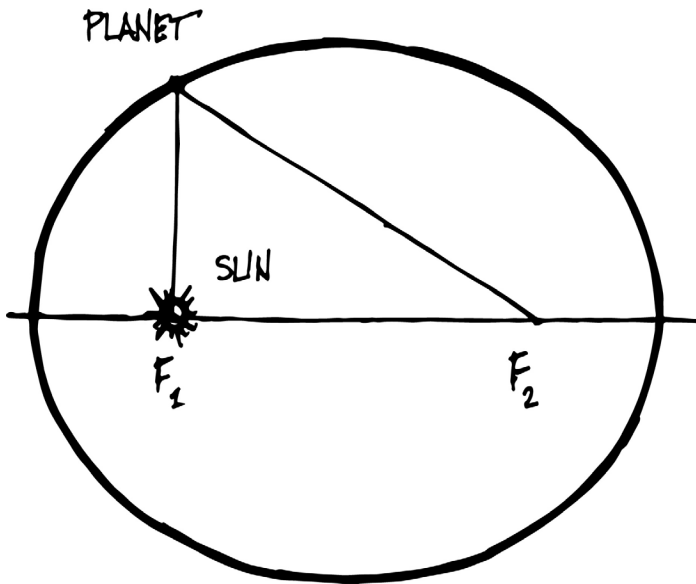


Figure 4.1 The Two Body Problem

The mathematical analysis of the 2BP using the equation for gravity as the central force proves that the distance from F_1 to the planet plus the distance from F_2 to the planet remains constant throughout the planet's orbit. So, using a string to construct the figure results in a perfect ellipse; it's not just a clever approximation. Also, keep in mind that the math of the 2BP applies to any two bodies under the influence of gravity as long as one is much, much more massive than the other.

A SIMPLE $M_1=M_2$ TWO BODY PROBLEM

Trying to quantify our mythical Force at the zygote level, we suggested a $1/r$ force (the simplest, most basic kind of force) and presented a plot of the Cassini curves. Compare Figure 3.2 with Figure 4.2 which is a plot of zero velocity curves for a Three Body Problem (two large primary masses) where the masses are equal. You can see that indeed the orbital geometry around the two primaries close to the central masses matches the Cassini curves. Except that now the central force is gravity, an inverse-squared force that is proportional to $1/r^2$.

In the 3BP there's a line called the separatrix which is "a boundary that separates two modes of behavior in a problem." In the context of our zygote theory, this geometry implies mitochondria on the verge of cell division into separate cells centered on F_1 and F_2 . Notice the circular orbits around the primary masses and the figure-8 shaped curve we called a free-return orbital. (You'll find out the meaning of L_2 , a stability point, later on.)

In the last chapter, we next embarked on a discussion of conic section geometry and how the ellipse fits into that mathematical paradigm. Although not exactly analogous, Figure 4.1 is a section of a larger graphic of zero velocity curves (closed, stable orbits upon which the third much smaller mass will remain indefinitely, absent any external forces other than gravity from the two central masses).

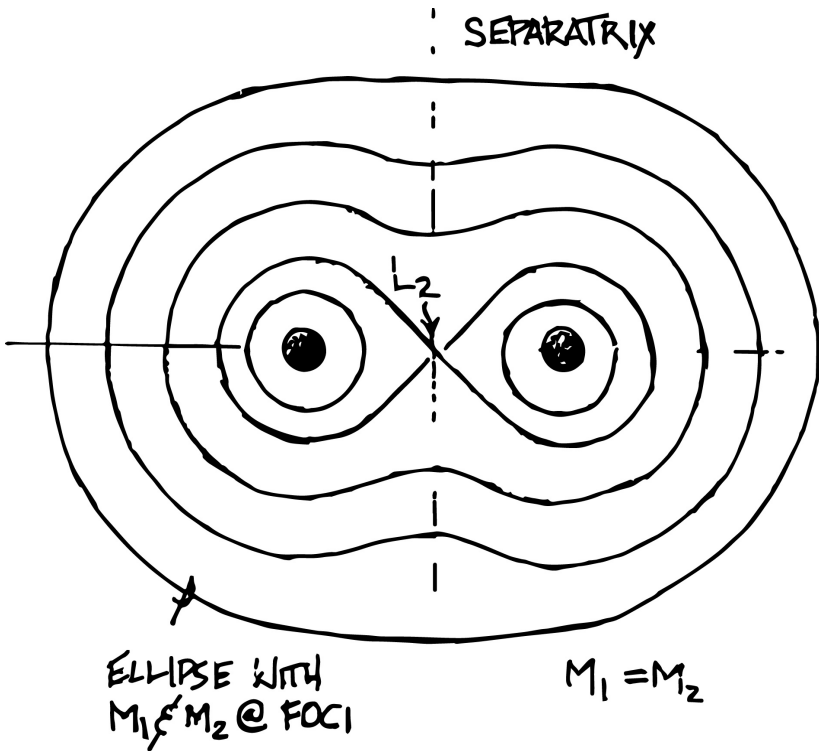


Figure 4.2 The Three Body Problem with $m_1 = m_2$

THE 3D THREE BODY PROBLEM GRAPH

The full 3BP plot, in 3D, is provided in Figure 4.3. Notice that M_2 is a little more massive than M_1 in this graphic. If you study the diagram carefully, you'll recognize that Figure 4.2 is a section (or a plane taken through the 3D plot) near the bottom of the "tubes" in Figure 4.3 at the saddle (u-shaped transition) between the vertical column of stable orbitals above m_1 and m_2 . You'll notice the ellipses, the curved indentations, and the separatrix

demarcation in the direction approaching L_5 (another stability point in the 3BP).

This 3BP will be discussed at great length later. All of the closed lines are mathematically exact orbits, so the plot represents a rigorous body of analysis. Fortunately, you don't need to understand all that advanced math in order to grasp the underlying dynamic. Recall that the figure-8 loop around the two primaries was a stable, zero-thrust orbit used by the Apollo mission to the moon. This orbit rotates with the moon. In other words, the whole 3BP graphic rotates. The mathematics is configured so that m_1 and m_2 remain fixed on the horizontal x-axis, as seen here. Again, this notion of rotating coordinates will be ironed out clearly and patiently in future chapters.

21ST CENTURY SCHIZOID HUMANITY

As long as we're upgrading all of the underlying math, we can also upgrade to a more modern model of the human psyche. Figure 4.4 is a graphic popular on the Internet these days that shows the general consensus for the current state of the so-called iceberg model of the psyche. You'll observe that the subconscious mind is no longer entirely your own. What used to be all "personal subconscious" is now only a fourth of the unconscious mind. The other three-fourths is occupied by a collective, shared consciousness.

Is this depiction for real? One metric of the subconscious mind is body language, that part of human communication that's done automatically, unconsciously by facial expressions, the motion of your limbs, the position of your body, and so forth. Presumably, early man communicated 100% by nonverbal cues until they developed a spoken language. In some of my old notes from 20 years ago, the recognized percent of communication that was nonverbal back then was 90%. The latest figures estimate it at 70%. So, yes, the subconscious mind is diminishing, at least as far as expression via nonverbal cues.

There's a great deal of anecdotal evidence in the psychology

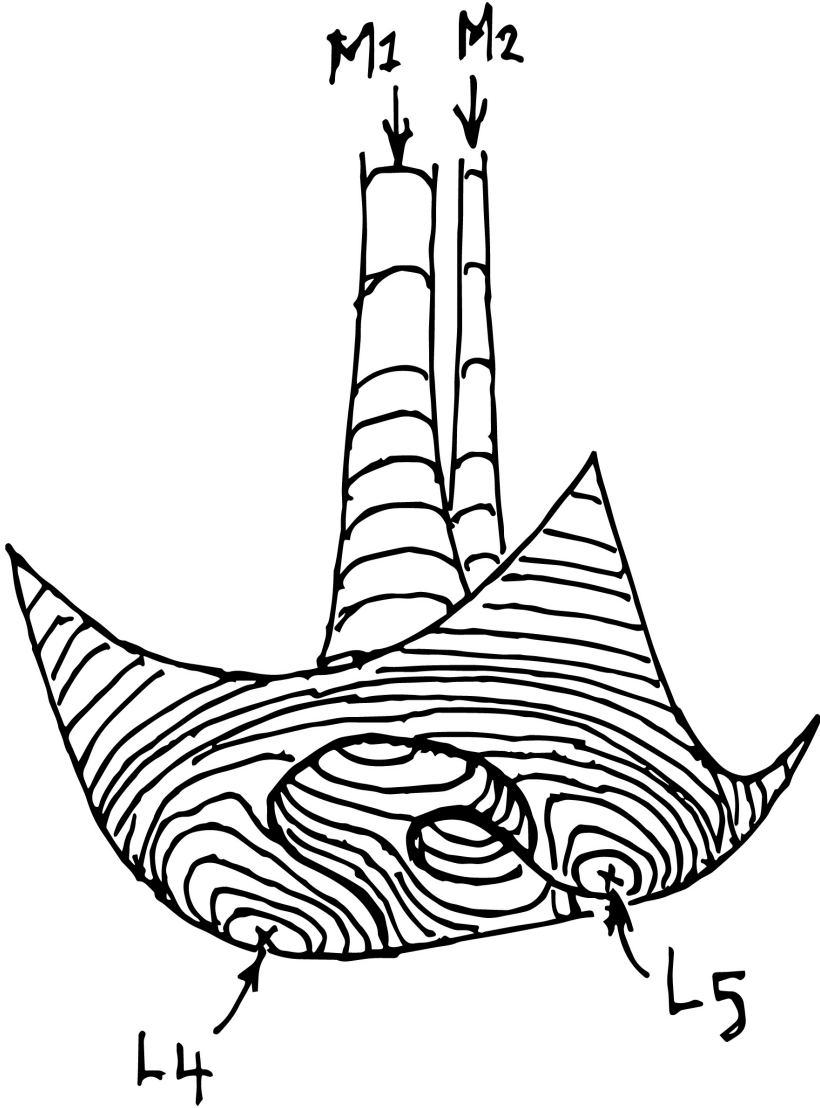


Figure 4.3 The Full Three Body Problem

literature that young people especially are so hooked into social networking that they interact much less on a person-to-person basis than past generations. They're using the written word instead of the spoken word to communicate with their peers. As the old adage goes, "use it or lose it," they're losing the ability to either express or read nonverbal messages from other people. So, by this metric as well, Figure 4.4 is spot on.

(And the written word isn't even using ten fingers on a full keyboard but two thumbs on a tiny, aggravating, unresponsive smartphone screen. We've taken all the power of the T-Rex dinosaur away, and all that's left is T-Rex's small arms and dysfunctional hands.)

WE HAVE AN APP FOR THAT TOO

The younger generations have, even by their own account, grow up so wrapped up in their social networking apps they literally live in their own bubble or alternate reality. They have their own values, their own (new range of) sexuality, and a whole gamut of political and social beliefs that they share – and, as we've clearly seen in the Trump era, enforce with great enthusiasm (to the point of bullying any of their peers who have other beliefs into compliance). So, again, the idea of a collective consciousness shared among your own generation is as applicable with the younger generation as with any other. (They'll say baby boomers are the same way, which is quite true, but arguably not to the extent as with the millennials, Gen Xers, and other young people. Although boomers also live in their own bubble, reinforced like never before via – you guessed it, technology.)

THE NEW VIRTUAL SOUL

In all of this new wave of social Bolshevism, political correctness, or whatever you want to call it; there's a worldwide watering down of religion. Even established religions have been secularized and

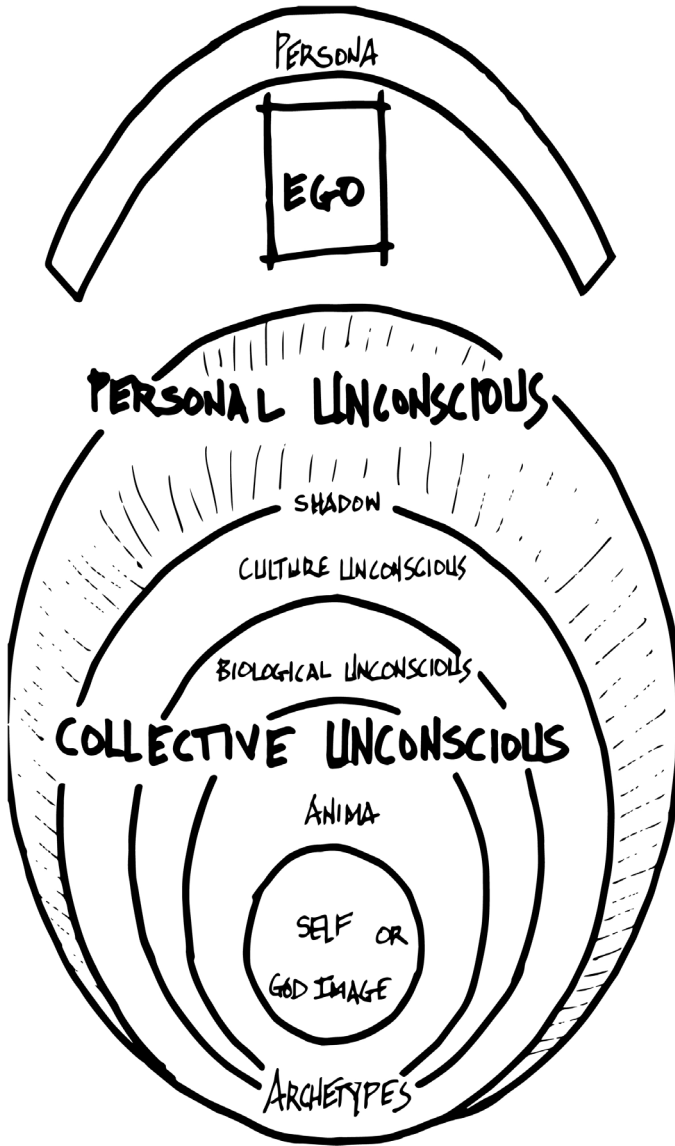


Figure 4.4 New Age Psyche

play much less of a role in people's lives. This diminishment of spiritual conviction, in our model, suggests an increased vulnerability to external forces. Can this be born out? Can we illustrate all this in our model?

Well, virtually no young people can avoid having a Facebook page or spending 8 hours a week updating their virtual self. There are extreme forces to conform, enforced not just by your peers but by the media platforms themselves. Google and Facebook and Twitter algorithms know more about you than your own mother, and they use this secret knowledge of you to influence your politics, your sexuality, your fashions, interests, and everything your purchase. So, once more, the idea that a weaker soul makes you less of an individual and more prone to external influences is very much in line with current social networking constructs.

Whether good, bad, or neutral there are undoubtedly great forces upon every aspect of the lives of young people. There's no escaping the Matrix of it all, to reference the popular movies. Can this phenomenon be incorporated into our psyche model? Or is this all just the usual prejudice every generation has for the young upstarts?

THE KABBALAH PSYCHE MODEL

Consider Figure 4.5, a graphic from Kabbalah, the Jewish mystical tradition. The large circles indicate direct connections to the external that connect the individual physically (or at least metaphysically) with the collective unconscious. These "connections" are predominantly via the upper half of this particular diagram, called the Tree of Life: the roots of the tree are the personal consciousness, and the branches extend outward from the person and into the collective.

The Kabbalah tradition dates all the way back to the era of the Patriarchs before Moses (circa 1300 BC), with continuous contributions through the Inquisition period and beyond. This

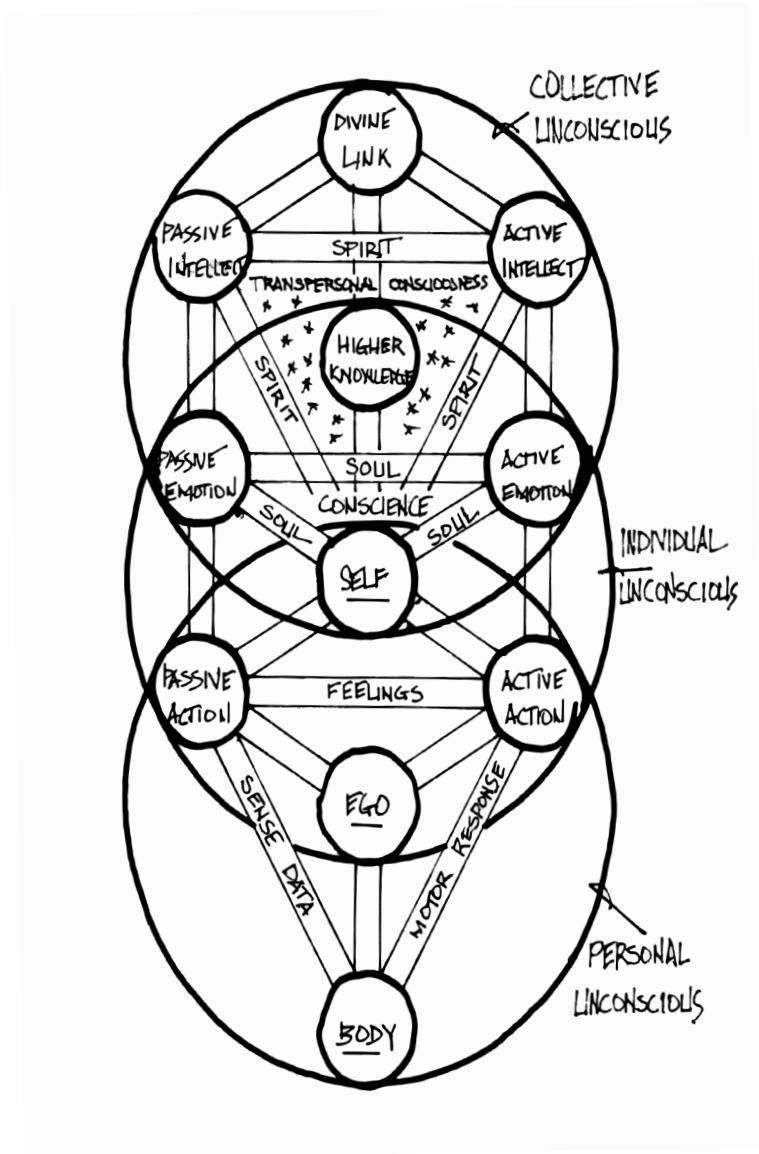


Figure 4.5 **The Kabbalah Tree of Life**

“applied spirituality” likely contributed to the original iceberg model of the psyche, and you can notice many similarities.

In the context of our current discussion, the aspects of the complicated Kabbalah model (which you will notice includes the spirit and the soul) that are of greatest interest are the three large circles that seem to imply a connection beyond the physical body and to the collective unconscious. A similar sweeping relationship can be imagined from Figure 4.4 which is mainly based on the works of Carl Jung and Jungian psychology.

DO WE EVEN NEED A SOUL?

Consider our prototypical individual beset by an onslaught of powerful forces in the modern world, pressures imposed by advertising to “keep up with the Jones” (Kardashians), to keep her Facebook page updated continuously (with Photoshopped images to make her always look perfect), to sport the latest fashions (clothes, makeup, silicone body enhancements), and all the latest gossip on the hip celebrities currently in vogue.

It would be nice to somehow be able to remain above all that; to, well, fit in with the crowd but to not let their ideas and convictions invade your own ideals and beliefs. This implies a kind of invisible barrier that protects your most inner self, that keeps it private, privileged, and invisible to all the whole world (except your intimates, with whom it’s your sacred bond). Your “tree of life” needs a force field like those large circles to buffer the world at large, to act as a firewall against all the junk, trash, and spam in the world (not just in your email inbox but in a constant streams of ads on the web, from Facebook, from the news media, Google, Amazon, and every other site you frequent).

The major players all maintain an extensive database on you: your purchases, the people you “like,” your survey answers, how you vote, who you talk to on the phone, where you dine out, where you vacation, etc. They use this information to serve you ads precisely targeted just to you, practically guaranteed to give you

fits of anxiety to buy, buy, buy. They wear down your resistance, day after day, with their relentless onslaught of images, pix, film clips, and a thousand subconscious cues you never even notice.

They wear down your firewall until it's nothing more than a frazzled sieve if that much. The outer circles of your "tree of life" are dashed lines now; they're past your conscious barriers and into your inner subconscious world.

5

A Conic Geometry Model

Returning now to the discussion thread of chapter two, the egg and sperm contain all of the instincts and primitive aspects of the personality that are passed along to the zygote from mother and father. These aspects of our topographical model of the psyche are collectively called the id.

Every living creature has these (instincts) instructions built in to its sperm, egg, seed, shell, whatever. Arguably animals develop beyond the id, into a whole psyche, of varying complexity. If you've ever had a cat, you don't need any convincing they have personality and a psyche; or a dog. Never seen your cat spasm in a dream state (OMG who let the dogs out!)? They all have unique personalities that go beyond basic instincts built into their genes like cats hate dogs and vice versa.

Our model for sperm-meets-egg was a sphere, which is roughly the shape of the human egg. We fit a circular geometry to the fertilization process and likened the construct to a circular orbit caused by force or forces unknown. Gravity, of course, the kind that makes planets orbit suns, is not the kind of force we're looking for; however, a similar force also exists at the subatomic level as the attraction between negative-charged electrons and positive-charged nuclei.

The original electron model, proposed by Niels Bohr, was inspired by the Two Body problem of celestial mechanics. It's now the standard, accepted model for the atom: a central nucleus surrounded by an electron in a circular orbit. The Heisenberg Uncertainty Principle states that you cannot know both the position

and velocity of that electron at any given moment, even in theory. We just know that over time, on average the electron's position is somewhere in a range of distances from the nucleus.

This allowable range for the electron is usually portrayed as a cloud of dots around the nucleus, as in Figure 5.1. This is called a probability distribution (realize that it's a spherical distribution).

TWO INVERSE-SQUARED FORCES

The governing force for electrostatics, defined by Coulomb's Law (5.1), has the same form as Newton's Law of Gravity (5.2). Consequently, this electrostatic analogy is very much in line with our gravity-based model. The only difference between the two equations is a constant that accounts for the difference in scale.

$$(5.1) \quad F = k \frac{q_1 q_2}{r^2}$$

Where

- F = force
- q = charge
- r = distance between charges
- k = constant of proportionality

$$(5.2) \quad F = G \frac{m_1 m_2}{r^2}$$

Where

- F = force
- m = mass
- r = distance between masses
- G = constant of proportionality

So, our spherical egg is now more than a geometry but a

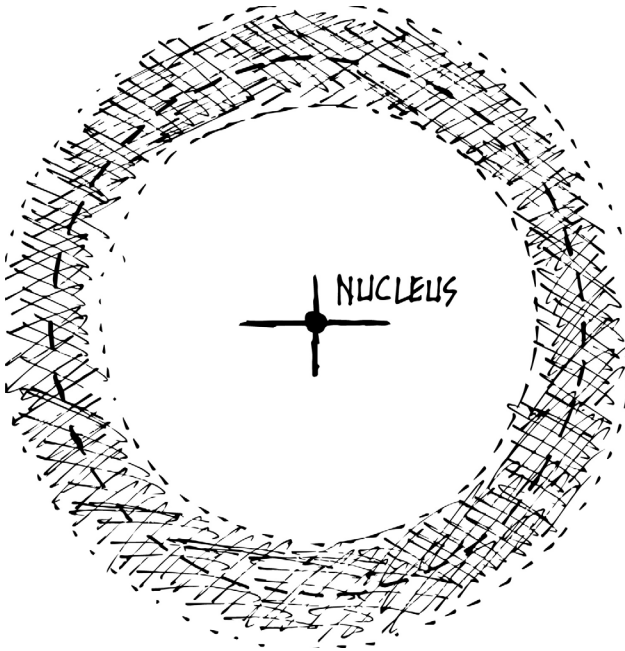


Figure 5.1 The Bohr Atom

geometry with a governing force; at least a force much closer to our scale than gravity.

The first practical example in electrostatics is usually the Many Body Problem, one positive-charged particle zipping through a packed matrix of electron clouds. The equations for this problem reduce down to the equations for static flow in fluid dynamics. In other words, the forces seen by the proton act upon it exactly as if it was moving through a fluid. Which puts the problem more on the scale of our problem, or at least closer than one electron and one nucleus.

How does this help our model? A disjointed configuration of brain cells, all electrically charged and ready to soak up all the information of a bright, new world out there beyond Mom's belly – suddenly the random collection of dots becomes a Many Body

Problem, and a billion random impulses become a fluid flow of consciousness. Elegant and rational, mathematical too. Can it be born out physically?

The fertilized egg grows into a form that has limbs, hands, spine, head. At some point, the baby develops awareness, a consciousness. Suddenly she's a living creature: the nucleus is an umbilical cord, and the electron shroud is the womb and beyond that is the mother who protects the delicate creature from the outside world. Baby kicks and struggles and starts asserting her personality right away. (Our model is evolving with the infant child.)

A NEW CIRCLE OF CONCERN

As the embryo grows and begins to take on a human form (you can now distinguish fingers, toes, bones, ears, eyes), the picture becomes ever more complicated. The unborn child is influenced by the mother's chemistry and emotional state and a hundred other subtle things. It's still a pretty small world, but our circle still symbolizes it well because everything is perfectly climate-controlled, and all the nutritional needs are met as needed.

Just as the infant is now almost fully developed, we should now fully develop our model and look at the actual math behind the geometries we've been talking about. We begin with the equation for a circle.

$$(5.3) \quad r^2 = (x - i)^2 + (y - j)^2$$

Where

- r = radius
- (i, j) are the coordinates for the center of the circle.

The circle in figure 5.2 is centered at the origin $(0,0)$, so there are no i and j terms. For a sphere, you simply add the term $(z - k)^2$

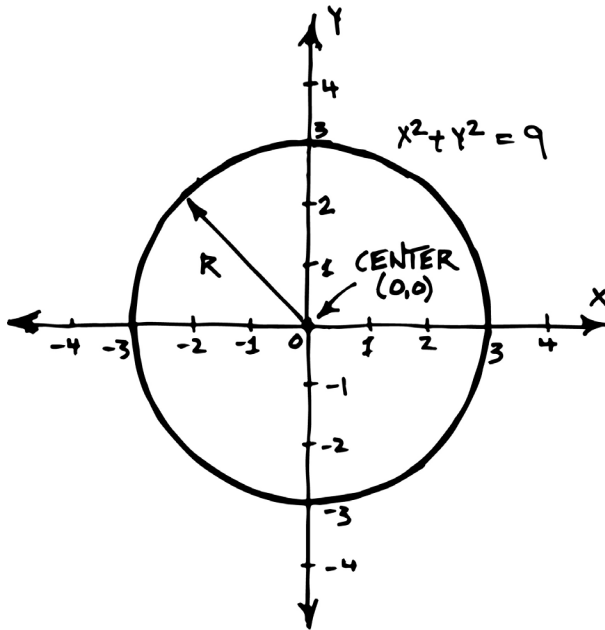


Figure 5.2 Targeting What's Most Important

to the right side of equation (5.3), and now the origin is centered at (i,j,k), with the z-axis perpendicular to the page.

Figure 5.2 is our “targeting” circle again, perhaps a remnant of that instinct that motivated sperm to seek egg and fertilize it. However now that 2D circle is a 3D sphere, representing the child inside the mother’s womb, receiving all nutrients via the umbilical cord and comfortably oriented to the whole big new world via the mother, i.e., the child’s inertial reference frame, literally the center of his universe.

The personality of the newborn child is all id, and it is learning in the incubator of his mother’s entrails how to respond instinctively to its surroundings. Figure 5.2 shows the infant’s nascent psyche orientating itself to its world via an implied coordinate system.

Everything changes at birth. The newborn still has the mother



Figure 5.3 **Mother and Newborn Child**

as a frame of reference, but from outside the womb not inside. The umbilical cord turns into a new “circle of concern” as indicated in Figure 5.4. Everything is still circular, but more planar than spherical: the circle of concern is the mother’s breast, aureole, and nipple.

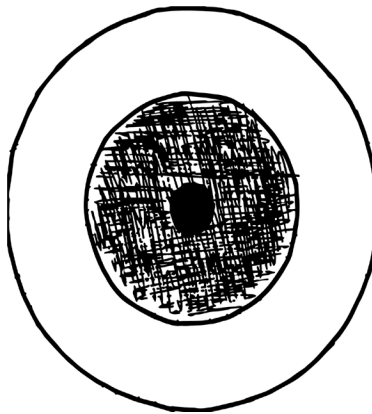


Figure 5.4 **The Circle of Concern**

Suddenly, the central focus is less well defined. Sure, there's Mom and her breast milk; but, oh wow, there's a whole, new, great big world out there, too. The child's psyche has to adjust to this expanding perspective, and our mathematical model as well. All of these irresistible distractions draw the child's attention away from Big Breast, and the Circle of Concern changes into a Figure 5.5 Circle of Gravity.

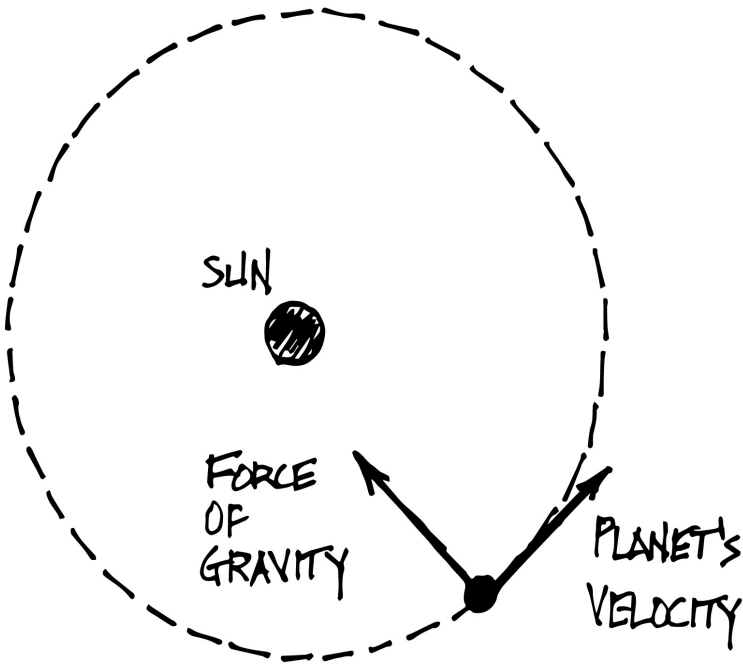


Figure 5.5 A Two Body Problem

The mother is still the main focus, but the orbit isn't a circle anymore but an ellipse, which has two foci. The empty focus "serves to mediate between the instinctive demands of the primitive id and the outside world." This is exactly the function of the empty

focus, F_2 in Figure 5.6 below. The empty focus is what Freud called the ego.

THE MATHEMATICS OF CONFLICT

As the infant psyche matures, the single circle of concern becomes two circles, two breasts. The circle becomes an ellipse, with not just one focus but two; and the second focus isn't an empty focus either, but occupied by another nourishing breast. Whereas the id is limited to the circular, the ego emerges to encompass this new reality – two breasts, two sources of warm, healthy milk; I want both! The first major, defining conflict. How does this play out analytically? Are we still on the right track? Let's review the math behind our geometric progress to date.

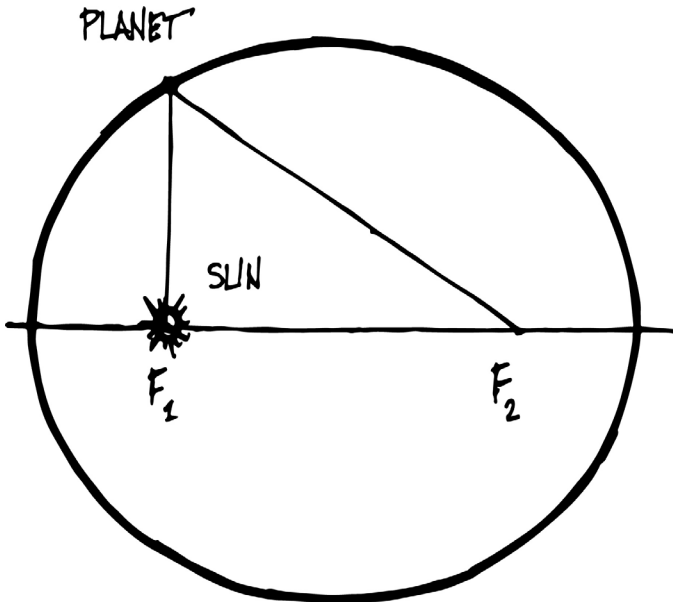


Figure 5.6 The Empty Focus F_2

We can now introduce the equation for an ellipse (5.4) centered at the origin (0,0) and oriented along the x- and y-coordinate axes.

$$(5.4) \quad \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

Where the distance from the origin (the geometric center of the ellipse) to the foci is +/- c where c is defined in (5.5): a is the semimajor axis (the longest dimension of the ellipse) and b is the semiminor axis (the shortest dimension); in Figure 5.6 the dimensions along the x-axis and y-axis, respectively.

$$(5.5) \quad c^2 = a^2 - b^2$$

The significance of (5.4) indicates the ellipse is an “inverse squared geometry.” In chapter two we alluded to a magical force guiding the sperm to the egg, establishing the “target” configuration of Figure 5.2. Well, there may not be an actual force in play, but perhaps a geometric force. This is not such a fantastical notion, either, because we saw how the Many Body Problem manifests as fluid flow rather than a linear force. Indeed, Relativity is a geometric force, e.g., the warping of space and time around a star that causes light to bend as it passes close by.

Geometry is not a force per se in the usual way of looking at things, but geometry can influence objects just like a force, if not in more complicated and intricate ways. Which is exactly what we’re looking for.

THE EXTERNAL: DIRECTRIX

It doesn’t take very long for the newborn’s focus to move beyond the mother’s breasts, to the many fascinating things in her environment. That means our geometry has to change too.

The vertical line in Figure 5.7 is called the directrix. It’s a line drawn such that the ratio is the same for any line drawn from the focus to any point on the ellipse versus the distance of that point

from the directrix. We can use this directrix to represent the growing presence of the world beyond Mom in the young psyche's worldview.

Think of F_2 in the figure as the original focus, the mother. All these new external forces shift attention to F_1 which was originally an empty focus, but which now is becoming more and more the main focus. Our Circle of Concern was “discomboobulated” by the second breast; now it has to build out a new infrastructure external to the ellipse, outside the original comfort zone; beyond Mom. (Ideally, the second major player in this big, new world is Dad.)

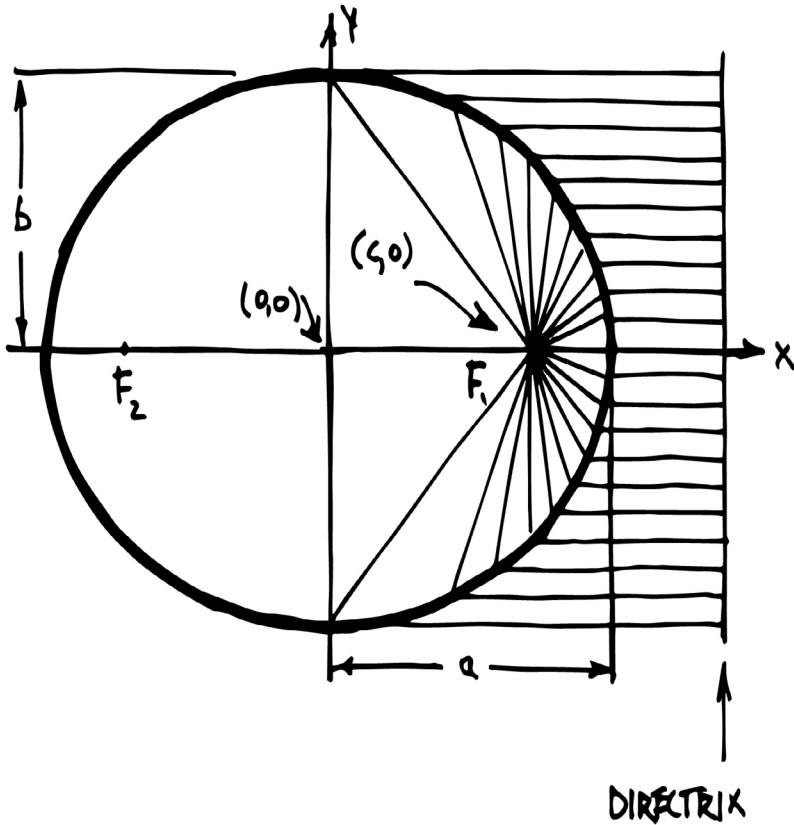


Figure 5.7 **Main Focus & The Directrix**

Here's an easy way to think about the relationship of the directrix to the focus: Every light ray parallel to the main axis of the ellipse is reflected through the focus. Conversely, if you put a strong light source at the focus, it will be deflected into parallel rays as the light passes through the ellipse (same as what happens with parabolas, which is why they're used as solar collectors, to concentrate light on a single source - typically a tube running perpendicular to the page in which a fluid is heated by the concentrated solar energy).

The directrix suggests the emerging superego, by which the values and moral of society begin to influence the behavior of the id and ego. So now we have a complete psyche with the id and ego as the focus and empty focus, respectively; and the projection of outside influences upon this model via the directrix or superego. (Beware of the power of television at this point, as any kind of electronic babysitter like TV far exceeds the power of the real world. If you doubt that, the explain why infants now recognize McDonald's Arches as a symbol long before they recognize Mom's breasts - same shape, no pizzazz.)

A LOW ECCENTRICITY ELLIPSE

How does this situation fit in with our conic sections model, beginning with the "circle of concern?" For all its elegance and simplicity, you'll never encounter a true circle in nature. The norm is a slight deviation from a true circle, which implies the kind of subtle dynamic instability that we know drives nature forward: constant change, always selecting the best from the available options, survival of the fittest.

Figure 5.8 shows a slight deviation from the circle into a low-eccentricity ellipse. Naturally, you don't want to shock the nascent psyche as he becomes acquainted with the outside world, but to limit exposure and do so gently. In our current analogy, the angle increases as the infant matures, and the ellipse becomes more pronounced. It's a slow, steady process as the infant becomes more

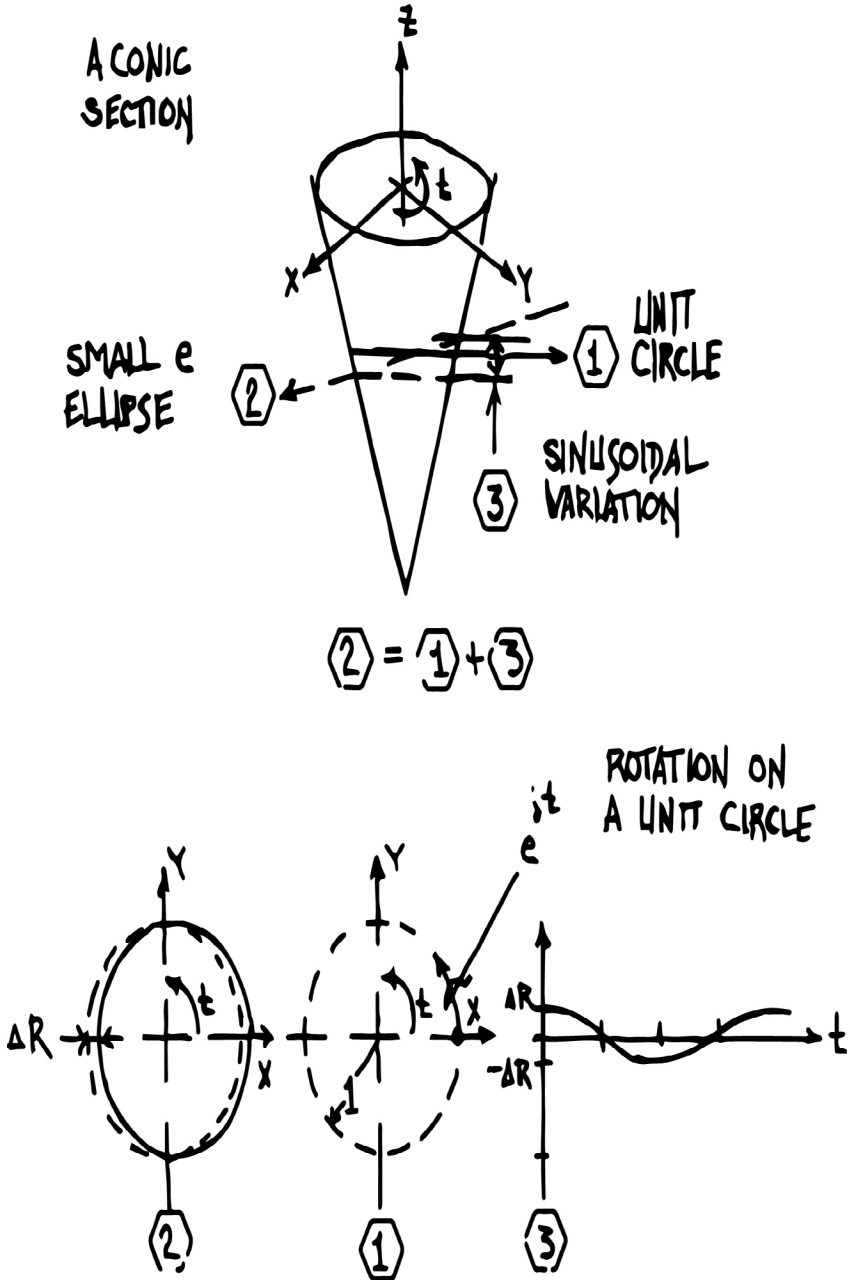


Figure 5.8 Forming a Low-Eccentricity Ellipse

and more curious, and starts to interact with the world physically and emotionally.

Notice that this conic analogy can also represent change as the “plane of reality” moves upward from the apex, causing the “circle of awareness” or the range of the infant’s awareness, to expand. The dynamic of a plane, which can never in nature be perfectly horizontal (which implicates a true circle, which isn’t possible), symbolizes the young psyche’s urgency to soak in more and more, restless for the world beyond to grow every minute of the day. (Thus, the allure of parents to use the boob tube as a crutch – and you wonder why parents are now less influential on young people than ever before?)

TRANSCERENCE TO CELEBRITY MOM

Historically, the infant psyche has matured in the comfort zone of the family unit until well past puberty, under close supervision and mentoring. The child-psyche’s “plane of awareness” moves gradually upward, away from the apex (the point of origin which presumably begins at the moment of first consciousness within the womb). There are no surprises here: the world is always on average circular, complete, in balance. The shape varies into an ellipse, building a tolerance for change, and gradually introducing the young psyche to reality.

The “comfort zone” transitions from a circle of comfort to a cone of comfort. Any shocks or unexpected realities, and there is always a retreat back down the cone a bit, a leveling of the plane toward the horizontal, or both. This dynamic is predictable, stable, and always there. In a stable family unit, the two foci of the emergent ellipse are the mother and father (or two primary caregivers, as the case may be). In the modern day, if one of the two is TV (or some facsimile thereof, a bad person, say), then that detracts from the development of the psyche and roots it in; well, reality TV, literally. This obsession with celebrities and the famous is well documented in modern culture, built in from infancy by TV role



Figure 5.9 **Celebrity TV Babysitter: Hooked for Life**

models and cartoon heroes. documented in modern culture, built in from infancy by TV role models and cartoon heroes.

Which brings up the need to be sure our model can encompass not just the norm, the healthy psyche, but deviations thereof. The TV example using the vertical screen of the directrix beaming its powerful image directly into the nascent consciousness is a vivid, realistic example. There are many other possibilities for the bad; poor diet, negligent parents, bullying by siblings, not enough quality time with parents, and many other such situations.

A healthy child's psyche can cope with almost everything we dish out. The key is that the balance never goes beyond our circle-ellipse situation on the "cone of life." Change is good, both up and down, sideways and off-kilter. A healthy psyche learns to deal with all these influences collectively as a Many Body Problem, with their overall influence being a fluid wave. You can imagine this wave changing the orientation of our floating plane on the cone. This builds resilience and confidence; e.g., a grommet on the plane that permits flexibility in a wide range of situations. (Which kind of makes TV seem like a good thing, if in small doses and of an appropriate age rating.) The important thing is that it all happens in a safe environment, that there's always a "home base," a sure, dependable, constant. A human constant who is touchable, who responds emotionally and supportively, in real space-time.

PSYCHE OUT OF BALANCE

Of course, there's no human constant in our math model. The only constant in our geometry is the angle of the conic section. There are two ways to expand the "circle of comfort" – move up the cone gradually, along the one given constant – or change the angle of the cone, which changes everything. This risks throwing the plane itself out of balance and projecting the psyche out of an ellipse and into a parabola. This gets you the right side of Figure 5.9, which is absent the second focus but still with a directrix. This happens if the plane of reference goes full vertical in our conic section diagram: you get a hyperbola and Figure 5.10.

Again, notice all rays parallel to the axis of Figure 5.10 are reflected though the focus. It's the same old dilemma as before, a child choosing between two teats; an infant torn between the parental comfort zone and the fascinating outside world, and the power of the boob tube to beam a message directly into the child's subconscious brain.

The discussion so far has been with one cone, projected upward. You'll recall the conic section diagram had a mirror image of the

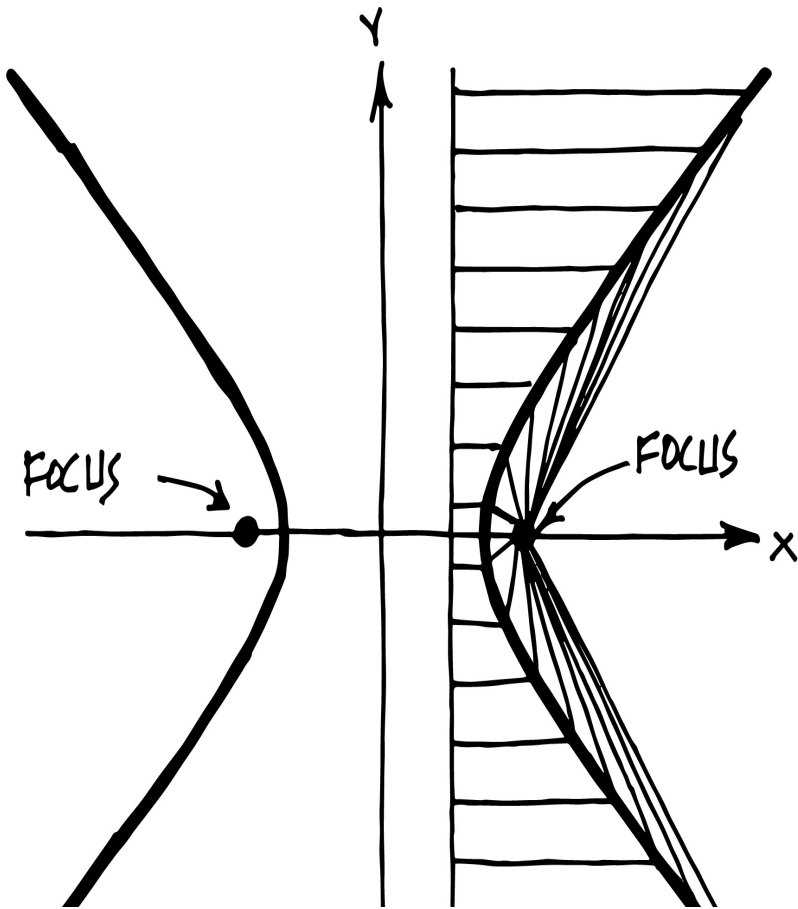


Figure 5.10 **The Directrix of a Hyperbola**

cone below. Assuming this second cone to be the subconscious mind, then if the young psyche has developed a subconscious, then the full vertical of the plane of reference results in a hyperbola, which has two foci and a directrix and seems to less of an extreme deviation from an ellipse than a parabola. In other words, the math says a subconscious is good for the psyche. It's like the part

of the iceberg under water, in that it gives stability and constancy to a psyche beset by (Many Body) waves of change in the world.

LIFE ON A CONIC ROLLER COASTER

These major changes may be bad for a young, formative psyche, but are likely actual transitions that occur naturally as the subject matures to puberty (which certainly sets everything topsy-turvy) and beyond. For example, somebody with a strong subconscious may weather the violent storms of life better, with more resilience. A person with a shallow lower cone is like flotsam on the sea, set adrift and powerless to avoid to rip tides of political correctness.

Maybe introverts have a narrow conic profile, with a deep inner life; extroverts with a wide conic profile to grasp a wide and varied social circle, and not so deep an inner life. A truly wise and mature individual may be able to move between the two states of awareness, to enjoy the best of both worlds as a true renaissance man (woman).

A (Saturday Night Live) conehead bully might purposefully narrow his conic to artificially deepen his subconscious, and use this heavy keel to throw others off course. A dreamer might narrow her cone to extend the conscious awareness high and above the surf, to catch a ride on the zeitgeist winds (be sure you have a deep keel to stay on course). An adult in the parabola phase, with no conscience below the water may be a sociopath; and needs therapy to get their geometry straight before they do bad things.

All of this is for the experts to consider. What's important for this discussion is that the math model is also maturing well. It has the level of complexity needed to grasp analytically a great many different personality types, states of mind, and ranges of mental health. The Force in this discussion would seem to be a strong impulse to advance, mature; expand and grow. It's the role of caregivers to nurture this drive while also fostering resiliency and depth, conscience and conviction.

6

The Uncertain Teenage Years

Welcome to the teenage years, when the young psyche is put to the test for real. Hormones throw the whole “inertial reference frame” totally out of whack as the youngster explores his limits in the adult world, complete with romance, academic stress, bullying, peer pressures, and all the chemical temptations modern society has to offer: tobacco, alcohol, weed, drugs, energy drinks, and a surfeit of sugar colas.

Instead of posing a normative model, this time we will consider the extreme case and the coincidence of circumstances that sometimes results in a terrible diagnosis of a severe mental illness. Late adolescence is the most common age for early-onset schizophrenia, the worse of the worst – striking in the zenith of youth apparently without warning or cause and without any known remedy either pharmaceutical or therapeutic.

Is there a subtle tipping point in our conic geometry model, some unusual or unexpected geometric anomaly that can occur by happenstance or calamity?

Our teenage psyche is amidst a flux of dynamic change, represented by an ellipse in a state of evolution – all other facets of the conic being relatively constant over a short-term (notably the angle of the cone which is a fundamental aspect of personality in our model). That leaves the “plane of reality” whose range/reach/size/extent is dependent upon the depth and scope of the subject’s social support network.

Slight changes in the orientation of that flat plane (changing schools, beginning a new school year or a new romance, a new

sibling in the home or a sibling leaving home, a bitter divorce) can change the shape of the ellipse. Bullying or extreme social pressure might change the psyche dynamic from within, causing a localized “space-time distortion” in the otherwise uniformly flat plane that, in turn, results in friction within the social support network (ideally a flat plane).

JUNIOR HIGH GEOMETRY

Geometrically, changes in the ellipse shape can be quantified by the variables a and b , such that (over a short term at least), $a^2 + b^2$ remains equal to c^2 . As such, incremental changes in the ellipse ideally occur so that c remains constant.

Another even more stable constant is the inertial reference frame, i.e., the x - and y -axes along which a and b are measured. These axes are fundamental to the stability of the psyche, more so than even the value of c . The two facets of a youngster in our traditional family model (you have to start somewhere) are the parents, two constants that ideally do not change to any extent, at least over the short term and at least over the most important qualities they provide to the young psyche: being there, offering moral support and encouraging supervision and counsel.

Having thus established the ground rules, we can explore the mathematics holding everything together for a vulnerability. A likely possibility is in the function $c^2 = a^2 + b^2$ and for the value of c – which is an important variable, and relatively constant and fundamental to the psyche.

Now, a change is atypical but likely not so disastrous as to cause a psychotic break and a schizoid reaction. The math is forgiving, within certain limits, and it’s possible for our model to change to the extreme, even doing so short term.

As our psyche matures, the plane moves slowly up the cone to form a sequence of low-eccentricity ellipses increasing gradually in size. The farther you go upward from the apex of the cone, the wider the cross section and the more stable the social support

plane has to be because a change in the inclination of that plane causes a much more significant change in the shape of the ellipse the farther you go from the nadir point of the cone.

Throughout all of these changes the x- and y-axes, the parental units, are somewhat constant.

COLLEGE MATH

A crisis happens in the math if $a^2 - b^2$ is a negative value (if b is greater than a), which forces c to be an imaginary number, i.e., the square root of a negative number. Is that the kind of big problem we're looking for or what? Enough to cause a psychotic break – and, long-term if not restored to a real number quickly, schizophrenia? At the risk of offending mathematicians, who deal with imaginary numbers all the time; well, negative square roots just don't jive well with ordinary reality.

The short answer to this psychic dilemma is that we have a continuous dynamical system here. In order for b to become greater than a , our geometry construction transitions to a circle and then to an ellipse elongated in the opposite (perpendicular) direction, at which point the roles of a and b in our equation are reversed, and c remains positive and real.

The Achilles heel of this whole argument is the implicit assumption that there is a time lag for the psyche to adjust to changes to the anchoring aspects of its virtual geometry (instead of an immediate, seamless adjustment of a , b , and c). Moreover, this time-lapse must somehow be linked mathematically to the complex plane and its real and imaginary axes.

ENGINEERING MATHEMATICS

It's time to show all of this graphically and with solid math.

First, consider the intrinsic mathematics in the geometry of the ellipse and its close relationship to a circle. If you look carefully at the chicken scratch at the bottom of Figure 5.8, you will notice

that a small sinusoid added to a circle will form a perfect ellipse. In other words, if you subtract the largest circle you can fit inside a low-eccentricity ellipse from the ellipse, you get an ideal sine wave.

Second, we need to quantify the complex plane with an intuitive graphic. Figure 6.1 which shows how a point on a rotating circle that projected outward forms a sine wave (and vice versa). Rotate the project 90 degrees clockwise, and the new orthogonal (perpendicular) projection creates a cosine wave. In advanced engineering mathematics, these form the real and imaginary axes of the complex plane.

These two fundamental trigonometric functions combine to define the unit (radius = 1) circle by

$$(6.1) \sin^2 + \cos^2 = 1$$

This is a *regularization* (simplification) of our circle equation.

Another way to represent a point rotating affixed to a circle is by using a rotating vector (see Figure 6.1) whose origin is kept at the origin (0,0) and whose length is equal to the radius of the circle. This vector function is how engineers take a dynamical system in real time and transfer the problem to the frequency domain, where you just state the frequency of the system or the number of times per minute that the vector rotates 360 degrees.

The problem now takes a very compact form by stating the fundamental equation of complex analysis for a vector F.

$$(6.2) \vec{F} = r e^{j\omega t}$$

where j = the imaginary number $\sqrt{-1}$, ω = the angular position of the vector, and t = time.

Hence, as time advances in (6.2) the vector rotates counterclockwise, and the endpoint of the vector designates the same point on the rotating circle through time. Another way to represent that point on the complex plane (referring to the axes

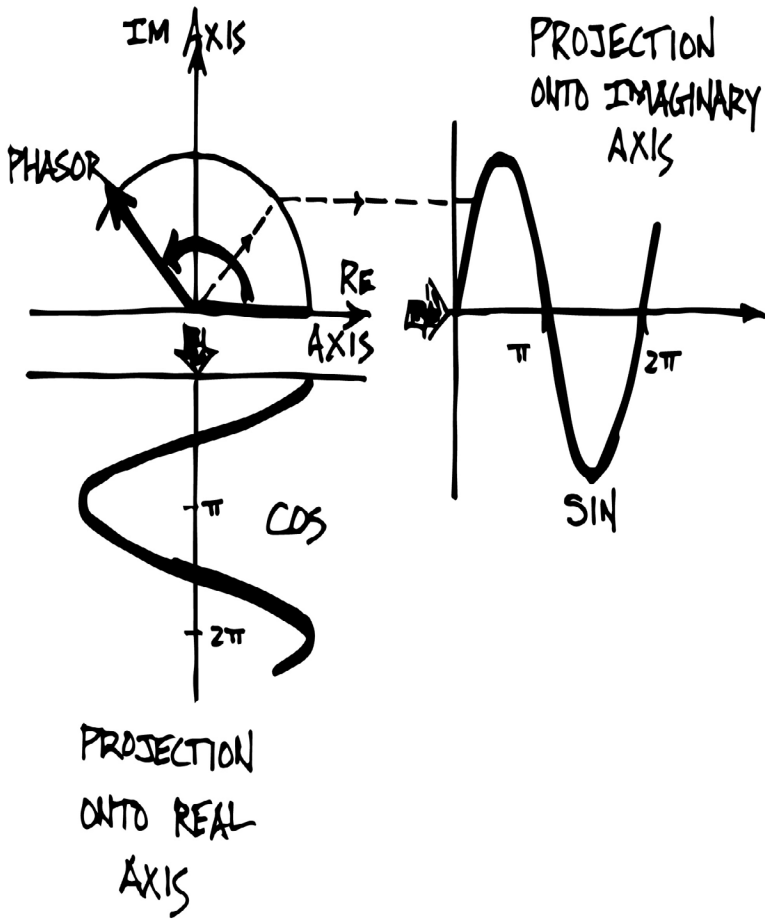


Figure 6.1 **Sine and Cosine Wave Projections From a Rotating Circle**

in Figure 6.1 where the x-axis is real and the y-axis is imaginary) is the Euler Identity.

$$(6.3) \vec{F} = r(j \sin wt + \cos wt)$$

Which puts the relationship back as a function of sine and cosine. (Again, the arrow above F means it's a vector.)

We now look at the mathematics of the constituent functions of our circle, the sine and cosine, where we will observe first-hand an approximation that in our psyche model can be manifest as a short-term approximation or, in physical practice, a time lag. In turn, the math can be used to elaborate the model to be used in examining the schizophrenia diagnosis (or maybe PTSD or other severe breaks from reality that perseveres over a long time).

We first zoom in on the sine function in Figure 6.1

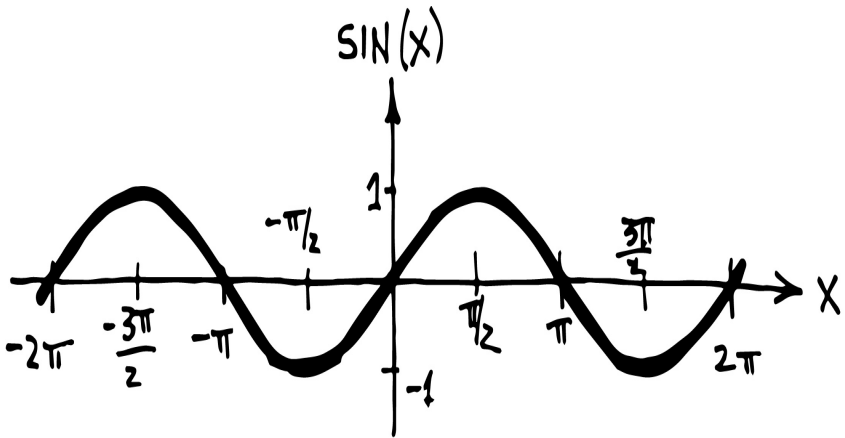


Figure 6.2 The Sine Function

When your calculator determines the sine of an angle, it uses a series approximated, as follows.

$$(6.4) \sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

Where the angle “x” is in radians (there are 2π radians in a circle of 360 degrees) and “!” in the denominator is a factorial, e.g., $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$.

We can do the same thing for the cosine function in Figure 6.1, which you will notice (also comparing to Figure 6.2), is a sine wave displaced by 90 degrees or $\pi/2$ to the right, i.e., the positive x-axis.

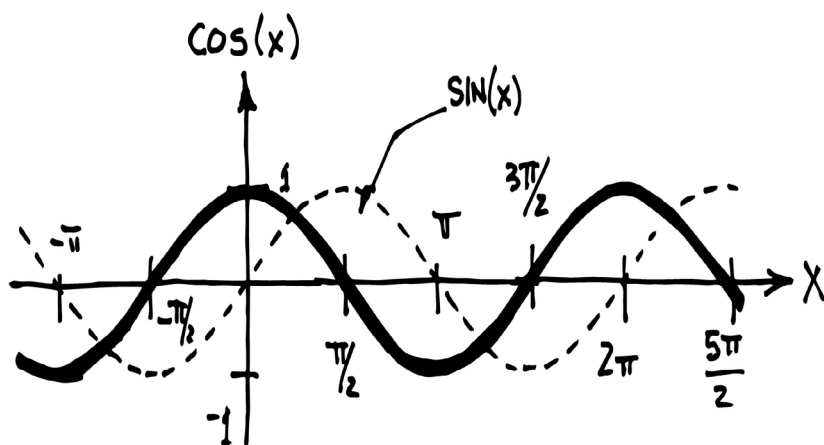


Figure 6.3 The Cosine Function

Again, your calculator determines the cosine of an angle using a fixed number of terms (typically until the first 16 significant digits are unchanging) of an infinite series.

$$(6.5) \cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$$

Finally, you will see both infinite series in the representation of e (Euler's constant)

$$(6.6) \quad e^x = x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + \dots$$

Where you can see the relationship between e , sine, and cosine by comparing (6.2) and (6.3).

$$(6.7) \quad e^{j\omega t} = j \sin(\omega t) + \cos(\omega t)$$

Where the first sine term is the imaginary component along the vertical y-axis and the second cosine term is the real component along the horizontal x-axis.

What these equations mean is that the ordinates for our point on a circle $((x,y) = (r\cos x, r\sin x))$ are inexact because they're calculated by an infinite series: there are an infinite number of significant digits for both sine and cosine, and any value we use is just an approximation.

AN UNCERTAINTY PRINCIPLE

This, of course, doesn't mean that the brain computes sine and cosine as an infinite series, only that – as we have implied all along – there is an inherent inaccuracy in a perfect circle (also, we now see, in the low-eccentricity ellipse which is a just a circle + a low-amplitude sinusoid with wavelength equal to the circumference of the circle), a natural instability.

This, in turn, injects the same level of uncertainty into our conic section model. It's the Heisenberg Uncertainty Principle all over again: you can't know both the exact shape of an ellipse and your position on that ellipse; or, referencing the larger model, the psyche is never stable but always in a constant state of flux, incremented to its virtual representation of reality by the fundamental limitations of any construct, no matter how mathematical or geometrically precise.

Which is not all bad because it requires the psyche to be flexible and dynamic, able to adapt to almost any possible situation. In fact, it says that late-onset schizophrenia may result from an increased vulnerability to traumatic life events because of a loss of this necessary flexibility of the psyche.

This discussion adds yet another, very fundamental variability to the conic section model. Because it affects the whole mathematical construct, it's a way to subtly modify the parameters of the model once its applied to a real-life situation to perhaps use it, as suggested above, for older individuals or for those for whom traumatic events have shocked some of the built-in flexibility of the psyche, e.g., victims of PTSD.

This is one situation where a gravity analogy would come in handy because the infinite series representation is too minuscule to leverage into a workable model. If not a gravity model, then at least something a little bit larger in scope than the hundredth significant digit in an infinite series, something big enough to pop the hood or crawl under the chassis to see just how it works.

7

A Psychology Of Society

So far, the discussion has assumed a simple conic section: a cone growing upward from an apex that was created while the baby is still in the womb. Over time, the infant's awareness grows and expands into a social support network which builds out our conic model into the quintessential iceberg. As the psyche matures, the tip of the iceberg remains relatively constant, but the depth grows as the subconscious evolves into adolescence and beyond.

The mathematics says that the buoyant force of the water displaced determines that 10% of frozen water is above the surface and 90% is below. So, theoretically, as the subconscious doubles in size, the part above the water (in our iceberg construct, half of the ego and a fraction of the superego), only increases by roughly 15%. Given the extreme narcissism of the modern world (so common that the Diagnostic and Statistical Manual of Mental Disorders, 5th edition, the Bible of the mental health profession, almost eliminated narcissism as a personality disorder), this implies is the exact opposite of the iceberg dynamics: in reality, the ego/superego above the surface has doubled in size, while the subconscious has decreased in extent. The only solution is that something is anchoring the subconscious to offset the growth of the individual ego; i.e., the collective subconscious or in the vernacular, political correctness; just as suggested in earlier comments.

Be that as it may, we need to get back to talking about the natural psyche, absent the extreme power of political correctness enforced on younger people by virtue of social media. We should complete our idealized psyche model first before we add these

external influences, which we will do in later chapters, to see if they are good or bad, healthy or merely benign.

A PSYCHE WITH SOUL

A simple cone floating in turbulent waters is not at all a stable configuration. Ocean buoys have a deep center of mass to keep them upright and relatively stable. Hence the bottom half of our conic section diagram, which mirrors the cone projecting upward with another extending down, deep. This second cone makes our model far more stable. It's like the heavy keel of a racing sailboat, counteracting the high wind force on the sail area, so the yacht doesn't "keel over." A second function of the underwater part of the sailboat is the rudder, which lets you sail parallel to the wind, even tack almost directly into the wind.

For lack of another term, we'll call this second cone the soul. Earlier we suggested the soul might act as a firewall to protect the subconscious against the evils of the world; here we can posit that the soul fortifies the cone itself and that this intrinsic strength carries upward throughout the conic section. In our modern Jungian psyche, the presence of a collective consciousness implies for this extension of our conic model, currents and thermoclines that are deep beneath the surface, unseen and all but unnoticed. It's the *Zeitgeist*, the subconscious of the world and of the species that subtly influences everybody.

This depth is the ultimate evil to the modern, materialistic world. Absent this spiritual keel, advertisers can coerce you into keeping up with all the latest fashions (clothes, glam, electronics, apps, vacations, vehicles), politicians can win your vote on the most superficial of issues (usually involving free stuff like healthcare, welfare, student loan forgiveness, or lower taxes – all of which will be paid for by our children and grandchildren, which doesn't bother us one bit), and you can otherwise live your life free of guilt no matter how immoral or shallow or selfish.

Mind you; this "keel" doesn't have to be religion or even

spirituality. It's simply some strong conviction. For example, minorities in America have a unique cultural identity with their own music, media, cuisine, language/slang, customs, even churches. Gays have their own culture, their own haunts, even their own slang.

Democrats, Republicans; engineers, screenwriters; blue-collar workers, management, millionaires; single people, divorced people, the disadvantaged – they all share certain values and experiences and (or could) benefit from the same kind of camaraderie that helps alcoholics in AA groups. Your conviction might be a passion for science or acting or art; the underlying conviction in this project is mathematics. There are many “keels” that can give your psyche the depth and identity to be dynamically balanced and whole. Arguably, it would be difficult to survive without one or more such guiding influences in your life.

SOCIAL NETWORKING AS CROWD MENTALITY

The problem with these groups, for all their “social support network” benefits, is that in our math model they aren't associated with the 2nd cone at all, but with simply widening the horizontal plane (the ocean level in the iceberg theory). They help the individual achieve personal life stability not by provisioning a heavy keel but by calming the ocean in her environs. Remember the Many Body Problem, reducing the math down to static fluid flow.

The current paradigm in psychology, applied to the younger Internet generations, is “creating a bubble of social-networking” security around entire generations. In Sigmund Freud's era, they called it the crowd mentality, as they watched a rabid madness overcome people during the French revolution.

Jesus walked on the calm waters of the domain he created (mathematicians call this a deleted neighborhood in the complex plane); at his zenith, Obama walked on water too as far as the black community, and far-left liberals thought. Likewise, for Trump and the dedicated-right conservatives. The Pope and Catholics. Warren

Buffett and wealthy investors. Einstein or Hawking (none of whose work has ever been proven, by the way) and hard-core scientists. Everybody has their martyr or hero. These central figures are necessary to the horizontal plane because they exist dead-center, along the centerline of the cone, at the center of the true believer's circle, at a focus of everybody else in that exclusive group.

Sometimes these cotton-candy, Kool Aid groups we belong to can be unhealthy or even dangerous. Think Hitler and the Nazis using crowd mentality. Or the Roman emperor Nero, the second most evil man of all time, fiddling/singing/dancing while Rome burned all around him.

And yet, we're all doing exactly the same thing, the entire human population: dancing/partying/singing while the whole planet is burning around us. All of our leaders are so out of touch with reality that they vilify the science and the scientists that clearly show the dangers, backed up by more and more solid data with each passing year. Environmental activists are their own, close group too, by the way. Everybody has their cause.

You might even go so far as to say that what makes schizophrenics flip out is that their brief venture into the complex plane connects them to their innermost soul, and it absolutely horrifies them, stark reality and the dark future it projects.

This glimpse into the future etches such a terrible scar on the spirit that they can never recover from it. Actually, you don't even need to experience that kind of psychotic break to be horrified by the dangers ahead for Planet Earth; anybody who dares to care is stigmatized and bullied until they just duck out of society and suffer their solitude with as much grace as they can muster.

A MYSTIC TRANQUILITY

Then there are the mystical few who can tap into the Force with a solid, dedicated 2nd cone. They're able to rise above all the pitiful day-to-day pettiness of the world and to sustain hope. These are the scientists who spend a decade in college then another decade

of intense studying in their field before making substantial contributions (waiting yet another decade before winning a Nobel Prize or the equivalent accolades in their area). They never give up hope, and their faith – and especially their discoveries – give hope to everybody else. (While the hyper-rich reap the rewards of their hard work, and Big Business continues their perpetual war to obliterate the middle class.)

For all the rest of us mere mortals, there's a short period in the development of the psyche when the full double-monte cone is alive and well when hope is burning, and expectations are strong. If you follow the news, school kids are the only ones who have formally challenged the position of their leaders on global warming. Some young students in Oregon tried to sue the federal government; others in Australia boycotted their classes to protest their nation's inaction. The media treated these events like they were school shootings, and surely those courageous youngsters will be marked for life. It's all part of the New World Order, you see.

CONIC COMPLEXITIES

The orbital maneuvers (finally some action!) we'll discuss in the next section require a full conic: daring relationship encounters and the like. Teenagers and young adults brave the limits of their psyche on the wonderful trapeze adventure when you're young and spirited. Before social pressures to conform wipe out the soul and cauterize the psyche so that you'll never have the courage to ever again dare to be different. Over half of all people now get married for money, and the only generation to marry for love is Generation Z.

We'll leave these profound mental health discrepancies for later chapters, the diseases of the soul. We first need to dance and sing and romance a little bit to get a feel for the connection of our top cone to the bottom one, the psyche to the soul. You'll notice that there has been no mention so far of sexuality; our model is ready to wade into that intimate subject now. We do so indirectly, with

a kind of moral shyness because anything to do with sex these days is a super-charged keg of dynamite.

The parabolic and hyperbolic sections have been proposed as deviant sections of the conic model. We'll now discover that they're ubiquitous in the study of gravity and orbital mechanics. How to explain this contradiction? Our simulations for these orbital maneuvers will refer to relationships, guy seeking a date with a girl he's attracted to.

You can't deny there's a certain madness to the excitement of love, especially adolescent puppy love. If the heat doesn't fade to a tolerable level, this love turns into infatuation, even obsession. All the people who marry for money (they call it financial security) think that love is insane anyway; like, totally unsustainable, dude.

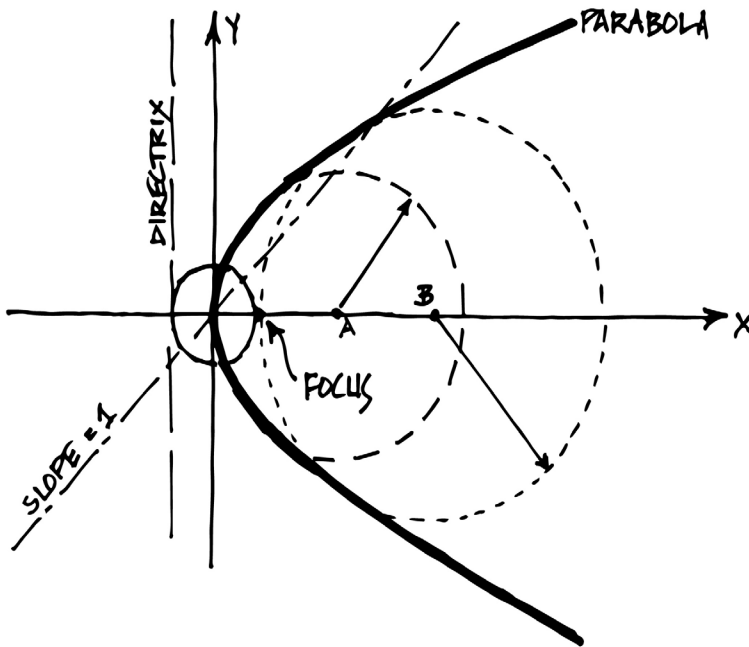


Figure 7.1 Conic Complexities

At the electrostatic level of our new inverse-squared-force universe, opposite particles attract, but also same charges repel. Which means that even though our examples here are for gravity and close encounters with planets by spacecraft (egg and sperm respectively; female and male), the same problems can be configured for electrostatic repulsion or, as the case may sometimes be, hatred.

Again, there's the soap-opera adage that love and hate are only a heartbeat separated. It's comforting (well, sort of) to know that our math model can be configured for a range of emotions and situations both positive and negative.

PSYCHOLOGY + MATH = RESULTS

The selection of orbital maneuvers as examples are not just for the romantic or other situations as described, but perhaps as therapeutic lessons, via role-playing or just examples. A short-term hyperbolic trajectory to your life is okay, but long-term being on a hyperbolic tangent is usually problematic (love or affection becoming an obsession) or at least eccentric.

If you can characterize the unhealthy trajectory of a person's life and if you know how you want their psyche to be in the conic model, then you can plot a path back to elliptical health, orbiting your core beliefs as an anchor in troubled waters.

Otherwise, psychology and the psyche aren't just about the individual but also the interaction among individuals, relationships. We'll investigate one-on-one functions first, then in later chapters get into groups, cultures, and whole societies. We know already that the equation for electrostatics at the atomic level has the same form as gravity, so you wouldn't be amiss to think of the progression in group size from one to many as a range of functions from the very small (electrostatics) to the very large (gravity).

8

A Fractal Theory

Before we get back to our orbital maneuvers and applying hard-core math to relationships in our ever-expanding model of the human psyche, it's helpful to take a minute to see where we are in the Big Picture and to see where our Big Theory will be leading us. This not only motivates the reader forward but also gives a little more significance to the theoretical underpinnings of the whole project.

The Force in our models and diagrams from this point forward will be the inverse-squared force, predominantly illustrated using gravity diagrams because they're more intuitively obvious to people. Some of the models in later chapters will be electronic, particularly electro-magnetism (if we can fashion gravity the force into the gravity of a situation, we can also use magnetism the force in relationships), which is also an inverse-squared force if a little more complicated than gravity (it has repulsion as well as attraction).

To account for the different scales of the models we'll build up a fractal theory, that is patterns that repeat at many levels. A common example is the nautilus shell, reference Figure 8.1.

Fractals are very common in nature: snowflakes, seashells, patterns in leaves and tree branches, air bubbles, lightning, and the cracks in ice. Fractals are fundamental in music too, as a way to carry on an underlying theme through several octaves, instruments, or arrangements.

The fractals offered here will all be variations on our inverse-squared theme developed so far. Many of the patterns will be exact, showing known problems from celestial mechanics,

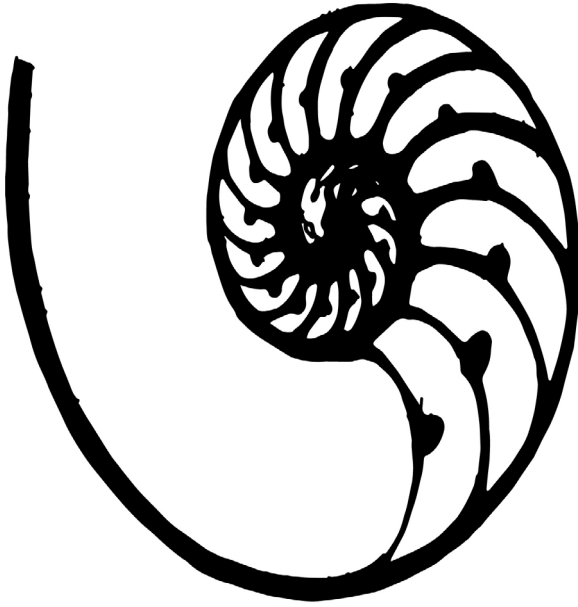


Figure 8.1 **The Nautilus Shell Fractal**

such as the Two, Three, and Many Body Problems sketched out so far. Other fractals will be derivatives of one of these problems to populate the levels in between the atomic and the celestial, with a sequence of intermediate steps, like sections of our nautilus shell going from the innermost core (the atom) to the outer shell (the cosmos).

Everything will be done with diagrams. We've seen how all the very complex "rocket science" math of a Two Body orbit can be represented with a simple elliptical orbit, or a Three Body Problem with the zero-velocity curves (which will be explained in much more detail soon). We'll merely apply these same patterns to intermediate levels. Once you understand the gravity examples, you'll be able to perceive the same basic principles manifest in the new fractal levels.

A STAIRWAY TO HEAVEN

We know the equation for the inverse-square force for electrostatics and gravity. No such comparisons can be proposed for our intermediate fractal levels. Nor are there any equations explaining all of the above fractal levels in nature. However, it's obvious there must be some kind of force doing this. We've referred to an "inverse-square geometry" as a fundamental principle that might influence the natural world even more subtly than actual forces. Just because we have no math to explain a phenomenon doesn't mean we can't model it accurately and reliably using geometry (Relativity is one example).

Imagine a whole stairway to heaven, from the atom up to the scale of the solar system, all based on the $2/3/4/N$ Body Problem, i.e., Newton's Law of Gravity. Saying any intermediate level is an "inverse-square geometry" is clever but not definitive, and probably not even significant. However, if you stack all these levels together in one Big Theory, then you have a comprehensive fractal theory, and suddenly that intermediate level is significant, and ditto for all the other levels.

In our conventional thinking, gravity is kind of boring: a linear force acting like a string holding a planet in an elliptical orbit, for example. Electrostatics is even more unexceptional: a cloud of probabilities shrouding a nucleus. It's hard to imagine extending these simplistic concepts into a giant fractal theory spanning the entire scale between electrons and stars. Then you think about the full plot of the stable orbits or zero-velocity curves in the Three Body Problem, the graphic with the two spiked tubes above the two primary masses. Wow – gravity is awfully damn complicated; symmetric and enchanting, too.

Yes, that graphic has possibilities. Mathematically, it exists at the subatomic level too: in a crystal matrix where a uniform structure repeats infinitely, imagine our fancy 3BP graphic repeating as well: that uniformity plainly expresses itself at the electromagnetic level of motors and machines: somewhere in that

transition is the Many Body Problem of electrons and uniformly constant current flow like we see in the semiconductor junction.

We've already followed just this kind of sequence of some mythical Force through the evolution of the human psyche from conception to adolescence. It all made half-way decent sense, in the patterns and geometry. We'll soon tie both systems together, in modeling actual human physiology to the 3BP graphic.

It all seems kind of simplistic if you just skip through the rough illustrations. However, if you consider that there are mountains of math behind each figure, that bona fide forces anchor the two extremes (and several anchor points in between that we'll iron out here); well, it all becomes something quite magical.

How else to describe the power uniting it all but the Force?

9

Pax Romana

As the Big Theory advances and the ideas mature into a new depth, the progress will not be linear as it has been so far but by way of fractal “jumps.” One such jump you know already: going from the Bohr atom model at the subatomic level to the planet-orbiting-sun problem at the astronomy level, both of which are governed by equivalent (except for a constant to account for the difference in scale) inverse-squared forces. As we now try to fill in that giant gap in scales with new examples, we’ll be taking one baby step at a time, upward from our current psyche construction.

Our project began with an ellipse, first as a model of the new sperm-meets-egg zygote and then as a dynamic for the human psyche orienting to the world at large (you probably didn’t notice, but that was a fractal baby-step jump, or maybe hop). We now expand our view a little more, and instead of looking at the world from the psyche outward, we’ll look at the individual from beyond the body human.

Referencing the sketch in Figure 9.1 of a famous Roman amphitheater (which really is built in an elliptical shape), before we were gladiators in the arena (think surgeons in the operating room working on a patient). Now we’re in the stands watching the drama unfold (in a gallery above and around the surgical theater in a teaching hospital).

Instead of gladiators and lions fighting, our dramatic production here is the reenactment of a famous Roman naval battle, called a *naumachia* (Latin for “naval combat”) where they fill the Coliseum with water and literally float ships therein, complete with sails,

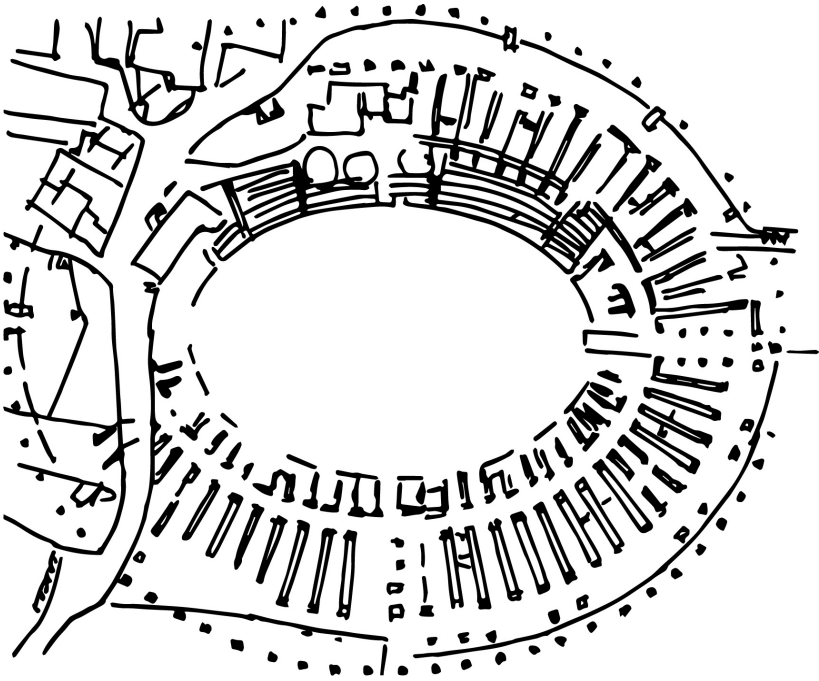


Figure 9.1 **The Roman Coliseum in El Djem, Tunisia**

battering rams, fire, and boarding parties of soldiers taking over the evil enemy ships. Nero loved the *naumachia*, which isn't much of a surprise.

Can you imagine the Roman engineers laying out the elliptical arena using a string stretched between two foci? We don't need to worry about the mathematical basis for that geometry anymore. Now we're going to drop all the heavy theory and focus (pun intended) on applications; we'll get out of your head and into the stands of the amphitheater.

The semimajor and semiminor axes of El Jem are 500 and 400 feet respectively. It's one of the largest ancient theaters in the world, and exceptionally well preserved; very much reminiscent of the Coliseum in Rome. Like the Coliseum, it had passages under the arena with trap doors on the surface to let lions and tigers

and gladiators pop out onto the stage. Or, as the case may be, to drain the artificial lake once Nero's fav show was over.

AN EARTH-CENTERED UNIVERSE

Back then in the Roman era, everybody assumed the motion of the planets and stars was geocentric, orbiting around the Earth (geo, Earth + centric, centered). Ptolemy, who lived about 150 years before Nero (and 200 years after Menaechmus, the Greek thinker who figured out all the geometry of the ellipse) built a model of the planets in our solar system. The Earth was at the center of this model. Figure 9.2 is a sketch of the motions of the major planets in Ptolemy's model, where Earth is at the center.

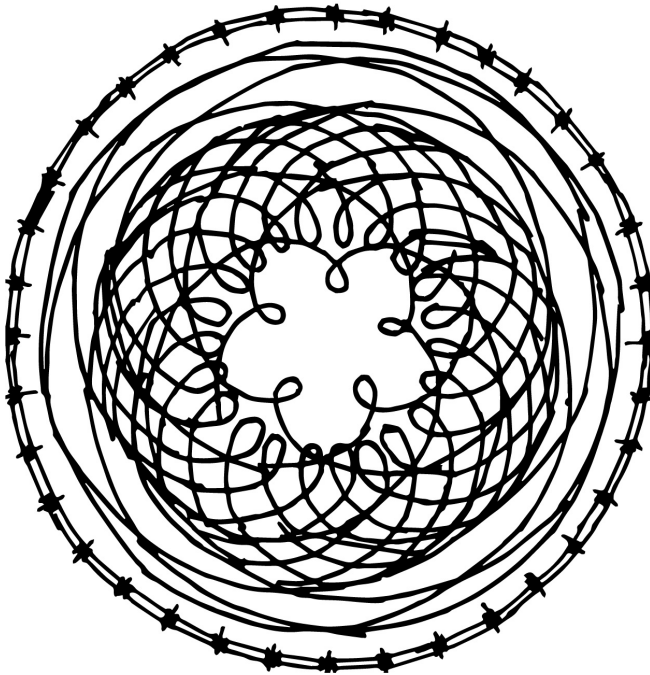


Figure 9.2 **Ptolemy's Geocentric Model of the Solar System**

Flash forward almost 2000 years, and in 1543 Copernicus proposed that the planets moved in orbits around the sun. His heliocentric (helio, sun + centered) model said that the planets moved in circular orbits around the sun, with the sun at the center of the orbit, and that the planets moved at a constant speed.

A SUN-CENTERED SYSTEM

In 1609 Johannes Kepler published two laws that said (1) the planets moved in elliptical orbits around the sun, with the sun at one focus. His calculations (using observation data collected meticulously by Tycho Brahe) showed that (2) the orbital speed of the planets was not constant but that a line segment between the planet and the sun sweeps out equal areas in equal times.

If you think of chariots racing around the amphitheater in the annual games to the Roman war god Mars; if you instead think

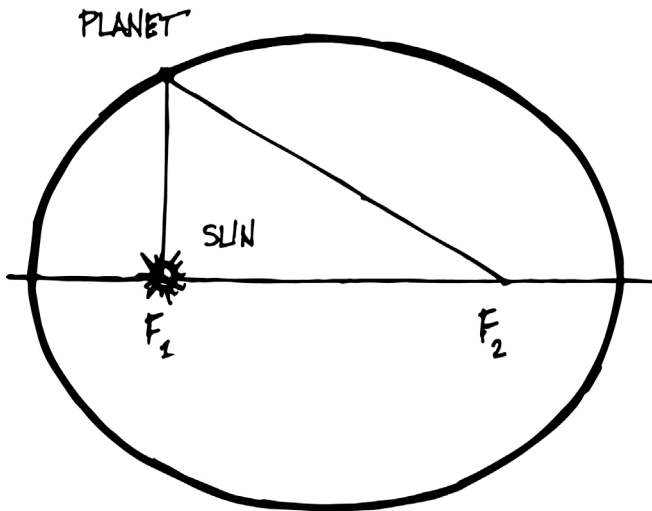


Figure 9.3 A Planet Orbiting the Sun

of this elliptical path as Mars orbiting the Sun, with the Sun at one focus, Mars moves fastest at aphelion (the point closest to the Sun in the orbit) and slowest at perihelion (the opposite end of the ellipse at the most distant point from the Sun). In a generic ellipse, these points are called apoapsis and periapsis; in an orbit around Earth, they're called apogee and perigee.

Or, if you think of orbital speed in terms of Kepler's second law, that a line from the sun to the planet traces out equal areas in equal times: a short line must move much faster than a long line in order to trace out the same area in the same amount of time.

We're back on familiar ground now, the ellipse and foci and orbits. We aren't modeling zygotes or mitochondria cell division or the evolution of the psyche into a full conic. We're above all that, literally. We're at a new fractal level, one baby step above in scale, examining how our inverse-square geometry might behave in the real world in person-to-person interactions.

FLUID DYNAMICS

You might think of this baby step as a Many Body transition. Recall that when you have N (many) primaries in an inverse-squared situation, the equations of those N gravity/electrostatic forces are the same as for static flow in fluid dynamics: the motion of the tiny N th body is precisely as though it's moving through a fluid. So, just like Nero, we're observing a fluid transition in the gravity games. (Actually, the Coliseum wasn't completed until 10 years after Nero, but the *naumachia* had been going on in other large arenas around the Roman Empire for almost 150 years since 50 B.C. and Julius Caesar's reign.)

In practical terms, the fluid-flow transition means that all the individual water molecules are no longer noticeable; we don't see any of the individual psyches in the crowd; we just see the overall body of water.

In terms of our psyche model, for all their individual differences, the crowd acts together in many ways: cheering when the Romans

achieve the upper hand in the naval combat reenactment, cringing at all the bloodshed (well, Nero's cheering that part), and then cheering wildly when the Romans are totally victorious.

In a very real way, then, the behavior of the crowd reflects the action of a collective psyche. "Crowd psychology" the experts call it. Typically, this crowd mentality is governed by the least-common denominators among the crowd. Never done anything really foolish when you're all caught up in the moment at a big sports game? That's crowd mentality bringing out your inner Neanderthal, or perhaps your inner Roman; maybe even your inner Nero.

Hopefully, you see the connections here. The psyche of the whole crowd is pretty much identical with the individual psyche, at least in necessary infrastructure. All of the same phenomena we discussed for the individual psyche can be seen in this crowd psyche – politicians manipulate the unwashed masses like that all the time. (They all routinely disparage the Nazis, but that doesn't keep them from using the exact same techniques on us; it's called political science. Ditto for Big Business advertising.)

The connection between the two psyches, individual and crowd, isn't just a resonance heightened by the moment; in our new way of looking at things, the individual and crowd are two fractal levels with the same basic structure. It's more than a resonance, that you see in the individual, what you also see in the crowd; and vice-versa: sometimes the crowd exhibits things too subtle to be noticed in individuals (the roar in a bullring when the matador finally kills the poor bull, after an hour of gruesome torture – which thrills everybody, too). That's the power of a fractal theory – what the math shows in one level exists in them all.

Are you ready for the show? Can you understand that our new relationship model is built on the foundation of our psyche model?

FIRST PERSON ROMAN

You're in the arena, if not the Roman-era coliseum, then at a critical epoch in your life. You just got fired without cause, and everybody's

watching for your reaction. You feel trapped, unappreciated, maybe even useless. You're pressured by everybody watching from the stands of life. Some people feel sorry for you. The eyes of others say they're enjoying your discomfort. You observe them all, record their reaction, and make the best of a bad situation.

Life's an ellipse, though, and you always move on and away, even from the times when you're burned by going too close to the sun. You know there will be more close calls in the future, there always are; best to gird up your loins and learn your lesson now so that the next close encounter with life (when you fly close to the heat again) will be better.

Maybe the ellipse reminds you of your love interest, how everything seems to move so fast when you're near them, at aphelion; and so slow when you are far away.

Does the attraction you feel seem stronger when you're nearby; weaker when far away and out of sight?

Perhaps your obsession on this individual, making them the "center of your universe," and you need to center your attention, at least a part of it, on an "empty focus," if only to make the object of your affections jealous, more attracted to you, afraid of losing you to another person's foci.

Or perhaps you're in the stands, watching with sadness, as this drama plays out in another couple. Your life is moving in a circle, where both foci are at the same point; yourself.

Maybe the "Ground Hog Day" repetition of life in an endless elliptical orbit bores you; or perhaps you're enamored by the power of your ego, the perfection of your life; happily, distanced from others as if by an invisible barrier, unwilling to let anybody inside your comfort zone to throw your life into an ellipse, and to then become a focus for your life outside of your own self.

REAL LIFE APPS

What do these dramas bring to mind? Other than perhaps modern psychology and its Earth-centered (self-centered) model is a

huge mess and could use a makeover into a Sun-centered model (Christ the Son; sun as the soul; sun as, well, anything at all but the narcissistic self).

FAMILY UNIT AS A FRACTAL LEVEL

Extending our base theme of the nascent child-psyche, in Figure 9.2 the ellipse is a family unit where everything revolves around the mother as the primary focus (or father, as the case may be) and the other spouse feels left out, a “third wheel” an “empty focus?” A similar situation in a relationship; for example, a lady who feels she’s in second place behind her man’s obsession with sports or with his job or some hobby. Or the guy might resent his girl’s obsession with fashion or gossip or sports or her employment or some amusement. How do you get these situations into balance? Or, worst-case scenario, the family might be totally dysfunctional as a hyperbolic unit and getting it into an ellipse with two foci would be progress, even if there are still dysfunctions; well, it’s a step toward better.

Perhaps a child has too many things that splinter her attention so that she can’t make good progress in school. Her attention is divided into a Ptolemaic nightmare of intersecting trajectories. If you could only get her to focus on her classwork, to set her priorities, to realize that you need to do well in school before you can slowly expand outward into one more focus. Religious people might think of that kind of help; others find better results if the child is out on the track running off all that excess energy, making her friends on the sports field instead of at parties/on Facebook/ with the evil neighbor’s kids.

The general idea is to put the needy person’s situation into one of the conic sections, then resolve how to put all the split ends together so that the situation is a manageable ellipse, however eccentric; at least you can manage a high-eccentricity ellipse toward a circle with one, central, all-important focus (school,

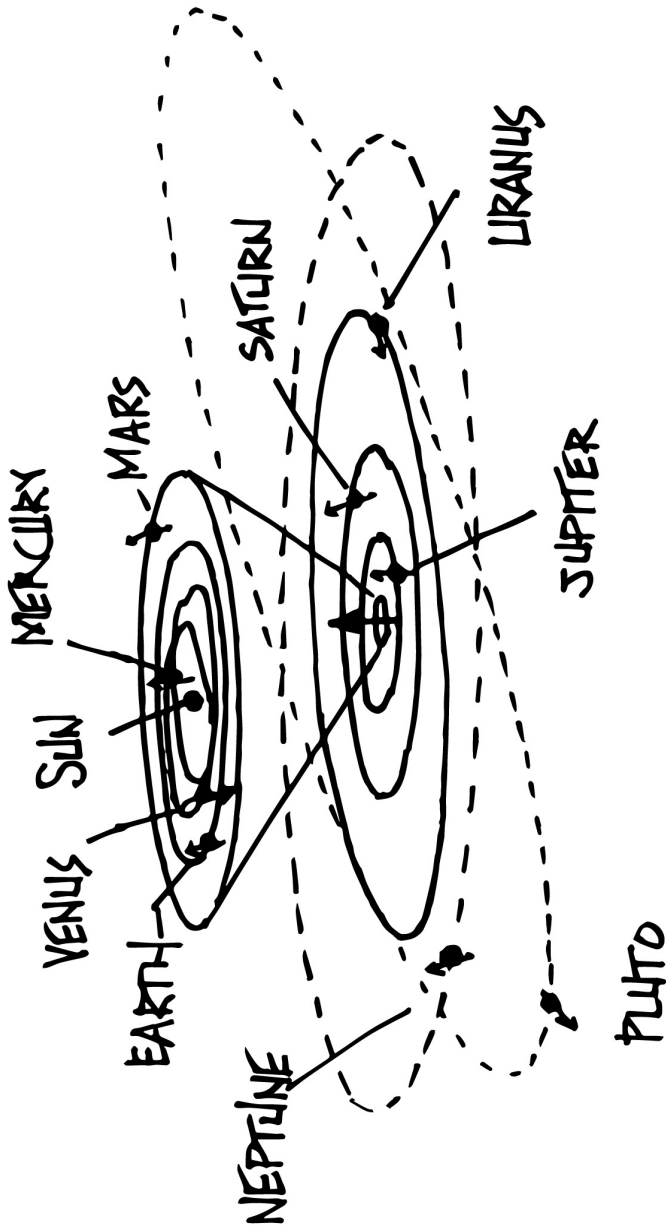


Figure 9.4 Orbits in the Solar System

career, sports, hobby, the 4H club, dance classes, anything with a future attached to it).

Notice that, strictly speaking, religion isn't a good focus here because although it might be healthy, it's not the kind of real future-focus a child needs. Maybe later; when he's mature and responsible and focused on a life goal. Of course, unless that goal is to be a minister or a social worker or the like, closely aligned to helping people above all else.

Otherwise, the idea is to set limits – not just for kids, but for everybody. If you have boundaries, there's hope. Some restrictions are easy to define – an alcoholic draws the line at tipping the bottle; an attractive boy or girl might need to set limits on their exuberant social life; a workaholic adult needs to limit time at work. Once you establish those limits, you have the conic section, and you can start putting the rest of your life together.

As for the people with severe mental problems, who are still in Ptolemy's solar system, maybe defining a new, intense focus; a focus that can be made the center of everything that's wrong. A job, hobby, community work, church; anything outside the internal chaos. Once you make one step in that direction, get one part of your problem orbiting the new focus, you can work on the next issue, and so forth, until your solar system is aligned as in Figure 9.4. Then you need to realize that you can't hula-hoop but one hoop at a time, and chose the most critical circle among them.

Part Two

The Soul

10

Patched Conic Psyche

With all due respect to the “rainbow coalition,” this model has had the subtext all along that the normal psyche evolves in a traditional household with both parents heterosexual and with nothing hidden in the closet. As we move into more concrete examples, this requirement is even more critical. This pretext about parental units is born out by many psychology studies, which show that an influential male figure in the home is the most essential antidote against homosexuality in raising children (and presumably why the liberal activists in Hollywood have flooded kiddie shows and cartoons with effeminate male figures to adulate, emulate, and prognosticate).

The mathematics is very insistent on this point. You can’t have two rigorous, predictable coordinate axes unless they’re the traditional Mom and Pop. That’s a fundamental aspect of this Big Theory. Maybe some sort of Relativity constant can be introduced later that accounts for a feminized male figure (which, if all the studies are correct; will only confirm the need for a strong male presence in raising a heterosexual child – which, again, is the gold standard here) but that’s not happening here, even after we get deep into the Relativity phenomena later on.

Indeed, the absence of Mom and Pop has been conjectured here to have drastic consequences, in destabilizing the psyche’s inertial reference frame to the point where it’s vulnerable to psychotic breaks and even schizophrenia. Similarly, for late-onset schizophrenia where an individual might be bullied by gays for one reason or another (e.g., publishing a theory like this).

Homosexuality is not established by any dominant psychology theory other than Freud's psychosexual theory (which we'll add to the fractal levels later on). The intention here is not to say there is anything wrong with the lifestyle choice, only to say that for now, it's just too complicated an issue to conceptualize in our math model.

FYI, homosexuality was taken out of the Diagnostic and Statistical Manual-3R in 1987, not because of clinical studies but because of protests by gay activists (yes, behaving like angry two-year-olds in a collective temper tantrum) year after year after year at the annual psychology meetings worldwide. Gay activists also discredited the orgasmic reconditioning method (which they themselves use to strengthen their gay) because it implies homosexuality is a lifestyle choice, thereby eliminating a valuable tool to help many kinds of people overcome their sexual issues – pedophiles to get turned on by older individuals, troubled couples to get turned on by, well, each other; and so forth.

Not this time, and not with this theory. Math is sacred, and if you want to prove your particular condition is okay, come up with your own Big Theory.

We offer the following case to show just how delicate the coordinate system is for our mathematical analyses here. And to illustrate precisely why the above definitive statements have been made to highlight the situation. As we've done before, when introducing a new schema, we return to the beginning and develop it from scratch. Hence, to begin our main storyline about the Force (of gravity) we return to the source, the sphere.

THE ONE BODY PROBLEM

As stated, we're now getting into gravity problems not as symbolic systems but as mathematical problems. There will be three actual bodies in the 3BP, for example; typically, three people (which is still taking the context as symbolic, but less analogous than the entirely virtual psyche). The 2BP is relationships between two

individuals; the Many Body Problem is a crowd of people, and so forth. In this framework, what we've been studying so far is technically a 1BP. However, since gravity acts between two masses, theoretically a 1BP isn't possible in the theory of orbits; although we can study gravity as a field, or as noted several times before, as an "inverse squared geometry."

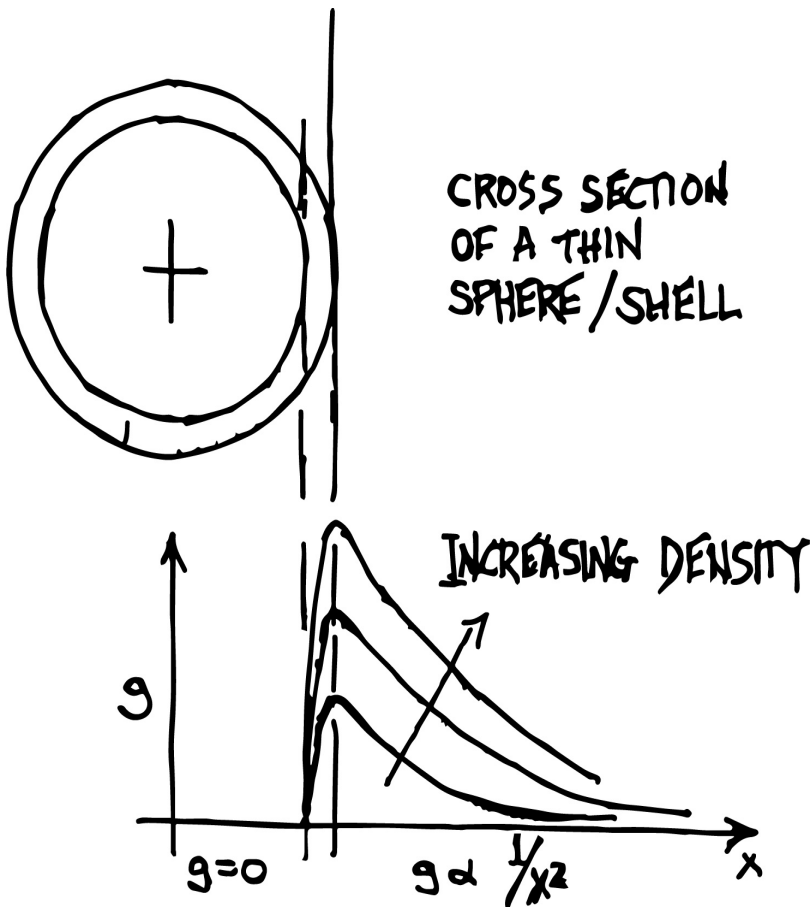


Figure 10.1 Gravity Inside a Hollow Sphere

Recall the early, nascent psyche – before we got into the whole conic thing and everything was at most a very low-eccentricity ellipse – it was modeled as close to a circle as you can get in nature (since the psyche is virtual at this point, it may very well be a circle/sphere).

This is the transcendental state where yogis and gurus go to meditate to be at one with the universe. It's the root source of the Force, if you want to go Star Wars on us here. It's where the *Kwisatz Haderach* went in Frank Herbert's Dune books (except you can get there without the geriatric spice: 30 mg of fiber/day + 10 glasses of water + a max of 9 teaspoons/day of added sugar on a steady diet of 300 minutes/week of aerobic activity will do the trick).

Figure 10.1 shows the gravitational force relative to a hollow circle, alias our 1BP.

We borrow this diagram from celestial mechanics, which can show by a shrewd integration that no gravity is felt anywhere inside of a hollow sphere, assuming the shell is of a uniform thickness and of a consistent density.

In our psyche metaphor, a healthy psyche is impervious to all external forces, pressures, and influences. You can't bully a strong psyche into accepting your point of view, manipulate your way through a robust psychic firewall to force the individual to buy your product, smoke your weed, or roll in the hay with you no matter how convincing their arguments or powerful their persuasion.

Using the same integration methods, the gravity outside the sphere drops as

$$(10.1) \quad F \sim \frac{1}{r^2}$$

This same math shows that the force of gravity outside the hollow shell is as if all the mass was concentrated at the exact center of the sphere.

Metaphysically, this suggests that a healthy psyche's influence upon its (your) environs diminishes rapidly. In our modern age of

narcissism where everybody is consumed by self-interest, this isn't a lousy reckoning of reality: if you're psyche is so self-confident and assured, the average social-networking clone isn't going to notice you; not if you won't "like" them or otherwise appeal to their vanity, text, sext, or video app them.

The only people who exist in the New World Order are those who are plugged into the virtual social Matrix. A self-contained, self-sufficient psyche exists beyond that Matrix, doesn't need to join the crowd; is quite satisfied with a distal relationship, keeping up pretenses without becoming consumed by them.

GRAVITY GAMES

That's what the math implies, at least. What ideas does this image trigger in your brain? Can you identify 1BP people in your circle of friends? Do you resent not being able to "yank their chain" or reach their focus to discombobulate their clear, consistent, compelling vision of the world? Maybe they scare you deep down inside, these social outcasts who stride through life, clueless (or so you assume).

Maybe you live inside your own hollow sphere, in a bubble of social networking; but you feel no attachment to anything, as though you're floating in zero-gravity.

Or perhaps you're on the outside, your life full of gravity and stress, and you yearn to escape it all, into a tranquil, peaceful zone where nothing matters, to be at one with the cosmos.

Sure, you can avoid all that responsibility and angst by escaping it, going far, far away; or you can find a quiet place inside yourself, relax, and meditate until you discover the magical oasis.

Maybe you've just moved to a new school, city, or neighborhood and are still "inside your shell." Perhaps you're a late bloomer and just starting to venture into the complicated world of relationships. Could be your family can't afford a smartphone for you or a desktop computer at home, and you hang out with the non-virtual rejects.

Whatever your situation or maturity, we're still in the teenage years and hormones are not happy with your being excluded from

the real world, having only virtual friends, and spending so much time interacting via your thumbs, texting. Having spent so much time staring at an electronic screen of one size or another, real-world dynamics aren't just foreign to you but downright scary. How do you even start? Is it even possible to find a real person of the opposite sex who feels like you and wants to have a real, person-to-person friendship?

MATH AVERSION SYNDROME

It doesn't help that most people are like totally turned off by math. Yuck, what kind of nerds can you meet using math analogies and math diagrams – another math creep? No effing way. I'll stick to sexting and virtual sex.

Then the hormones kick in. Life becomes irrational, chaotic, and unpredictable. Math starts to seem like a Force you might could use. Geometry's not so bad. Trig sucks, but conics are somewhat refreshing. Space is fantastic, and I can deal with diagrams and wacky personifications of abstract ideas.

Hey, all the world's tech is nothing but math; smartphones, apps, broadband, Facebook, Twitter, computers, the Internet, search engines. Math, math, and more math. It's what makes the world go around. Some of the tech is even fairly righteous: GPS, YouTube, snapping pix with your smartphone.

How do you think Star Wars light sabers work, Star Trek warp drive and transporters, anything and everything in every sci-fi flick you've ever seen? It's all math, every last iota. How can you operate a lightsaber unless you know math? Not possible. Try transporting without math. No way, Jose. Reach Mars without math? Fight the Matrix without math? Not gonna happen.

Math is the Force. The Force is Math.

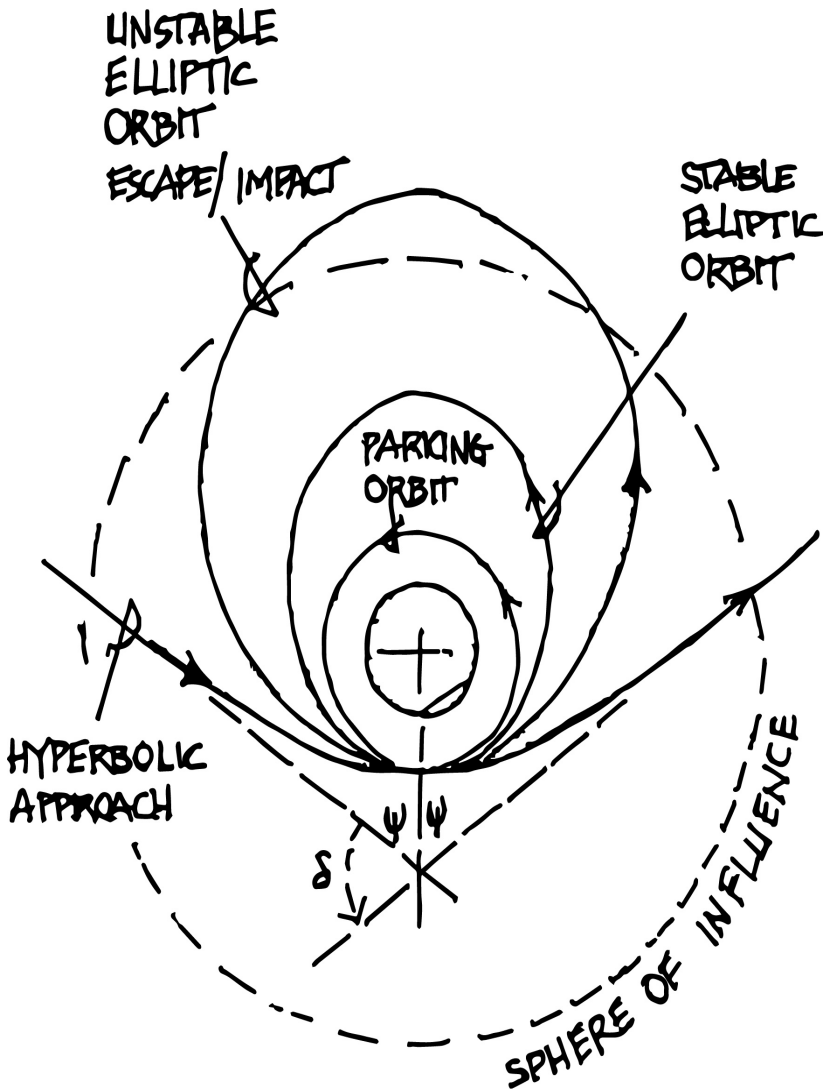


Figure 10.2 Parking Orbit Inside the SOI

THE PLANETARY FLYBY

Finally, we get to a real 2BP in Figure 10.2, a spacecraft approaching a planet for a landing or planetary flyby. Orbits like this are analyzed in orbital mechanics by the “patched conic method” as follows:

1. We approach our objective planet on an elliptical sun-centered heliocentric orbit, as illustrated in Figure 10.3, with the sun at the main focus of the trajectory.
2. When the s/c (spacecraft) passes an imaginary line called the Sphere of Influence, there’s a transfer of coordinates so that now the s/c is on a hyperbolic approach orbit with the target planet (in this case, Mars) at the main focus.
3. Once the s/c is very close to the planet, you apply the brakes with a small reverse thrust and slow down the speed so that you’re captured by the gravity of Mars. Now you’re in a high-eccentricity elliptical orbit (an elongated ellipse) with Mars at the main focus.
4. (If you don’t slow down you zoom on by Mars on a hyperbolic escape trajectory following the same hyperbola, except your speed has increased thanks to Mars’ gravity.)
5. Every time the s/c goes through apoapsis (the closest point in the orbit to Mars, which remains constant, and is also equal to the closest point of the approach hyperbola) the atmosphere slows down the s/c a little bit which changes the dynamics of the elliptical orbit so that the eccentricity of the ellipse diminishes slightly. (Think Kepler’s 2nd Law: the line from the focus to the planet at apoapsis slows down a little with each pass, so the line at periapsis must either slow down and/or get shorter – it does a little of both.)

6. Over time, with many passes through the atmosphere slowing down the s/c (gradually reducing the eccentricity), the orbit is circularized, at which point you're in a stable parking orbit around Mars. Mission accomplished.

THE SPHERE OF INFLUENCE

A key concept here is the Sphere of Influence (SOI), which is an imaginary line where the force of gravity from the Sun equals the force of gravity from the planet. That's where, in modeling these interplanetary orbits on the computer, you transfer the coordinates of the s/c from the sun to the target planet.

There's that sphere again, our recurring symbol for the psyche. It's analogous to the sphere of influence of an influential person, a big business, or even an entire nation. It's the realm within which said person/business/nation is all powerful, the dominant factor, the big *kahuna*, the focus of all things. Think of the nesting Russian dolls, a *matryoshka* doll.

Mathematically, these are fractal levels of the very same inverse-squared geometry. The $\mathfrak{z}$ BP trajectory goes all the way down to the subatomic level. Ernst Rutherford, a contemporary of Niels Bohr, observed the deflection of a stream of electrons by a thin layer of gold foil and deduced (correctly) that the change in the trajectory of the electrons was caused by passing close by the heavy gold nuclei, as a real-life application of the flyby $\mathfrak{z}$ BP.

What does all this mean for our adolescent trying to "come out of her shell?" Here we have two warm bodies; two humans in a flyby relationship – isn't how they all start? We have two psyches interacting in a conic fashion, just what the doctor ordered.

Is this love at first sight, where the entire trajectory of your life is changed by a close encounter with the man/woman of your dreams? Where the affection two people feel draws them closer despite (or because of) difficulties that would drag down any other

relationship, until they're united in holy matrimony, to remain in a parking orbit until "death do us part?"

Perhaps it's a person who zeros in on that special someone, the apple of their eye, but the gravity of their close encounter isn't enough to pull you out of that hyperbolic approach effort? So, you soon right on back into your heliocentric orbit, in search of Mars or Venus?

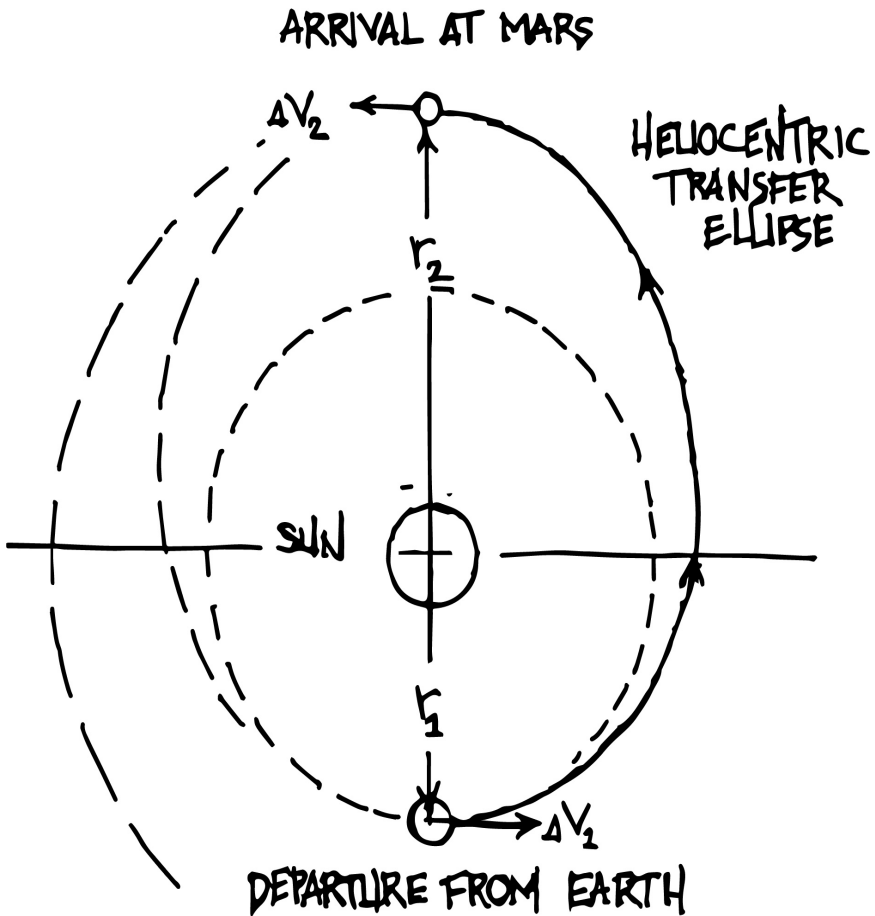


Figure 10.3 The Heliocentric Transfer Ellipse

Perhaps your approach angle was wrong; you were too direct, or not direct enough; so that the gravity of opposites attracting didn't come off so well?

THE INTERPLANETARY TRANSFER

Maybe, instead of focusing on that final objective; the love interest or dream job or dream career; you need to take a sharp look at the bigger picture, the heliocentric transfer ellipse. Instead of an all-or-nothing approach, where you stake so much emotional cash on the success that failure leaves you nothing in reserve, and you careen off into deep space after failing.

Keep a little in reserve so that if things don't work out right, you can at least make a course correction after the approach to the planet of your desires, and return to your original Sun-centered life.

The delta-v arrows in Figure 10.3 are thrusts. In this case, a positive change in velocity at Earth to jump out ahead onto a heliocentric ellipse that will put you on a path to Mars, and another positive delta-v once you arrive at Mars because your speed at perihelion is less than the orbital velocity of Mars.

What, you didn't think it took a great deal of effort to put your lie on a new trajectory? That often, once you reach your goal, you still need some fuel in reserve for that one last effort – to pass your final exams, to romance your objective into the marital ceremony; or to finally convince the Big Boss that you're ready for that promotion.

Or you didn't realize that even if you fail at that long-term effort to land on Mars or to land that promotion; it's not the end of the world? You can always just drift on by Mars and follow the heliocentric ellipse right on back to Earth; except – Doh! – by the time you return to aphelion Earth won't be there any longer. Bummer.

Relax, enjoy the view; if you can't return home for a couple hundred revolutions, at least you've learned some essential ideas in orbital mechanics, and maybe in life, too.

Gravity between humans behaves just like gravity between celestial bodies. Is human gravity an inverse- r^2 function? Does culture play the role of the sun in organizing relationships from a distance? Where once you're in the final approach phase to your object of desire (attraction) do culture issues fade and the universality of flirting and intimacy rule the roost? If the landing fails, and you zoom off into deep space, will your cultureglom onto you and keep you in a heliocentric orbit ready for another try; or do you get farther and farther away from the central sun with each failure, until you're hoping for a lasting relationship fades into the cold darkness of deep space – back into your old virtual world again?

Then again, there's always a dark side to a model like this. Advertisers know that by far the best return they get on their advertising dollars is to hook you while you're still very young. There are plenty of people united to protect the unborn, but nobody to protect the young from invasive advertising.

They get under your skin (into your sphere of influence) as soon as you can recognize McDonald's arches (before you can even recognize Mom's breasts) and hook you for life. It's all about brand loyalty. Just look at Apple products: 5+ years out of date but still leader of the pack by virtue of the class consciousness they promote. Ditto for the whole FAANG collective.

Why do you think we call it the Force here, hoping to educate people to protect their psyche from all the hidden, subversive evils out there, to develop the spiritual firewall you need to protect your subconscious mind so you can be happy and prosperous in the world. (Instead of consumed by the envy fueled by powerful advertising, and buried under a mountain of debt to buy a houseful of things you didn't really want and will never, ever use.)

11

The Hero's Journey

In the last chapter, we took the basic psyche 1BP and projected it into 2BP relationships. Our psyche model was based on conic sections. The 2BP was organized by patching conic sections together to simulate a complete, seamless interplanetary trajectory from say Earth to Mars. (The patched conic method isn't just another geometric analogy. The name reflects how it's actually done in orbital mechanics.) The sphere was a convenient anchor giving reference points throughout.

The Earth-to-Mars interplanetary trajectory is actually a Four Body Problem because you have the small s/c plus three more large bodies, the primaries: the sun, Earth, and Mars. Whereas our 2BP examples were mostly short-term one-on-one scenarios, our 4BP example to follow will jump up one level on our fractal ladder and encompass a whole life journey; or at least a goal achieved over a much longer length of time. This is consistent with the evolution of our fractal inverse-squared geometry thus far.

Remember gravity is an inverse-square force, so while we're modeling around with gravity as our central force, we don't need to continually reference the underlying mathematical infrastructure as inverse-squared. Nor do we need to explain our models away as "inverse-squared geometry" because we're dealing with the Force itself now.

Our example 4BP analogy is something you've seen a thousand times on the big and small screens, and in dramatic productions of every kind from stage plays to teleplays to novels and short stories. It's the Three Act structure that has been polished and perfected

over the years (over the millennia, actually) and developed into a gripping, evocative way to involve you the audience in the story. Here we narrow down the selection set to the silver screen, movies.

THE BEATS

Every film has the same basic structure with “beats” or critical events at very specific points in the drama. The industry standard is the Blake Snyder Beat Sheet developed in Snyder’s famous book Save The Cat. This book, published in 2005, revolutionized the industry.

There has always been a strict structure to screenplays, and a recognition of the Three Act drama goes back to the Greeks and Aristotle. Flash forward almost 2500 years, and Blake Snyder, after studying hundreds of successful films, recognized a series of breakpoints, or what the industry calls “beats,” critical points in the development of every successful film.

Note: In acoustics, a beat is “an interference pattern between two sounds of slightly different frequencies, perceived as a periodic variation in volume whose rate is the difference of the two frequencies.” The two frequencies form a new wave as suggested by Figure 11.1. The overall perception is the change in amplitude

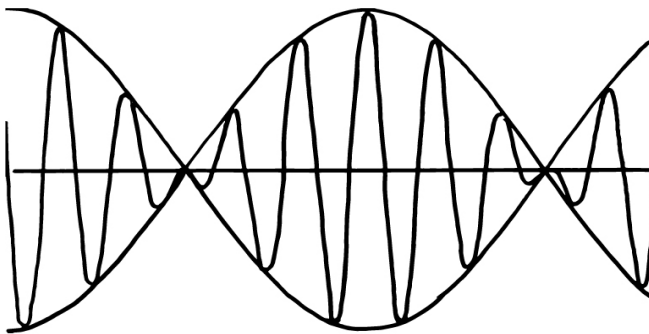


Figure 11.1 **Constructive Interference as Beats**

(volume) of the envelope curve. That's when the movie's reality syncs with yours subconsciously and you're "hooked." There are many psychological analogies: chemistry between two people, falling in love, which in the movie world is not just acted out on screen but in your beating heart as well.

Snyder's screenplay infrastructure is based on an average script length of 110 pages, with typically one page of a script per minute of screen time.

THE BLAKE SNYDER BEATS (page number)

- Opening Image (1)
- Theme Stated (5)
- Set-Up (1-10)
- Catalyst (12)
- Debate (12-25)
- Break into Two (25)
- B Story (30)
- Fun and Games (30-55)
- Midpoint (55)
- Bad Guys Close In (55-75)
- All Is Lost (75)
- Dark Night of the Soul (75-85)
- Break into Three (85) Finale (85-110)
- Final Image (110)

This standard is now enforced ruthlessly by Hollywood. For example, when you enter your script in a contest, the readers typically first turn to page 25, and if you don't have a significant, dramatic event on that page, they toss it. "Clearly, this moron doesn't know structure" is the inevitable subtext when the critique comes back from the "experts."

Of course, there are a thousand things they can find wrong with a script that's obviously from a conservative writer (no gay characters, strong male lead with depth, bold and sassy female lead

who actually has a brain and personality and important lines to speak), which is another reason why Hollywood absolutely adores Blake Snyder's boilerplate standard. Even if you hit all fifteen beats square on the head, if it's from a conservative writer, the readers don't even notice the beats. It's an automatic fail. Get a professional to proofread the material, they'll tell you; too many words, too many characters, the bad guys aren't good enough, too complex a structure. If you're a conservative writer, fuhgeddaboutit.

THE THREE ACT STRUCTURE

From our psychology perspective, Hollywood wants only scripts that feed directly into the narcissism of their viewers – they love superheroes, people with super-powers; anything super so that the fans leave the theater with super-sized egos and are fueled up with narcissism to last for weeks or months until the next superhero film comes out.

Hollywood's main target audience for blockbusters is young males. They're prime fodder for advertisers anxious to hook you for life. Hollywood is quite eager to please these advertisers because they pay the bills and – Doh! – it's a whole lot easier to write and produce and film a shallow feature film with tons of CGI and zero acting, no arc to the characters; nothing much of anything but violence and explosions and blood – you're talking teenage boys here, capiche?

Otherwise, the rigid beat structure jives perfectly with commercial breaks when the film is broadcast on TV. Advertisers want viewers to stay tuned after the standard station break after 26 minutes, so you need a "cliff-hanger" before that ad segment, with lesser dramatic anticipation before every other ad segment. Sure, I can see the value of a cliff-hanger at the end of an hour segment in a continuing story. But before every ten-minute ad segment; yes, they need that too, because the ad segments keep getting longer and longer, and more and more boring.

It's a testament to the power of this Three Act structure over

the human psyche that people even watch serialized television anymore on broadcast stations, with 20 minutes of advertising for every 15 minutes of movie.

Alas, enough with the backstory. Onward with the math.

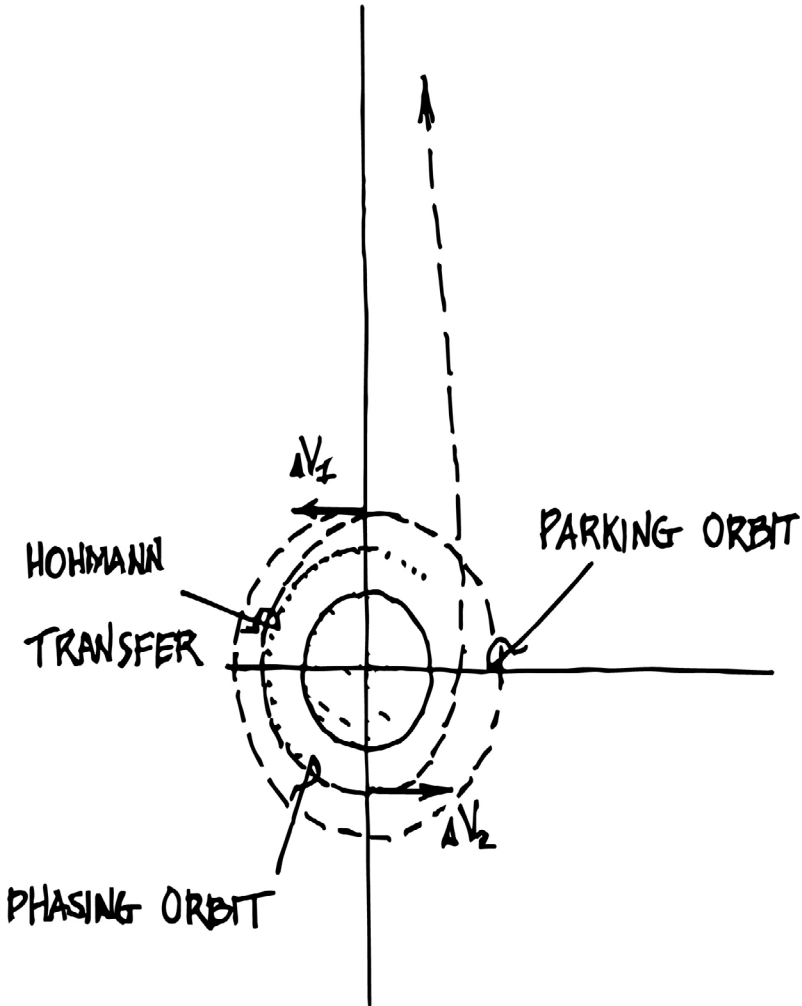


Figure 11.2 Escape from Earth

OUR HERO GOES TO MARS

Reference to Figure 11.2, the similarities of standard screenplay structure to the interplanetary trajectory are uncanny.

At this point in Act One, you're still inside the Earth's Sphere of Influence, an imaginary circle (dashed lines in Figure 11.2) where the Earth's gravity-force equals the Sun's gravity-force on the satellite. The focus of the hyperbolic escape trajectory is Earth, while inside the SOI, but the gravity force from the Sun becomes stronger and stronger until, once passed the SOI, the focus of the new elliptical orbit is the Sun.

In screenplay terms, there's a debate once the catalyst punches you beyond the set-up parking orbit, until you break into two upon reaching the SOI, after which time the B story begins; that is, the heliocentric ellipse, alias Act Two. Typically, there's a whole new set of characters; or gravitational forces, in the case of our trajectory allegory.

By this point in the drama, you're all caught up in the story.

SUSPENDED BELIEF

Screenwriters say that you've "suspended disbelief," and are ready to accept almost anything. For example, in a sci-fi flick, new laws of physics or time or space. The theater is dark, the atmosphere intimate, and you're all wrapped up in this strange new world.

There are two phases to Act Two, or the heliocentric transfer ellipse (Figure 11.3), divided roughly at the midpoint or conjunction (when the Sun-Earth-Mars are on a direct line). Prior to the midpoint, the spacecraft is gaining on Mars, but very slowly. This is the fun and games part of the script, where the romance builds, and where there are no major impediments in sight to their happiness, or to reaching their goals.

Then at the midpoint, there's a dramatic increase in stakes; a significant event that changes everything for the worse. In an interplanetary trajectory, this is typically where the spacecraft

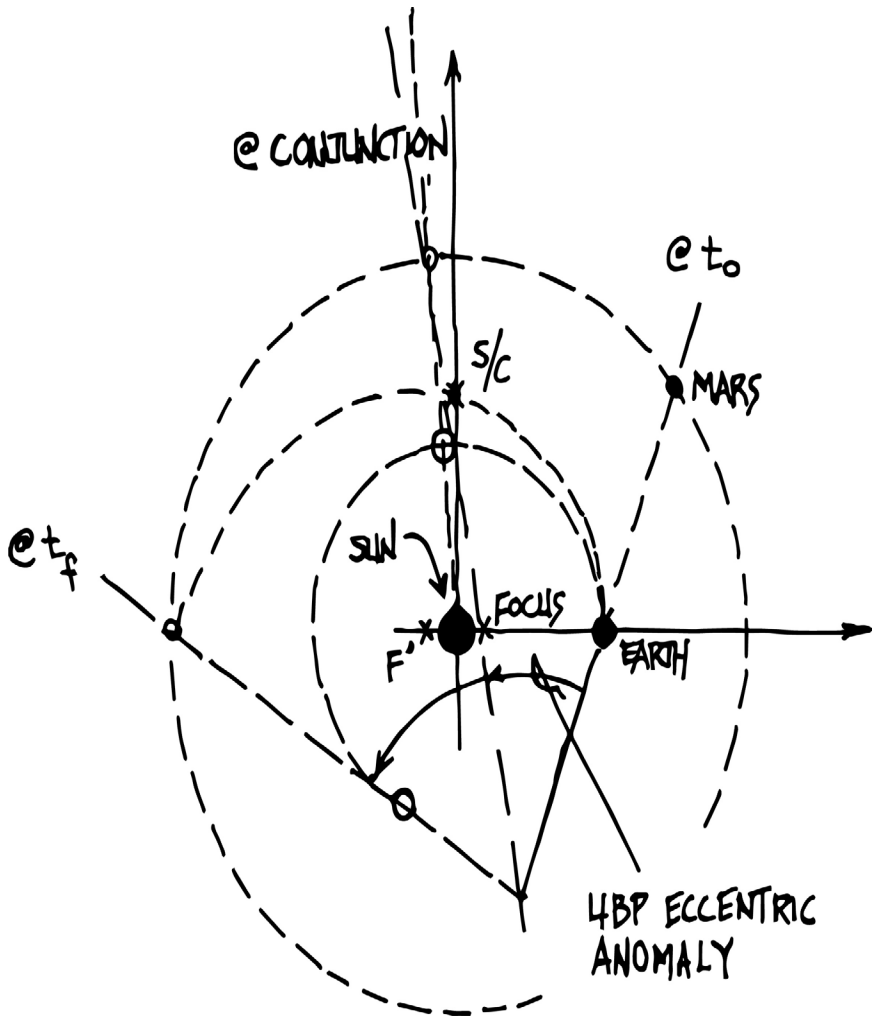


Figure 11.3 Heliocentric Transfer Ellipse

applies a thrust to change from motion in the Earth's orbital plane to Mar's orbital plane. It's an critical maneuver which, if done correctly, can save a lot of valuable fuel.

After midpoint, the bad guys close in. The Earth has now moved well ahead of the spacecraft, and its gravitational influence drops off rapidly. But now Mars is moving into gravitational influence, and quickly. Recall that the slowest velocity of an object on an elliptical orbit is at perihelion, which is where the spacecraft will reach Mars. Their relative velocities at this point are such that it's like waiting at a railroad crossing for the train to arrive, Mars is moving in so much faster!

There's a moment, as the spacecraft approaches this critical juncture; the bad guys (Mars) closing in, reaching the Sphere of Influence of Mars, passing it – all is lost if this maneuver is only a fraction off.

Then there's an approach to an inner planet like Venus, where you can approach behind the planet, and use its gravity to pull you in for a landing. (Think romantic comedy, where you know there will be a happy ending.) If your maneuvers are a little off, no big deal – you'll still be able to achieve a parking orbit at a little higher altitude, then just wait for drag to circularize it.

PSYCHOLOGY ANALOGIES

The heliocentric transfer ellipse (Act Two) is the superego, society's values and morals that function to control the id's impulses (Act One), persuading the ego (Act Three) to turn to moralistic goals rather than the self-serving. The superego consists of two systems: the conscience and the ideal self.

Traditionally society's values and morals have guided individuals carefully toward the sexual ideal, maturity – Mars; fraught with dangers and threats, as it may be. One tiny deviation from the norm; and – crash!

The genital phase is out of reach.

That's the current state of modern society. The gentle coaxing and guidance of traditional values no longer exist, and the path to sexual maturity is all but out of reach; forbidden, even.

Narcissists are trapped in the anal phase; unable to move beyond Earth's Sphere of Influence into the grand journey across the cosmos, under the guidance of "Son-centered" values.

The millions of young adults who embrace the new sexual continuum of trans-sexuality are trapped in the latent phase, in the chaos of Mars approach; afraid, unassertive; without any guidance whatsoever from society. While, before our very eyes, they crash – or careen off into deep space – and never, ever land on the gentle landscape of sexual maturity.

Indeed, all the forces of society are amassed to dissuade, block, or turn aside those who seek sexual maturity. Hollywood has abused the trust we place in them, by taking advantage of the "suspended disbelief" phenomenon to cram their unorthodox philosophy directly into our subconscious, bypassing all conscious filtering. All these abstract ideas on sexuality will be ironed out with some math and examples later on after we investigate the much more complicated 3BP.

Later, after a rigorous computer analysis of the Mars trajectory, we'll show exactly how this "suspended disbelief" phenomenon, and how Hollywood literally slips their message by directly into the subconscious brain, past all social and conscious filter mechanisms, without you even realizing it.

You can't fool the math, however. Which is why Hollywood always characters math whizzes as total nerds with a shallow, one-dimensional character, like totally boring, dude. Math is the dark side to all the decision makers in Tinseltown, the ultimate evil, what they fear the most above all other possible horrors.

Exercising for Mental Health

Physical exercise has become a spectator sport in the developed world. 2/3rds of Americans are either obese or overweight, and the other 1/3rd is in the clear only because the Body Mass Index (BMI) standard is so forgiving. (Actually, that figure is a decade old; the number is closer to 80% now). If you went by the good old Met Life longevity standards, identifying the weight for maximum lifespan (which seems to be a reasonable metric), then 95% of Americans are overweight.

It's a pity that Jesus, Mohammed, Moses, and Buddha all lived in Antiquity when everybody got regular exercise just to get around on foot. If any of them were to reincarnate to the modern day, there can be no doubt that their First Commandment would be:

“Thou shalt get at least one hour of hard exercise each day.”

BRAIN RX

Exercise is very good for the brain. It sends a boatload of oxygen-rich blood to your brain cells, which they need in abundance to do their thinking. The latest scientific research says that the underlying cause of Alzheimer's is a lessening in the flexibility of the main heart arteries so they can no longer absorb the pressure spikes of the beating heart, sending these pulses to the brain where they damage the complex mesh of very fine blood vessels there, cutting off the supply of blood, oxygen, nutrients, everything. A healthy heart delivers a smooth, consistent flow of blood to the brain; problem solved.

Who hasn't gone for a long walk to mull over a tough dilemma? Walking (or swimming, cycling, you name it) burns up stress, relaxes you, sends bright-red, highly oxygenated blood to your brain cells. Even mild exercise gets your conscious mind off the problem so your subconscious can super-compute a solution for you. Regular exercise for school-age children is the cheapest, most effective way to dramatically improve their grades and keep them elevated.

TOXIC STRESS

Exercise is very good for the psyche, too. Stress is a contributing factor in practically every mental illness and personality disorder. Exercise is evolution's excellent method in all the natural world to purge stress from bodies and minds. The first chore on every psychiatrist's Rx pad should be regular, dependable, strenuous exercise. It's cheap, efficient, effective, and practical for any lifestyle or situation.

Think of stress as the atmosphere of a planet you're trying to land on, say Mars. It takes your smooth elliptical motions (the ellipse is a very natural motion – think of all the elliptical trainers, treadmills, and climbers on the market – they work better than the linear kind) and circularizes the natural arc, turns it into a circle. If you don't exercise (and stretch, always stretch) that stress out of your joints it will become a complete circle/sphere and literally lock that joint up in a frozen shoulder/knee/etc. It'll take you six months to get your full range of motion back, if ever; might even give you rheumatoid arthritis (an autoimmune condition when your body attacks you because you aren't listening to all its messages to exercise, stretch, work out, every day).

NO PAIN, NO GAIN

Sure, exercise is hard, sometimes tedious; it makes you smell bad and is often inconvenient to our hyperactive, multi-tasking

lifestyles. But regular exercise is great for the waistline, good for your general mood and feeling of well-being, and you sleep like a log every night, to wake up refreshed and renewed.

With all due respect, don't expect to enable the Force in your life unless you're fit and exercise regularly. That's not fat-shaming; it's the honest truth. What, you think it's all about sheer mental power? They never show any superheroes working out in the movies. As far as that goes, all the evil Big Brains in the sci-fi flicks are the gross hulks of flab and blubber. Why not me?

I know we're halfway through the Big Theory, and this is the first mention of exercise. What, you think I'm going to offend 80% of the readers by saying right off the bat that, "You're fat, lazy, and won't ever be a Force to reckon with unless you get off your lardy buttocks and exercise?" I've got to get you hooked first.

Advertising 101.

NONVERBAL EXERCISE MUSCLES

Sure, you can be successful, influential, envied, feared, and overweight all at the same time (think Trump, Rush Limbaugh). But regular exercise and a reasonable BMI will make you even more successful, powerful, envied, and feared. You'll also live a lot longer, with far fewer complications in old age, and retain your mental faculties longer, too.

As far as our psyche model goes, everything so far has been set up with a standard coordinate system, the x- and y-axes sometimes called an inertial reference frame. That's your body. That's the wonderful, complicated machine attached to your head. It's chock full of muscles and nerve endings that let you feel and experience, move and be moved.

We've mentioned that 80% of communication is nonverbal (well, the latest figure is more like 65% because of the ubiquity of social networking – "use or lose it" at work) via body language. That's all orchestrated by your subconscious mind, both sending signals out and receiving them from others. Your mind is the translator

for all of this, but your body is the one that does the signaling (via hand motions, body position, stance, posture, and a hundred other subtle things).

Ever seen your hero or heroine pull a Force move on somebody by texting on their smartphone? Do you dream of sitting down at a video game to try your Force out against Darth Vader in a video game tournament? Is the next big Star Wars flick gonna be The Drone Wars, with all the villains sitting safe on Planet Doom at video consoles, operating their little drone bad guys remotely?

That's you, sitting in the movie theater, imagining yourself as the Jedi warrior with all these incredible powers. That's not how it works, people. You want to put Force into your life; you leverage your brain power with the physical. It's as simple as that, and there's no way around it either.

BODY FORCE FULCRUM

There are no arms, abs, legs or torso muscles in our math models. There's nothing that can even be imagined as a physical connection for our psyche construct. That's because the psyche is by definition virtual. It exists in the brain cells but can't be identified by a specific cluster or cells here or there. In fact, the more likely explanation is that the psyche exists in the entire central nervous system. The main CPU is the brain of course, but the 50 miles of nerves play their role, too. Nerve impulses travel at roughly 170 miles an hour; surely instinctive reactions happen much faster than that, implying that some muscle or nerve "learning" is involved.

The psyche processes higher-level information and the body expresses the outputs as actions. The speed at which all this takes place is not at all constant among all individuals. MLB pitchers dodge line-drives coming right at them all the time. Most of us would get clobbered every time. Just try and get your fingers moving as fast as a concert pianist, much less with all their control and finesse. Can you even get your racket on a serve from

a professional tennis player, much less place a zinger of a return shot precisely where you want it on the court?

Clearly, their subconscious mind can operate several orders of magnitude faster than the norm, with training, practice, and intense concentration. Those guys have a supercomputer linking their visual input to their nerves and muscles. The rest of us have a clunky old turn-of-the-century 486 chip crunching the data.

So, yes, the brain can do incredible, amazing things with your body. But is it all just mental power? There's a lot of style involved too, in athletic performance; in a musician's skills; in the martial artist, and in all those professionals that we're fascinated by in the arena or on the silver screen. That style, the brain's personality, is the psyche's doing.

The professional athlete/artist/musician has superpowers alright. They've polished the mind-body linkage to a perfection. They use muscles and nerves and brain cells that we all have but don't have access to. We struggle to spit out the first two terms of the infinite sine/cosine series in our body motions; they exude the full sinusoidal curve down to all the significant digits. They do the same part of the process as we do consciously, but their subconscious transforms their will into a work of art in its pure perfection.

CONIC WORKOUT

We've illustrated such differences before, as our fractal model has gotten more complicated. The crude conic sections were transformed into graceful, very complicated conic orbits. The clunky geometry of the ellipse or parabola or hyperbola looks very simplistic when you show how the same elegant patterns can be created by an inverse-square force like gravity. The geometry is the raw processing of a basic, generic brain. The sweeping simplicity of the same shape in an orbital pattern is the psyche at work, projecting from the focus, forming the same figure as before, in the same amount of time, but with infinitely more detail, purpose, and presence.

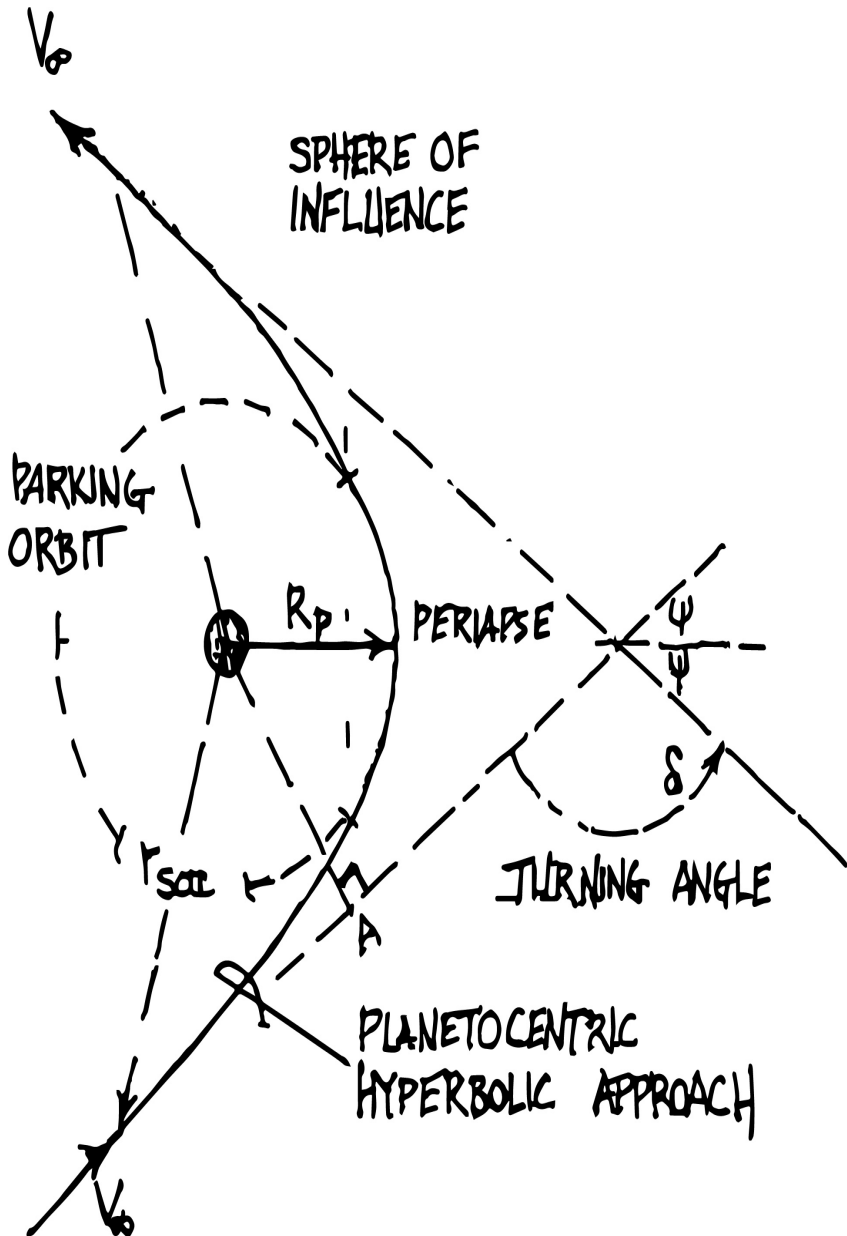


Figure 12.1 Calculating the Hyperbolic Flyby Geometry

And what we've seen here is only the beginning. You haven't even gotten into the math and equations yet (actually, we never will, not in this project). This section will elaborate on our understanding of the 2BP and flyby trajectories. Later on, we'll study the 3BP which will be even more subtly amazing.

We still have a lot of groundwork to cover before we're ready for the 3BP.

HYPERBOLIC FLYWEIGHT WORKOUT

Consider Figure 12.1, a new look at the hyperbolic geometry. This time we have a little more detail, with angles and distances. We've added a new level of power to the presentation, Force. Instead of pretty, graceful shapes and curves we now have an infrastructure: imagine angles and distances, weights and forces; a body attached to the psyche with muscles to move and nerves to communicate commands.

You don't know any of the math yet, but your brain can now perceive that the closer the spacecraft passes to the planet at apoapsis, the stronger the force of gravity will be at that point, and consequently the higher the velocity after passing the planet. That's why they call it a slingshot, another evocative term to enhance your intuitive understanding of the situation. If the s/c passes far away from the planet, there will be little change in velocity; if very close, a great deal of change; in all cases, the s/c remains on the same hyperbola.

SLINGSHOT WORKOUT

Passing very close to a much more massive planet will have an even greater change in velocity, as shown diagrammatically in Figure 12.2.

Observe the velocity of the s/c before and after the slingshot flyby of Jupiter, and just how much Jupiter's velocity contributes to the leaving velocity.

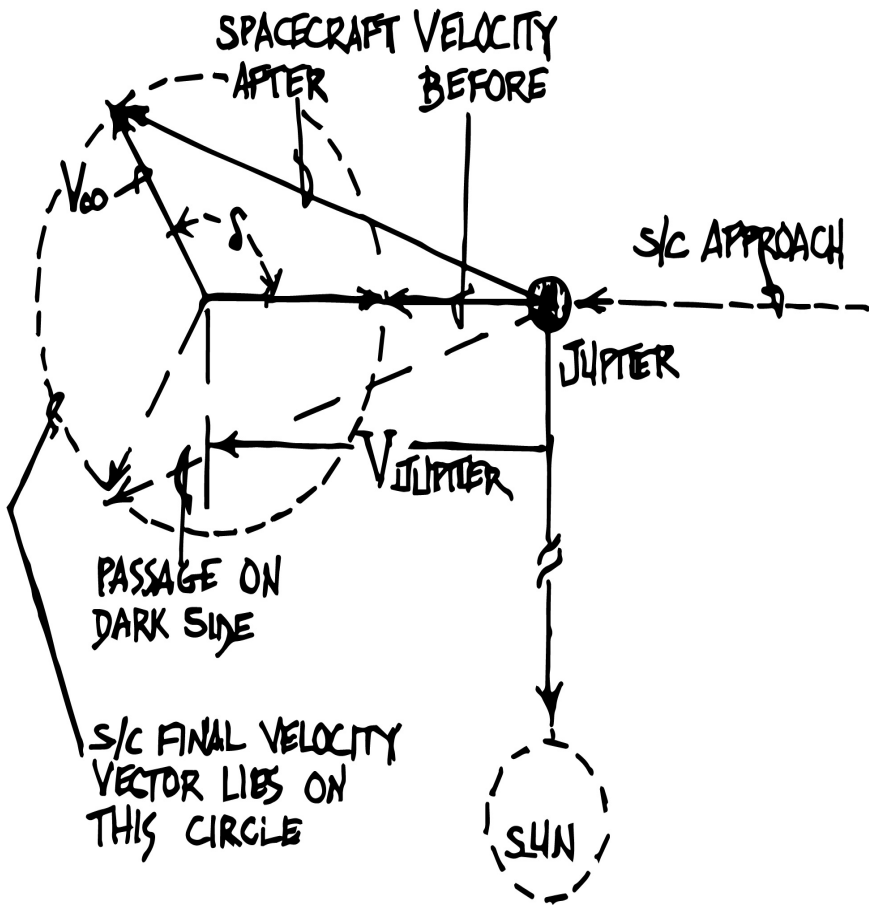


Figure 12.2 Outer Planet Flyby Geometry

Now test out your comprehension on an even more complicated diagram, a plot of the Voyager missions, reference Figure 12.3. You see heliocentric orbits and flybys. You imagine these as conic sections that are patched together to form a complete flight path. You can even surmise why NASA sent the s/c so close to Jupiter,

then the other massive outer planets, using each flyby to increase the velocity more and more.

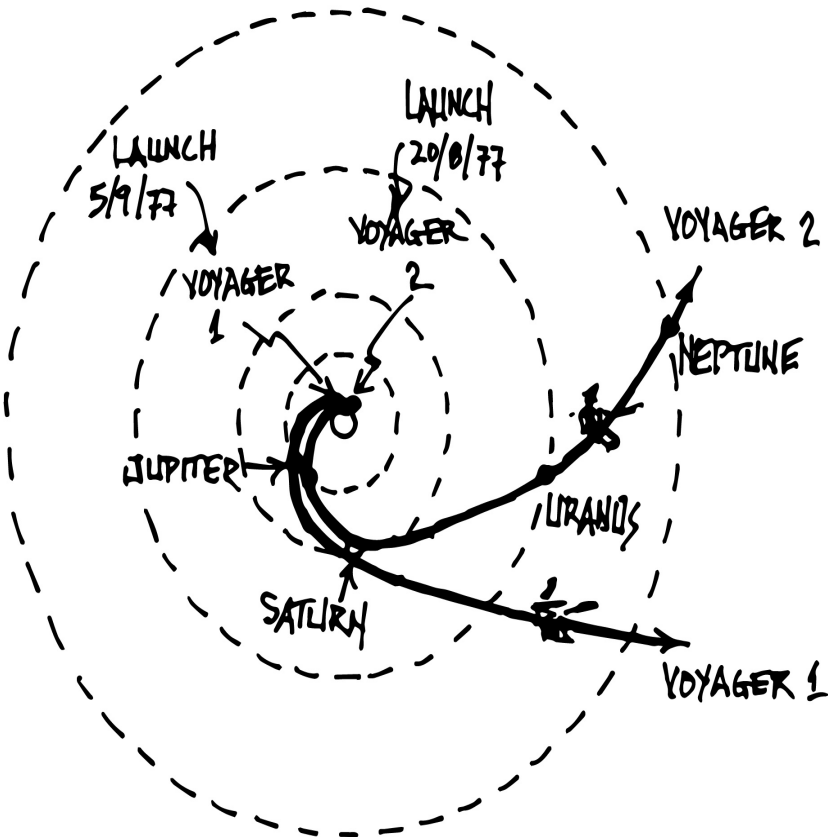


Figure 12.3 The Voyager Missions

Now you can transition to our psychology examples without nearly as much prompting.

It's a trajectory through adolescence: a series of romantic flybys, learning a little with each encounter until you're skilled enough to land the love of your life.

Or a coming-of-age trajectory, a sequence of difficult courses until you're ready for prime time and a tough college curriculum, your knowledge, skills, determination, and self-confidence increasing with each subject you conquer.

It's climbing the corporate ladder or learning how to play the piano, throw a football, raise a child, or do carpentry, auto repair, or electronics.

Each chapter in this book you've learned new ideas and concepts, and now you can apply them effortlessly to new situations, and conjure further examples from your own experience – sports, relationships, politics, even music. That's your brain working with the raw data, and your psyche projecting that knowledge onto different situations you're familiar with.

And now, without hardly realizing it, you're comfortable with the dynamics of a Seven Body Problem: a spacecraft acted upon by the gravity of the Sun, Earth, and the three massive outer planets. Feeling a little antsy, or stressed out by all this difficult mental work? Get off your posterior and go out for a long walk.

SOI AS COMFORT ZONE

Did you notice that all the action takes place inside the “Sphere Of Influence,” that imaginary circle around a planet where the force of gravity from the planet equals the force from the sun? Think of the sun's force as social pressures ambient to the situation. Once you pass inside the SOI you're at the mercy of the planet's gravity, more and more; less and less influenced by the sun.

Every relationship has a comfort zone, a polite distance which is socially acceptable for the occasion (and the culture; some cultures are more standoffish). Step inside that comfort zone, and you might offend the other person, or unwittingly/purposefully signal a new intention or intimacy. Do it right, and the new distance becomes your comfort zone, and you're on your way to a closer relationship; be it with a romantic interest a boss or a business partner. Do it wrong and zoom, zoom you're history, dude.

Figures 12.1 and 12.2 are close approaches to a much larger planet, a significant person, a critical business opportunity, or perhaps a beautiful individual who gets the attention of people from very far away. An unsuccessful flyby in this situation not only changes your trajectory but significantly increases your speed. If you land the contract you're thrust into the big leagues; if not, you careen off your ideal trajectory into oblivion.

If you approach the Big Boss at a function and klutz it badly, you're on his sh*t list and doomed to driving your desk in the back room for eternity. If you dare everything to approach the gorgeous blond and she brushes you off with a rude flick of her tail, then your self-esteem drops off the Richter scale, and it'll be a blue moon before you dare another such encounter again. Unless, of course, you know all the angles and the math and just chalk it all off to a miscalculation and carry on with your self-esteem unharmed, perhaps even enhanced because you learned how to cut corners just right next time.

What, you don't think our psyche model can possibly get more complicated than this and be of any significance in your life? Perhaps a taste of things to come will keep you motivated to turn some more pages.

MORE RELATIONSHIP FRACTAL LEVELS

The Three Body Problem is no longer a simple one-on-one situation. You're a small business trying to keep a good relationship with two large contractors who are themselves competitors, but you don't want either to consider your service as competition. You're a small political party trying to wheel and deal your way into the spotlight with the two dominant elephants (donkeys) in the room.

There aren't many angles in the 3BP like we've seen here, just zero-velocity curves and gravity fields and a rotating frame of reference. These have all been mentioned in passing. Want to challenge your brain cells even more? Are you up to the challenge?

So far, the psychic comparisons have been trivial relationships that are as simple as, well, the 2BP. The 3BP is far more complicated mathematically (although still easy to illustrate with quite intuitive diagrams), and it lets us go deeper into the individual. For example, what happens if the gorgeous lady of your dreams is your best friend's main squeeze. Or you're secretly ripping off your boss by padding your time sheet (or absconding with office supplies on the sly). Or your ex's dad is the owner of one of the big contract firms you're trying to land.

Think of a simple flight maneuver plus internal angst. A standard flyby but done while there's a battle inside your soul between the ego and superego and your id is trying to do what your instincts say you must do, throwing you off your game.

G SPOTS

The 3BP has several internal G spots (we call them L points) that we can use to simulate internal mechanisms affecting external actions and behavior. Call it body language or prejudices, inhibitions or guilt; we're getting into the really gritty part of the psyche now. To make things even more complicated, the 3BP is in rotating coordinates. This twists everything around – perhaps opening up an opportunity to incorporate the contorted mind into the model, i.e., mental illness. Bring it on, baby!

13

A New Transistor Model

Don't you believe all the hype about Terminator Skynet computers beating the top chess player in the world or the top Go player (a Chinese board game that's supposedly even more complex than chess). Those kind of contests don't test intelligence at all. Any given board situation has a fixed number of possible outcomes; each move after that has a fixed number of possibilities, and so forth. That's all very linear, predictable, boring.

Now, consider all the operations that go on in the head of a Ph.D. mathematician, cranking abstract mathematical equations in his head or on paper or the chalkboard faster than you or I can type words on a computer screen. Each mathematical symbol represents all the power of any single move in Go, and this math expert spits them out like you or I cobble words together in a clumsy, awkward conversation. No computer can match that kind of abstract mental acuity, not if it has to crunch a million lines of code for five minutes to approximate statistically each mathematical symbol that the mathematician scrawls on the board, each taking a fraction of a second (and his brain operates several orders of magnitude faster than even that).

All of the judgment calls performed by any practicing engineer are way beyond any computer; even an AI machine strung out on the most advanced learning algorithm. The experienced engineer's brain operates at the same level as any famous athlete, 8 hours a day, every day of the year at his job. We don't think it remarkable (actually we have the most profound disrespect for engineers), much less fill stadiums to watch them at work.

Meanwhile, video game tournaments are almost as popular as live sports events, and those contestants relative to your average engineer are using two thumbs, not ten fingers and two feet on a harpsichord; playing do-re-me tunes instead of sweeping, emotional symphonies. Engineers design with consummate ease, structures, and machines with zero tolerance for error (or the consumers will sue you for millions for making them late to work one day or a bump on the head when you crash your twenty-year-old jalopy head-on into a brick wall). Designing with that kind of skill, under that kind of extreme pressure? Priceless.

In fact, if you're following along okay with all these fancy gravity diagrams and their abstract applications to a psyche model, your brain is performing operations that rival any souped-up supercomputer in existence. (And the gravity games have only just begun here.) So, no, this kind of Force in your mental abilities is not some far-fetched sci-fi dream. It's real, it's happening right now, with you the reader.

ARTIFICIAL VS. REAL INTELLIGENCE

Give yourself some credit, and stop feeling humiliated and small at the “awesome power of computers.” That’s just a bunch of lousy PR garbage published by the FANG collective to slow down your brain, to dumb down your consciousness, so their clumsy AI algorithms running on the fastest mainframes known to mankind can project just one, tiny, inconsequential, irrelevant move you make in your life – to anticipate what brand of socks you’ll buy Dad for his birthday (which he’ll never even wear). They spend billions to create and operate their massive algorithms, paying for it all by anticipating trillions of penny-ante purchases in the online marketplace. (And you’re paying for everything because almost 15% of every purchase you make goes to pay for Google advertising.)

In this chapter, we’ll see just how that super athlete/engineer/mathematician brain works. We’ve had an inkling of this process

before, in how the Many Body Problem with a thousand forces from a thousand massive primary bodies all acting on one Nth body magically reduces down to something quite simple: static fluid flow.

The analogy here is an engineer's brain taking all of the unknowns and variables in a design problem and using his "judgment" to find the best, most practical solution. It's all done without hardly any conscious thought. It's a seamless, effortless design decision – taking into account forces, design constraints, and even cost of materials. Ten or more years of studying, math, design experience, and practice are applied to every, single decision.

Lawyers do the same thing, in how they work with juries or testimony, and especially body language. Doctors sift through all the lab tests, the patient's past history, even the patient's inevitable white lies; to discern a viable diagnosis. Carpenters working with the grain of wood to make a sturdy, elegant carving or furnishing. Writers, screenwriters, actors, and even auto mechanics all have marvelous skills that take years to hone and with amazing results.

THE COMFORT ZONE

They all live every bit as much in "the zone" as your top athlete or chess master. Teachers at practically any level, from kindergarten to graduate school, motivate and instruct an increasingly distracted and ill-prepared student class with great skill and dedication that we all take for granted, themselves included.

The Force is all around you; you only need to see it. You automatically take all the skills and talents of all these craftsmen and professional for granted. You abuse and bully them and pay them a fraction of what they're worth. But somehow, they rise above your ridicule and abuse and do their jobs with skill and grace.

Shame on you for ignoring them all, for elevating your extreme ego, your narcissism, but explaining it all away by the banal statement "all people are created equal." Sure, we're all created equal, but not all people do the same thing with what they have after that instant of creation when egg meets sperm. We all have

the ability to become great from that point on; very few actually fulfill their potential to “be all they can be.” Very, very few indeed. They’re the ones with the Force.

We still don’t know where this alleged Force comes from, or even have a decent explanation for what it is. We’ll now put some of the ideas developed thus far to use and finally, put this craven doubt to final rest, six feet under and covered with soil, humus, grass, and daisies.

SOLID STATE ASTROPHYSICS

The unlikely champion here is the semiconductor junction diode; of all things, the very phenomenon that makes computers work. It all started with a 1925 patent awarded by physicist Julius Lilienfeld for what he called a transistor; nobody noticed. A similar patent for a field effect transistor was granted to Oskar Heil in 1934; nobody noticed. After decades of materials development, particularly with germanium, William Shockley and Gerald Pearson at Bell Labs created a working transistor in 1947.

What makes this device work is that when you apply a specific voltage across one of the three terminals, there is a very sudden and dramatic increase in current flow through the device. Now, the structure and arrangement of the semiconductor junction have many similarities to the 4BP and the interplanetary trajectory, reference Figure 13.1.

Key to understanding this chart is that a standard Hohmann Transfer, an interplanetary transfer orbit from say Earth to Mars, has three main thrusts: (1) to escape from a circular low-altitude parking orbit around Earth on a hyperbolic escape trajectory which turns into a heliocentric ellipse as soon as you exit Earth’s SOI and (2) a thrust approximately half way at conjunction to change the flight path from Earth’s orbital plane to Mar’s orbital plane and (3) after you enter Mar’s SOI (at which point you’re on a hyperbolic approach), a thrust at apoapsis to exit into an elliptical

MECHANICAL TRANSLATION	ELECTRICAL	REMARKS
FORCE / THRUST, ΔV	POTENTIAL, V^+	{ EARTH ~ P-TYPE MARS ~ N-TYPE
SPACECRAFT, s/k	ELECTRON, e^-	
HOHMANN TRANSFER	JUNCTION DIODE	
EARTH	EMITTER	VOLTAGE (THRUST)
MARS	COLLECTOR	APPLIED @ EACH
SUN	BASE	
s/k @ RETURN	HOLES	MOSFET CONNECTS
VELOCITY	CURRENT FLOW	@ LAGRANGE POINTS

Figure 13.1 Solid State Astrophysics

orbit around Mars. Recall how each of these orbital types interacts in the patched conic method.

Recall that the equation for electrostatics in our transistor is precisely the same as the equation for gravity in the Mars problem. So, the forces acting on, say, one electron going to the collector after leaving the emitter are exactly the same as the forces acting on our spacecraft leaving Earth and going to Mars.

There are three voltages applied to the terminals of the semiconductor: to the base, collector, and emitter. These correspond to the three thrusts in our 4BP example. That is, voltage is the

electrical equivalent of a thrust applied to our s/c where (1) a positive voltage applied at the emitter starts our one electron on its path, (2) a reverse voltage at the collector ends the flow of the electron, and (3) a third voltage at the base aligns the trajectory of the electron so that the emitter and collector are in the same inertial reference frame.

Continuous voltages send many electrons on this trajectory, resulting in a steady flow of current.

THE TRANSISTOR AS A 4BP

What makes the transistor different is that in a regular conducting material like copper when you apply a voltage to the emitter, you get just a regular current at the collector; just like an electric current flowing through a wire, no big deal. However, when you build the connection out of germanium and apply just the right voltages in just the right orientations, you get a rush of current with a fraction of the voltage applied: resistance to electron flow drops dramatically (like frozen ice breaking down suddenly into water, alias our N Body fluid example).

A good analogy can be made with the Mars trajectory. Finding a straight path to Mars from Earth is an extremely nonlinear problem. The only way it can be solved (i.e., to get a s/c to Mars from Earth in a computer model representing the gravity from Earth, Mars, and the Sun) is using a genetic algorithm. Basically, you try a hundred escape trajectories from Earth, select the one that gets you closest to Mars from among them; generate a hundred more trajectories based on that one, choose the one that gets closest to Mars; and so forth. It takes millions of lines of computer code operating for days on a Cray supercomputer to find just one trajectory that reaches Mars.

Similarly, for your usual conducting material. Very few electrons make it through the transistor until you apply specific voltages, and suddenly they all reach the collector. Current models for this phenomenon in solid state physics rely on statistical methods.

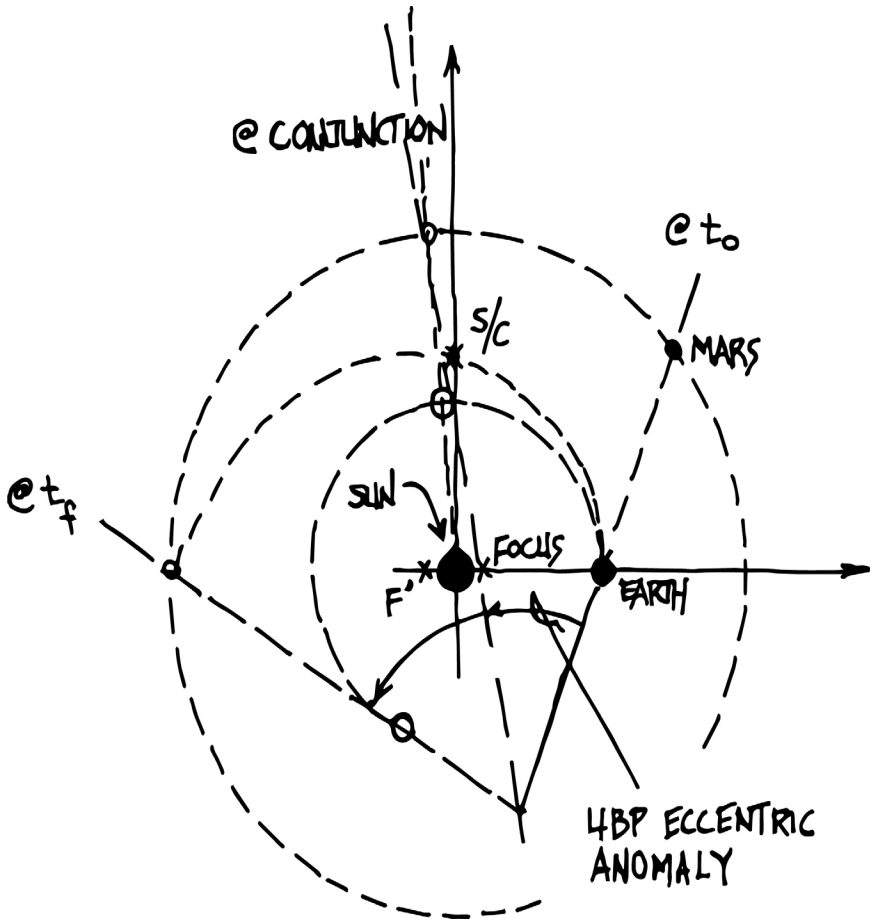


Figure 13.2 **Earth-Mars Conjunction**

There is no mathematical explanation for the process.

When I proposed this idea to my advisors in grad school, they weren't at all interested.

When I pushed it, they expelled me, a semester short of graduating with a Ph.D. in celestial mechanics. So, relax, you aren't the only one who's afraid of hard-core math.

CENTRAL FORCES

My primary research project was a computer model of the Mars trajectory. We'll get into that later, but you'll find the full 20-page source code in an appendix if you want preliminary confirmation. That little Fortran routine does (well did; this was back around the turn of the century) in 20 seconds on a 486 desktop PC what takes millions of lines of code running for days on a Cray supercomputer: it reaches Mars every time, not one in (literally) a million random tries like with NASA's genetic algorithm.

The key to my remarkable result is that all the forces in my routine are gravity, and gravity is a central force. That means you can integrate the forces backward in time (that's how astronomers study the origins of the solar system, by integrating their current organization backward through millions of years, billions even).

What I did was to divide the routine (which initially was impossible to reach Mars, like I've said) into two problems at roughly the half-way point, called conjunction (when a line from the sun goes through Earth and Mars, the s/c not far off that line) and integrate them separately, from conjunction forward to Mars and from conjunction backward to Earth. Reference the schematic in Figure 13.2. Once you tweak both ends, you just put the two parts together and voila', you have a very nice patched conic trajectory from Earth to Mars.

Again, this is important because my algorithm is now indeed a direct model of a transistor, indicating that the electrostatic forces in play are central forces; hence electrostatics.

THE BACKSTORY

This whole 2/3/4BP fractal project started off while I was still in grad school (at the Aerospace Engineering Department for the University of Texas at Austin) right after I presented my Mars Pathfinder solution at a graduate seminar. They said my result was so good that I had to come up with a theoretical explanation

(I had one already, which will be discussed in due time; but it wasn't good enough for them). I proposed this solid state physics model; not good enough. I offered half a dozen other ideas; nada, nyet, zilch. Eventually, I had dozens of ideas; not good enough, none of them. Not even when I cobbled everything together into a crude fractal theory.

The whole project and all the mini-fractal theories were, over the ensuing years, rejected outright by pretty much the entire scientific community worldwide. I eventually added three psychology fractal levels (the id/ego/superego model, the Three Act model, and the psychosexual model), to try and make the material understandable to the general public. That got a little traction, but it took a long time to dumb down the presentation and to explain everything well enough to be digestible to the general public.

It's still going to give you cramps, but hopefully, the absence of math and the diagrams (which all come from my original dissertation, called the General Solution to the Unrestricted Three Body Problem) helps keep it from becoming terminal bowel disease.

THE ANTI-HERO'S JOURNEY

FYI, this journey included years of studying screenwriting, polishing five feature-length thriller screenplays, a fortune spent of critiques from experts in Hollywood, another fortune spent on contest entry fees (they all placed high in major completions; one even was a finalist), until finally I hit the wall – that vicious, ruthless barrier that blocks all conservatives from success in Tinseltown.

What did I get from all that? Well, a crucial fractal level to my Big Theory (and a significant breakthrough in my Relativity thinking – you guessed it, coming soon - while writing a script about my experience in grad school, called Crashdown) which makes it all worthwhile.

My screenwriting adventures also got me to a much higher level in written communication, which in deference to the texting

generation, is no small accomplishment. So, sure, they (we) may lose something in depending on the written word, but there's a lot that's gained as well.

Now, if people can get their full nonverbal repertoire back online, we're talking Force, people.

Be that as it may, here we are, finished with one more fractal level, showing that the transistor behaves just like a 4BP and an interplanetary trajectory. This happens because Coulomb's Law for electrostatic forces and Newton's Law for gravity have exactly the same (except for constants account for the scale) inverse-square format.

THE BIG PICTURE

What this means for our Big Theory is that we now have Bohr's 2BP atomic model and this new 4BP transistor model, and we can suppose that there also exists a 3BP model between them (among atoms or molecules) that we can add to our "stairway to heaven" here and maybe even a patched conic method to create mathematical building blocks for a new solid-state astrophysics construct for subatomic interactions, replacing the current statistical models (which are always less exact, not nearly as intuitive, and far less useful in developing engineering applications).

Otherwise, remember that what happens in one fractal level happens in them all. That means that this super-fast electron flow in a transistor has a corollary in our psyche model, mainly because we related the transistor to the patched conic interplanetary Mars problem, and our conics are part and parcel of the psyche model. Consequently, you may not be able to muster the concentration and computing power of a chess or Go master; but you can certainly access more of your brain power than you currently use.

To start off with, remember that whenever you're facing a really intractable problem try and divide it into two parts and solve them separately (and you can always divide those sub-problems into two more issues, and so forth).

And above and beyond that, don't forget that you have a psyche and a subconscious; and that the problems you present to your conscious brain, the subconscious will work hard to solve all on its own.

Trust that power, and you'll find your solution soon enough. (And don't forget to reward your psyche with a good exercise session, a hearty meal, and a good night's sleep.)

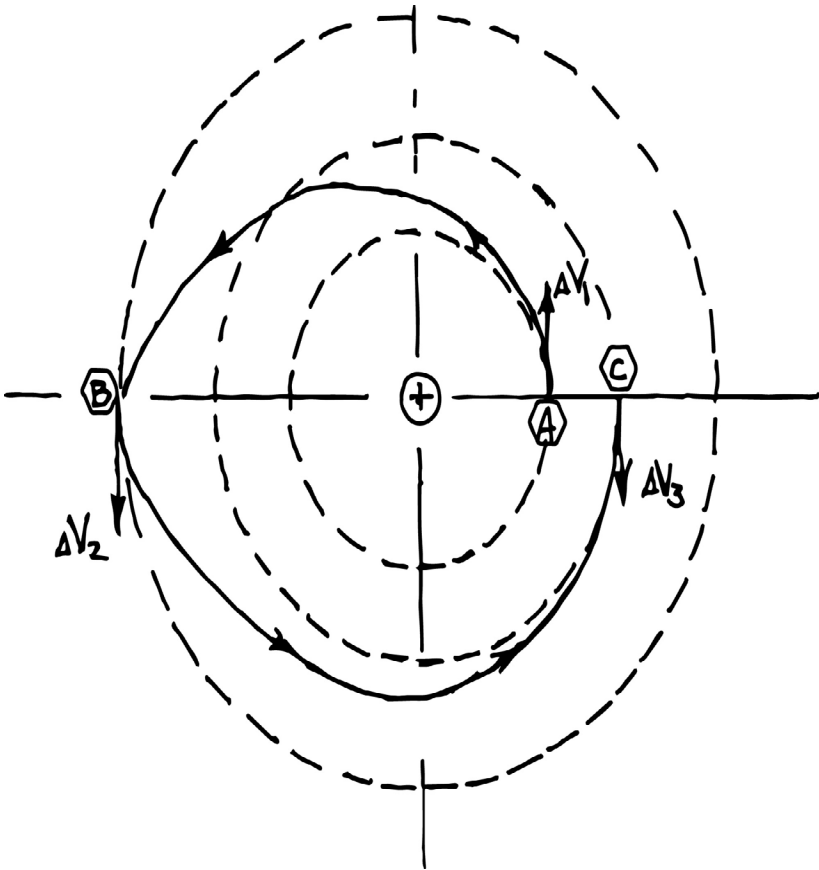


Figure 13.3 **The Sequel: Returning to Earth from Mars**

14

Freud's Psychosexual Stages

We now look at another life journey that corresponds to the interplanetary trajectory, Freud's psychosexual stages. He proposed that an individual goes through five distinct stages on the way to sexual maturity: oral, anal, phallic, latent, and genital.

In our patched conic trajectory, an interplanetary mission has a standard five-thrust structure: (1) a significant thrust to escape the low-altitude Earth orbit, (2) a small thrust at Earth's SOI to match the heliocentric ellipse exactly, (3) a small mid-course correction at conjunction to change from the Earth's orbital plane (the ecliptic) to Mars' orbital plane, (4) a small thrust at Mars' SOI to match the hyperbolic final approach exactly, and (5) a major thrust to be captured by Mars in an ellipse.

Analogous changes characterize Freud's psychosexual stages: (1) weaning the child off the mother's breast to solid food, (2) toilet training, (3) the first day of school, (4) puberty, and (5) falling deeply in love for the first time. We'll now look more closely at these comparisons and see if there is more than a casual correspondence.

THE ORAL PHASE

We have already established the oral phase of the infant, versus the "circle of concern" and the mother's breast. In our conic model, this corresponds to the initial, nearly circular state of the psyche. As yet there is no cone per se, just a protective, spherical shell protecting the nascent psyche, perhaps a geometric remnant or extrapolation of the zygote status.

The oral age typically lasts from birth to age 1. During this period the infant gets nourishment through the mouth, pleasure through sucking and tasting. Trust and comfort build in this period. The big issue next is the weaning period, when the caregivers become more distant, and the child must become more self-reliant. Freud believed that a fixation in this phase leads later in the life to problems with eating, drinking, nail-biting, and smoking.

THE ANAL PHASE

That zygote represents mother Earth, in our Earth-to-Mars interplanetary journey. Just as Mars is the end game, sexual maturity. As discussed previously, there are slight differences in the patched conics for a trip to an outer planet such as Mars than to an inner planet such as Venus. Arguably, these can be thought of as the male and female sexual treks, respectively; corresponding to the saying, “men are from Mars and women are from Venus.” In which case the five sexual phase theory replaces the phallic phase for men with a new vaginal stage for women.

As we have seen already, the Mars trajectory begins with a positive thrust from a circular parking or “timing” orbit around Earth. Earth and Mars move around the sun counterclockwise, so that parking orbit is also counterclockwise. This puts the s/c on an elliptical flight path toward the outer solar system with the sun at one focus; to arrive at Mars at the perihelion of that ellipse.

A trajectory to Venus, on the other hand, begins at perihelion of a sun-focus ellipse and reaches Venus at aphelion. The Mars trajectory starts with a thrust at the point in its parking orbit closest to the sun, whereas the Venus trajectory begins with a thrust from that same parking orbit at a position farthest from the sun.

When the Mars-borne s/c leaves its parking orbit, it's moving in close to the same direction as Earth, and only gradually pulls away. When the s/c headed toward Venus leaves its parking orbit, on the other hand, its moving opposite to the direction or Earth's

orbit, and pulls away very quickly, with only a brief period of perturbations from Earth on its trajectory.

MEN ARE FROM MARS

Upon arriving at Mars, the “male” s/c is at perihelion, the slowest point on its ellipse; and moving much slower than Mars (like waiting for a speeding train at the crossroads), so it must speed up to land on Mars. Arriving at Venus, on the other hand, the “female” s/c is at aphelion in its orbit, the fastest point on its ellipse; thus moving much faster than Venus (the s/c is the speeding train this time), so it must do a big reverse thrust to slow down and match its velocity to Venus as it approaches for a landing.

The heliocentric trek to Mars takes about 260 days; the mission to Venus roughly 97 days. So, the “female” s/c reaches sexual maturity in nearly 1/3rd of the time, just as females are typically more mature than boys in the teenage years. Not by 1/3rd although it may seem like that at the time.

Both interplanetary trajectories leave Earth on a hyperbolic escape trajectory and arrive at their target planet along a hyperbolic approach trajectory. Absent the difference in mass of the two planets (which may or may not correspond to the sexual analogies), the maneuvers are the same at the final orbital state, typically a parking orbit. As we’ve learned already, it’s easier to get captured by a more massive planet like Mars; although the presence of the sun nearby (which has 99.9% of all the mass in the solar system) as a perturbing force (adding to Venus’ gravity because when the s/c reaches Venus, the sun is right behind Venus) has a significant effect on the calculations.

Upon reaching sexual maturity, we have all the same relationship games as discussed previously. The math, the dynamics, and the consequences of miscalculation are the same in either case. Although with Venus there’s a genuine danger of not just zooming away into deep space, but zooming into the sun for a fiery ending, which always gives women that scary edge in encounters. After

all, if things go wrong and she gets pregnant, she's the one who carries the baby and the responsibility. Either way, it's well that that solar threat looms large so that they both take precautions and are ready emotionally (and financially) for the child, if they so choose.

THE LATENT PHASE

In our psychosexual model, we'll designate the long heliocentric ellipse part of each trajectory as Freud's latent phase. This is a period of repressed or dormant sexual energy when the child (age 6 to puberty) develops social skills, values, and relationships outside the family. In our patched conic model, this is a time where you're distant from the family (mother Earth) and not yet forming intimate sexual and emotional encounters with a person of the opposite sex (Mars and Venus, respectively). You're more interested in building relationships and intellectual interests than in sexuality. This is when you develop self-confidence, establish goals, and find hobbies and other interests to last a lifetime.

As will all the stages, Freud theorized, you can get "stuck" in this phase. In our model, you remain on that heliocentric ellipse and never land on Mars/Venus. Psychologically, such individuals tend to be immature and have trouble building strong relationships.

THE GENITAL PHASE

Having so identified the latent phase, the genital stage becomes the Mars/Venus approach and all its tentative relationship dynamics (presumably if you fail on one approach badly you stay in the latent phase, but the ellipse brings you back soon enough to Mars/Venus where you can try again). If you connect with the opposite sex and adjust your trajectory just right then, you enter an elliptical orbit around that special someone, and the "drag" of the atmosphere (working through your differences) circularizes your orbit until you tie the knot and finalize the relationship formally. (Keep in

mind that small planets have a very thin atmosphere; a 1000 MPH wind on Mars feels barely like a breeze.)

Then you have a baby, and your nice, predictable 2BP relationship explodes into a much, much more complicated/intricate/intimate 3BP and; well, let's just call that the marital psychosexual phase, and leave it there until we know more about the 3BP dynamic.

If all has gone well in the other phases, the individual in the genital stage is well balanced, with a healthy interest in your own needs and desires but also a keen awareness of society, your role in the world, and a positive outlook. The individual is warm, caring, empathetic, and with a balanced sphere of interests and activities. In our model, you need this kind of self-esteem and awareness to break off the comfy heliocentric ellipse onto a hyperbolic plunge toward a landing on Mars or Venus.

In Freud's psychosexual terms, the genital phase begins at puberty, when there's a heightened interest in the opposite sex. The boundary for this in our patch conic orbits model might be the SOI of the objective planet. In modeling interplanetary orbits on the computer, the SOI is a crucial point (where the sun's gravity is equal to that of the planet below) where you transfer coordinates: from an ellipse with the sun at the main focus to a hyperbola with the planet at the focus. Think of the looming planet as your main focus, your new sexual drive.

THE ANAL PHASE

Both male and female go through the anal phase, typically age 1 to 3 years. One possible key to identifying this phase in our orbits model is Freud's supposition that homosexuality results in an individual who is fixated in the anal phase. We identify homosexuality with an attraction or affinity to the opposite sex. Since we're 4-5 years away from puberty and the beginning of the genital stage (which is the first time of sexual attraction to others), the sexuality perceived here must be something else; similar to what happens at puberty, but simpler and much less intense.

We've suggested that the beginning of the heliocentric escape trajectory from Earth for males and females is different; men are headed toward Mars, an outer planet; women toward Venus, an inner planet. The focus for these ellipses are both Earth, but the apogees (closest point to Earth) are 180 degrees out-of-phase, on completely opposite sides of Earth.

Central to the genital phase, we've seen, is the drag phenomenon which circularizes the ellipse (relationships always begin as an ellipse, with the couple being real close for a short while, then a long period farther apart; then getting closer and closer as the eccentricity of the ellipse decreases). You also have drag in any Earth orbit, with the same circularizing trend.

IN THE ZONE

Going back to our original zygote and the nascent psyche, presumably the transition from the nice, comfy sphere; then the infant's horizons expand, and a horizontal plane develops as the infant's caregivers become more distant (the oral phase) and the child is weaned off their dependency on the "circle of concern." This plane is not likely to be a perfectly horizontal plane, matching the circular cross-section of the sphere, but at an angle. This forms a high-eccentricity ellipse, and the psyche fights to return to a much more stable low-eccentricity ellipse, and its natural state at this point. (Because the psyche has a minimal ability to cope with external influences.)

So, the weaning phase is more dramatic than you might think. It's not just parting with Mom's breast and all its trust and comfort; not only exposure to the cold, cruel world; but a sharp departure in the tender psyche from a fuzzy, warm sphere to a sharp, planar high-eccentricity ellipse. In our orbits model, this ellipse is quickly circularized by the Earth's atmosphere, forming an internal dynamic stability so the psyche can more easily cope with the rapidly changing (and invasive) world out there.

Here, we have drag and the circularization process, just like in

the genital phase. So, the body may not have genitals nor hormones, but the dynamic is there. Consequently, it's not at all irrational, as Freud proposed, to allege some sexual connotation to the anal phase; at least as far as our math model goes.

In Freud's psychosexual model, remember, there's the potential to get stuck in any of the stages. A psyche stuck in the anal phase would remain in this transitional "drag" circularizing phase. This is common in the orbital mechanics, where spacecraft can be placed in "frozen orbits" so that one of its orbital elements remain constant. A typical frozen orbit is to fix the eccentricity of the orbit, counteracting the circularizing effect of the atmosphere. (For example, to observe from a low altitude one specific region on the Earth surface, e.g., Antarctica to measure glaciation; whereas the s/c has to compensate for high drag for only a fraction of its orbit, i.e., while it is directly above the South Pole.)

A GRAVITY ASSIST

Since fuel is always at an extreme premium for orbital spacecraft, designers use the gravity of the sun to apply a force on the s/c at just the right point in its orbit to keep the eccentricity from changing. That is, instead of having to spend fuel for a thrust, they use the gravity from the sun to apply that same thrust (or a part of the thrust, making up the difference with rocket fuel).

Back to the psychosexual model, external influences on the young psyche can exert this perturbing force to keep it from circularizing, and then transitioning into the next (phallic) phase. This perturbation could be the steady stream of homosexual cues in kiddie shows; pressures from uber-liberal parents; parents unwilling to apply corrections to the child to keep the circularization process going; even graphic sex-ed classes in kindergarten (or on TV or in the home) that distant the child from the crucial influence of the parents in keeping the psyche oriented and growing and maturing.

This hypothesis extends well into adulthood because a frozen

orbit needs a steady, constant reinforcement or the circularization will move forward, and the psychosexual process continues (up to a certain point, presumably, after which the psyche is inflexible to change, or the stress to do so is beyond your capacity). Hence, the need for a close even closed, homosexual community; the extreme need of gays for that social reinforcement, reaching the point of “terrible-two” desperation every time it’s threatened in the slightest.

FROZEN IN ORBIT

Otherwise, the model introduces two aspects of the anal phase because of the orientation of the geometry toward Mars or toward Venus (180 degrees out of phase in an Earth-centered coordinate system). These two aspects account for the four types of homosexual archetypes – each sex must have a male/female partner in the union. For example, the “male” gay is oriented toward the usual Mars escape hyperbola; the “female” gay is oriented toward the Venus escape hyperbola. And similarly, for the “male” and “female” lesbians in the female homosexual union.

In Freud’s theory, the key to the anal phases is how the parents help the child with toilet training – another big break from the child’s usual routine. Parents who use praise, encouragement, and rewards help the child to become confident, self-reliant, and capable. They become as adults confident, productive, and creative. On the other hand, if the parents are impatient, or if they use punishment, ridicule, or shame; then you have a problematic personality as an adult.

In psychology terms, the negative parental behavior results in (1) anal-expressive personality if the parents are too lenient (causing a disorganized, inconsistent, or even destructive character) or anal-retentive if the parents are too strict or begin toilet training too early (an orderly, rigid, obsessive personality as an adult).

THE PHALLIC/VAGINAL PHASE

In the patched conic journey, the only segment left is the region between the low-altitude parking/timing orbit (the stable, low-eccentricity ellipse produced by a normal anal phase). Presumably, the parents have been supportive yet strong in helping the child through the anal period, and the child is positioned for the next psychosexual stage.

This is the period when the child becomes aware of sexual differences. Freud claimed all women have penis envy and they never overcome this issue. More modern theories say all men have womb envy and never overcome the problem, either. I suppose that means that we're all collectively sexually mixed up and so entirely out of contact with ourselves and each other that we never move beyond this phase or even reach the latent phase, much less the genital stage.

WOMEN ARE FROM VENUS

Perhaps this explains the universal obsession with pornography. You can't even call them "porn stars" anymore; that's sexist – they're "adult film" stars; emphasis on stars, for that they are. We call right to an abortion to kill the unborn, "reproductive rights." Is that crazy or; well, just phallic/vaginal. Rush Limbaugh calls them femi-Nazis; they call themselves feminists; with the equivalent attitudes and groups on the male side of the aisle. Now it's gotten political on the national level and; well, what a mess. I think you could probably categorize everybody in this high-stakes drama as either anal-retentive or anal-recessive, from top to bottom, and the entire political spectrum.

Let's do some orbit diagrams and see if we can't get a perspective on the situation. Figure 14.1 asks the inevitable question: how can any male ever "identify as female" if he's never had a messy, painful, disorienting period every month – after month – after month, never-ending. The illustration shows the month-long orbit

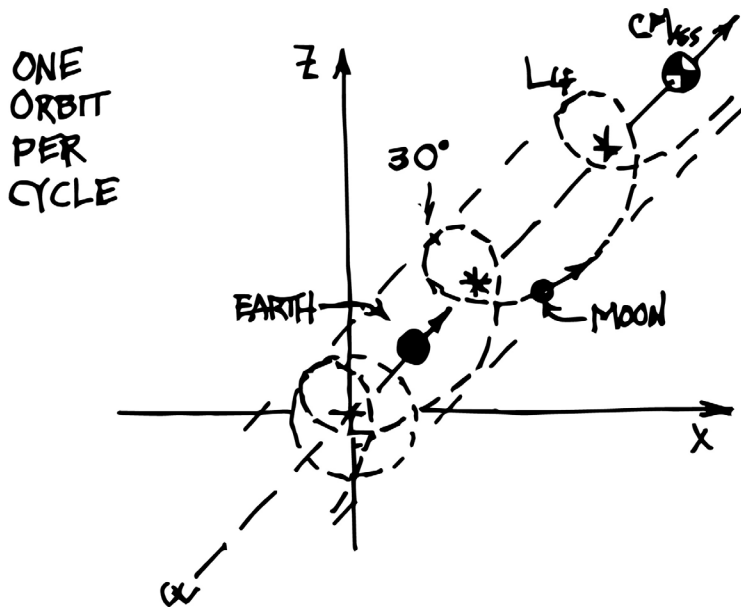
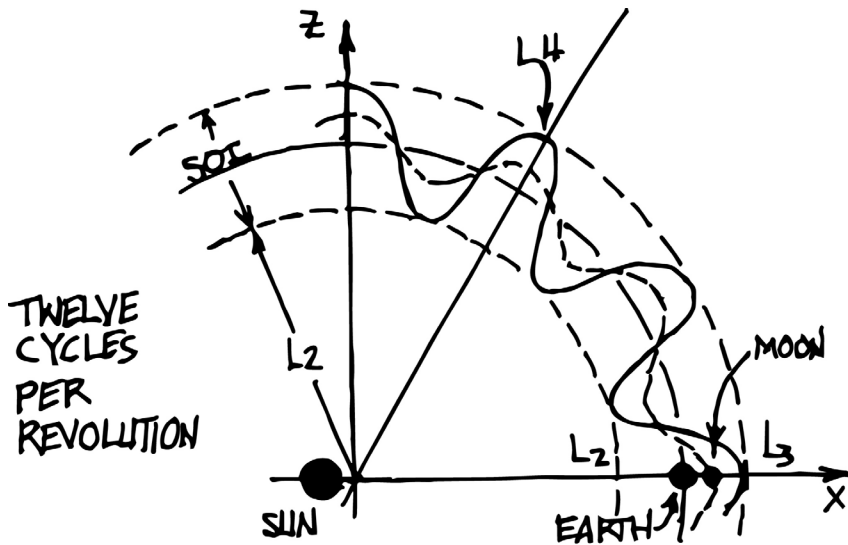


Figure 14.1 The Female Lunar Cycle

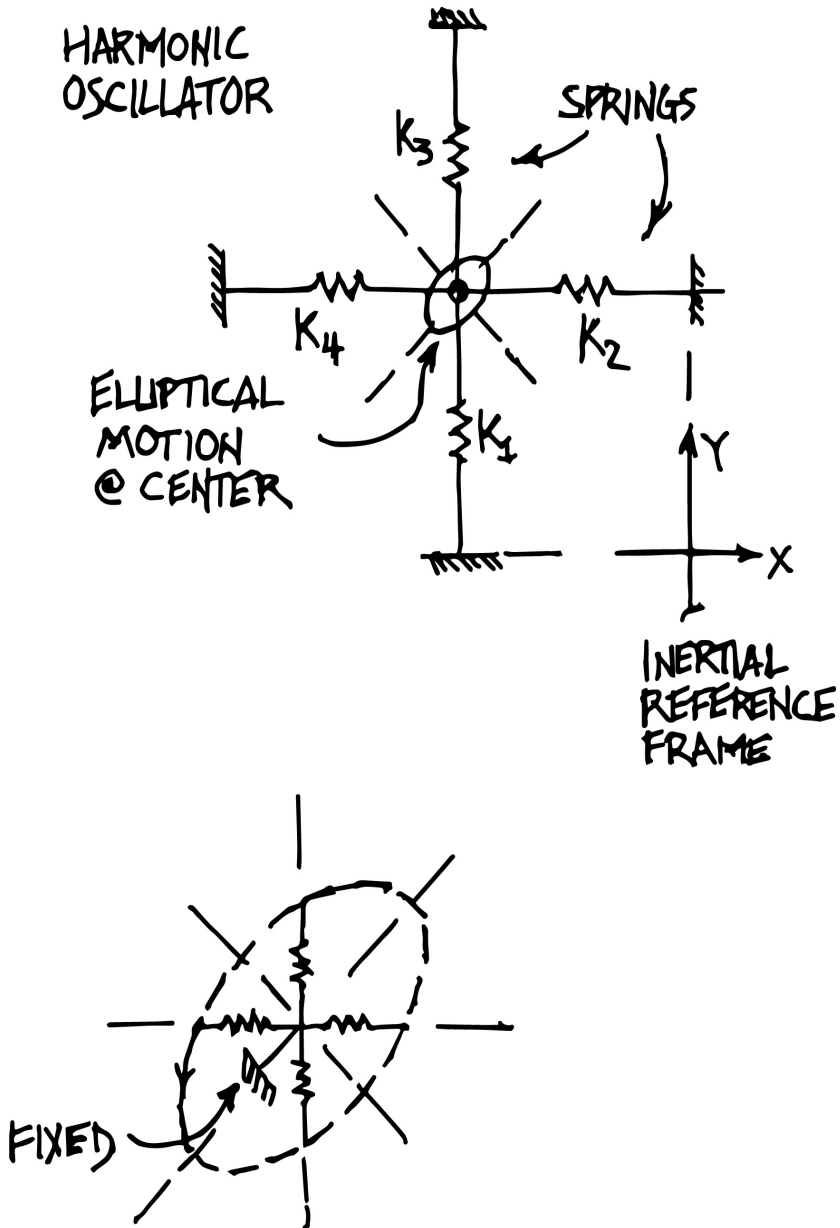


Figure 14.2 Vibrating Strings form an Ellipse

of the moon around the Earth in real time and again in rotating coordinates. You get a little bit nauseous just looking at it.

Figure 14.2 illustrates the importance of a stable reference frame to the maturing psyche. This kind of stability is even more critical in females after puberty, especially when menstruation first starts, because it is so destabilizing. If the poor girl is in an unstable or unsupportive environment, then it's a wonder she advances psychosexually at all.

You might even liken Figure 14.2 to the orgasm process, via vibration and excitement; and how young people are driven by the many powerfully invasive influence and forces (pressures from the media, music, videos, parents, social networking, academics, finances, fashions, advertising) to stabilize their reference frame if only briefly, by sex, sex of every kind; with love interests, with the same sex; with "friends with benefits," self-sexing, sexting, and more sex.

Sex is their only way to survive emotionally in the ugly world created by aloof adults who have projected all their own horrific flaws upon the innocent. And you wonder why young adults have created an impenetrable social bubble around themselves? It's their only defense against evil adults and all their evil methods. It's young people's only way to create a stable inertial reference system, to mature socially, sexually, and emotionally.

LOOKING TO THE FUTURE

There's a dark side to this young-adult bubble collective. As the group matures, they become the parents of the next generation(s), and their gay-permissive environment is the new norm (you can see it in the vicious, righteous, viral reaction to any comment by anybody of importance that's even slightly "homophobic"). In other words, the new coordinate axes of the infant psyche are by definition skewed from the ideal needed for a healthy youngster, developing consistently through the psychosexual stages to reach maturity with a bright, embracing, compassionate, considerate

outlook (sure, unless you're a conservative or criticize the Xers). In other words, the new norm will be homosexual babies, not heterosexual ones. We already see that in the younger generations themselves: well over half of males have had gay sex, and bisexuality is almost the norm in females; the next generation will be even more so, etc.

New liberal trends exacerbate this situation, by disabling all unisex organizations, starting with the Boy Scouts and Girl Scouts. Now it's at the collegiate level, as Harvard sets the example in barring all same-sex fraternities and sororities from campus and penalizing any student who belongs to any such off-campus organization by preventing members from being sports or other team captains and from getting any kind of fellowship for graduate school.

MADE IN JAPAN

The situation is exemplified by the Japanese people, whose young are so enamored by their virtual world that they have zero interest in real sex. The experts predict the Japanese race will be extinct in 250 years. The same fate is in store for all of the developed nations; perhaps much sooner, as social norms and peer pressures and social networking take hold and ruthlessly enforce the new (gay) world order.

This may not be a slow, gradual transition. Once it reaches the tipping point (hint: like, like right now if not already), the Many Body effect takes hold and everything changes in an instant. Hence the all-out war against conservatives and traditional values, using every legal means possible – and now every non-violent means available; with hints of violent protests erupting with the “yellow vest” movement in France, now beginning in Belgium, as I put these words on the page.

In psychology mob theory, there's always an invisible few who control the mob and direct its sentiments. The very activist gay community is a likely culprit, the influencers who control the social

networking crowd via any number of means: actual participation, “comedy” shows on prime time TV, Hollywood activism, etc.

And, no, this isn't being homophobic or bigoted. It's archo-psychology (or psycho-archaeology) 101. There are many verified examples in the historical record: Sodom and Gomorrah in Genesis, and the Book of Job, both in the Old Testament. The Anasazi Indians in the U.S. southwest disappeared without a trace. Nobody dares to put a viable theory forward that homosexuality was to blame because they would lose their reputation, their job, and everything else.

There's no place for political correctness in science.

15

The Three Body Problem

The Three Body Problem (3BP) is the most famous unsolved problem in mathematics. The best scientific minds have worked on this problem: Newton, Galileo, Amerigo Vespucci, d’Alambert, Clairaut, Euler, Laplace, Poincare, and many other experts in the modern day – Sundeman, Broucke, and Szebehely most notably (I studied under the latter two in grad school). Several others have studied the 3BP in quantum mechanics, i.e., at the subatomic level.

Mathematically, the 3BP consists of two very large primaries and one much smaller body; for example, Earth and the moon as the two primaries and the s/c as the much, much less massive third body. The motion of the two primaries is known and fixed; they rotate their common center of mass in circular orbits. The mathematics is used to study the motion of the 3rd body, e.g., a s/c going from Earth to Mars.

As we saw in the 2BP and the 4BP the mathematics applies to any set of primaries. There is some difference in the orbital configuration of the third body depending on the relative mass of the primaries, but the same basic features can be seen in the Earth-moon 3BP or the Sun-Jupiter 3BP, and so forth.

BARYCENTER OF THE SOLAR SYSTEM

Laplace did important work on the circular, restricted 3BP where both the primary bodies are in circular orbits and motion of all three bodies takes place in the same plane. His mathematical analysis showed five stability points called Lagrange Points which

have very practical applications in orbital mechanics. Significant contributions to the “circular, restricted” 3BP were made in the modern day by Broucke, Szebehely (who wrote the definitive book on the 3BP called *The Theory of Orbits*), and others.

The standard way to set up the 3BP is in a rotating coordinate system. That is, the two primaries are fixed on the horizontal x-axis. This not only simplifies the mathematics but also lends itself to some wonderfully intuitive diagrams of the motion of the 3rd body. (It’s easier to understand all this if you just kind of forget that all the motion is actually rotating.)

We begin with a look at the Sun-Jupiter 3BP. The sun has 99.9% of the mass in the whole solar system, but Jupiter is a very massive planet too. In fact, there are almost 600 comets that orbit Jupiter, mostly with periods less than 20 years and originating from the Kuiper Belt outside our solar system.

Jupiter’s orbital eccentricity is 0.048 (a circular orbit has zero eccentricity) roughly three times Earth’s orbital eccentricity of 0.0167. The center of mass of the Sun-Jupiter system, called barycenter, is just outside of the sun’s corona, reference Figure 15.1 (not to scale). This has several subtle implications: (1) the Sun is itself in a small orbit around this barycenter (the masses of all

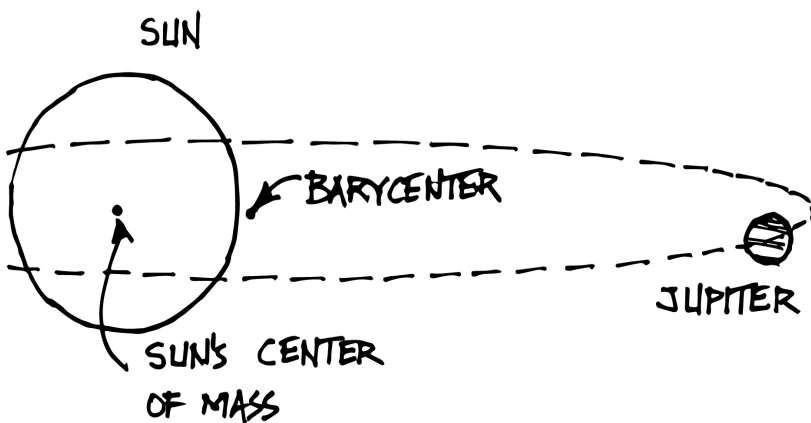


Figure 15.1 **Barycenter of the Sun-Jupiter System**

the other planets are negligible compared to Jupiter), (2) Jupiter doesn't actually orbit the sun but that barycenter. Moreover, if we're looking at this as a "circular, restricted" 3BP, then Jupiter isn't actually in a circular orbit. In reality, however, it behaves very much like the mathematical model, and you'll see how and why.

THE LAGRANGE POINTS

Lagrange's equations for the 3BP indicated five stability points in the circular, restricted case, called Lagrange Points and numbered L_1 through L_5 . Two of the points, L_4 and L_5 , are called equilateral points, indicated in Figure 15.2 (observe the center of mass or the origin of the XY coordinate system, is somewhat exaggerated toward Jupiter). If you take the distance from the Sun to Jupiter and form an equilateral triangle as indicated, the apex on the +y side of the x-axis is L_4 , and L_5 is a mirror image on the -y side of the x-axis.

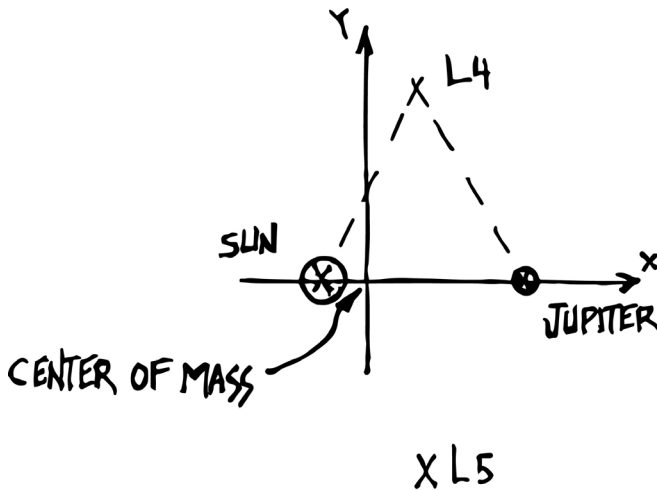


Figure 15.2 The Equilateral Lagrange Points

APOLLO & TROJAN ASTEROIDS

Recall that Lagrange's mathematics is in rotating coordinates. As indicated in Figure 15.3, the sun and Jupiter remain on the x-axis while the coordinate system rotates along with Jupiter. You see that the equilateral triangle(s) rotates along with the axis so that L_4 , L_5 , and Jupiter all have the same angular velocity (draw a circle from the sun with Jupiter at the circumference, and L_4 and L_5 will be on this circle, too).

The Lagrange Points are stability points, which means that while this system rotates, L_4 and L_5 with it, an object at L_4 or L_5 will remain at these stability points indefinitely (absent any other forces). These Lagrange Points were technically calculated in a "circular, restricted" system, but Jupiter's orbit has such a low eccentricity that it still has these equilateral stability points. In fact, as indicated in Figure 15.3, there is a family or asteroids orbiting L_4 and L_5 , the Trojan and Apollo asteroids, respectively.

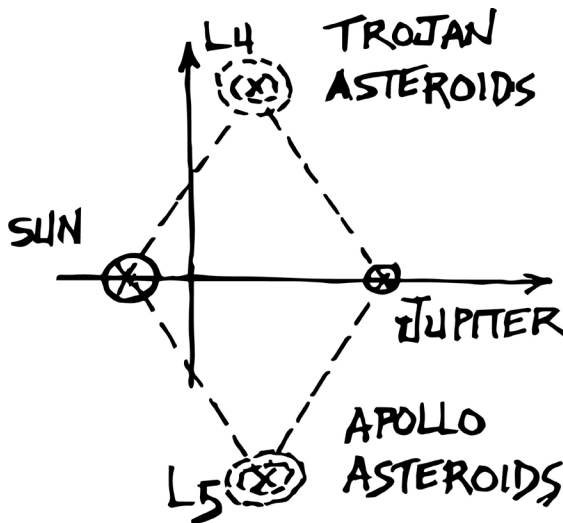


Figure 15.3 Asteroids Orbiting L_4 and L_5 in the Sun-Jupiter 3BP

Observe that we have drawn Figure 15.3 in the standard way for a 3BP, with the x-axis fixed on the horizontal. Also, notice that an asteroid situated at a stability point will remain there, but there is a small neighborhood around each stability point where an orbiting asteroid will continue indefinitely, as well. Otherwise, these examples show that even though the Sun-Jupiter system isn't the exact problem modeled by Lagrange's mathematics, it still has the stability points indicated by his rigorous analysis.

THE COLINEAR LAGRANGE POINTS

The other three Lagrange Points are called the colinear Lagrange Points, designated L_1 , L_2 , and L_3 ; and they are less stable. They're called unstable but aren't so unstable that a small 3rd body cannot orbit one of these points over a short period of time. Figure 15.4 shows these Lagrange Points and "halo orbits," as they called, around each one.

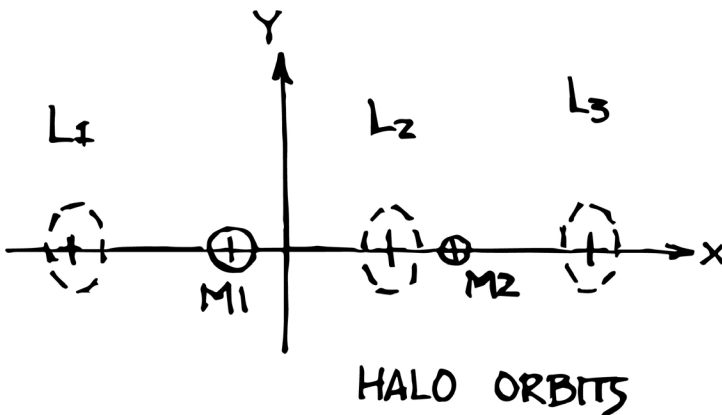


Figure 15.4 The Colinear Lagrange Points

HALO ORBITS

These colinear Lagrange Points have a practical significance. For example, astronomers place satellites at L_3 in the Earth-Moon (Earth is M_1 in Figure 15.4, the primary closest to the center of mass or origin) system to observe the far side of the moon. The s/c will wander off from its L_3 halo orbit after a while, but with periodic station-keeping thrusts, it can remain there for a long time. Orbiting L_3 like this requires far less fuel than at any other location nearby.

THE FREE RETURN ORBIT

Another fascinating aspect of the 3BP is the figure-8 shaped orbit in Figure 15.5, called a “free-return” orbit. It crosses L_2 on the x-axis and inside of L_1 and L_3 otherwise.

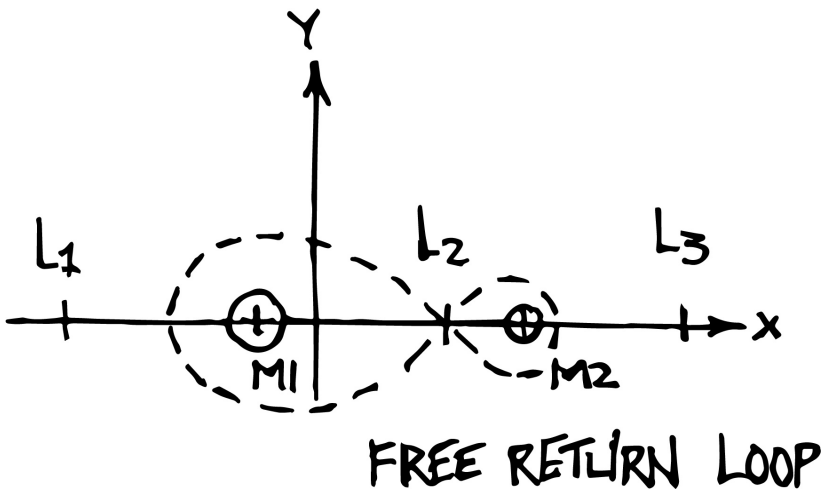


Figure 15.5 A Free Return Orbit in the 3BP

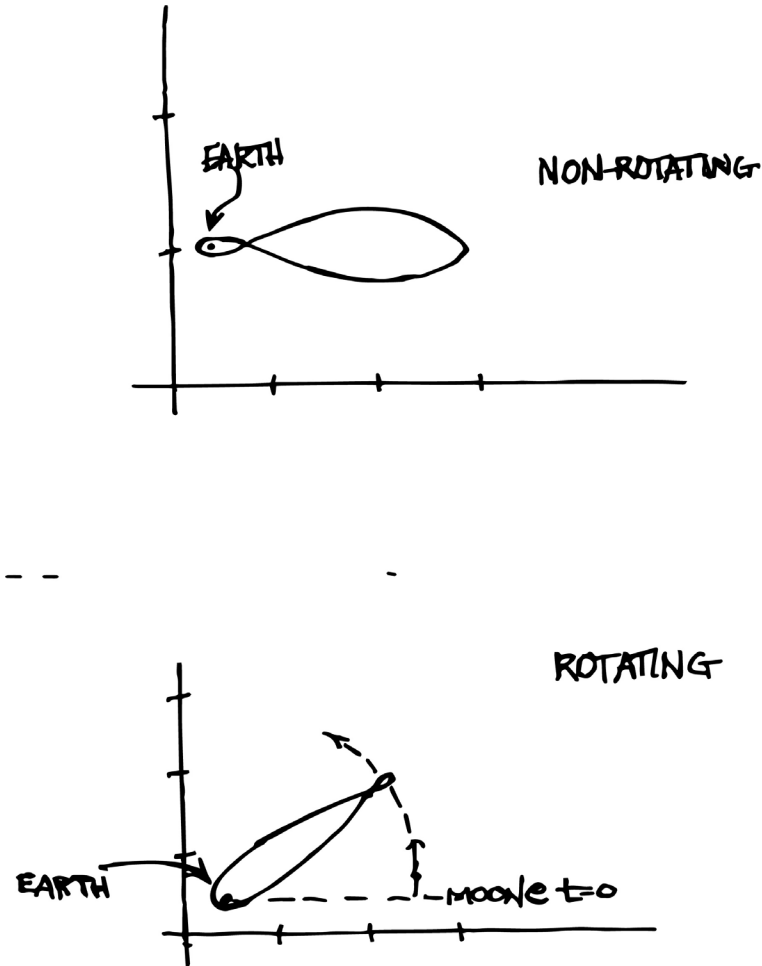


Figure 15.6 The Free Return Orbit in the Earth-Moon 3BP

Remember, once more, that all of this is in rotating coordinates. Figure 15.6 shows an actual plot in rotating and nonrotating coordinates for this free return loop in the Earth-moon 3BP. You can see that the loop rotates with the moon. You'll notice that the shape of the loop is different in the top and bottom. Which configuration is correct?

You might think that because Earth is more massive, the loop will be smaller there; but, in fact, the bottom figure is the correct depiction. Also, did you pick out that the coordinate system should be drawn with Earth at the origin? You can google “moon free return orbit” for some more detailed plots, typically for the Apollo 13 mission.

All the Apollo missions to the moon were on this free-return orbit so that just in case they lost power somewhere along the path they could return to Earth automatically, without needing any fuel. In fact, that’s exactly what happened with Apollo 13 (although they didn’t mention this in the film). They lost power near the moon and had just enough fuel left for a thrust when they reached Earth to break out of orbit and crash into the Pacific ocean safe and sound.

What if they didn’t quite have enough fuel to break out of that orbit and go directly to crashdown? If they had enough oxygen to breathe, a small thrust to bump out of the loop into an elliptical orbit around the earth, and then the drag from the atmosphere would circularize the orbit, until another small thrust would lead to crashdown. Here they use the atmosphere to exert a periodic reverse-thrust on the s/c instead of valuable fuel. (Of course, they probably used oxygen for fuel, too, so that makes the dilemma even more complicated.)

As the name, and the above circumstances, indicate this free-return loop is called a “zero velocity curve.” That means it’s a stable, closed orbit upon which the 3rd body will remain without any thrusts. The Apollo and Trojan Asteroids are on zero-velocity curves; and the halo orbits around the colinear Lagrange Points are zero-velocity curves, at least over the short term.

Figure 15.7 is a plot of all the zero-velocity curves in the plane defined by the two primaries, i.e., the “circular, restricted” problem. Here you can see all five Lagrange Points, the figure-8 free-return loop as well as orbits around L_4 and L_5 . You can also tell from the position of the origin of the XY-axis that the difference in masses between the primaries isn’t as much as for the Earth and the moon;

and that in an even more extreme case, the Sun-Jupiter system, there would be tight, closed loops around L_4 and L_5 . Also, the halo orbits around L_1 , L_2 , and L_3 are perpendicular to this plane.

With a little more imagination, you can adjust the topography so that the primaries have the same mass, and you get a perfect figure-8 for a free return loop, and a couple of the innermost curves match our earlier presentation of the Cassini orbits (which were generated using a $1/r$ force). Do you suppose there are also Lagrange Points in the $1/r$ version of this system?

Notice that the $1/r$ force is characteristic of springs; and recall the spring analogy at the end of the last chapter, forming an

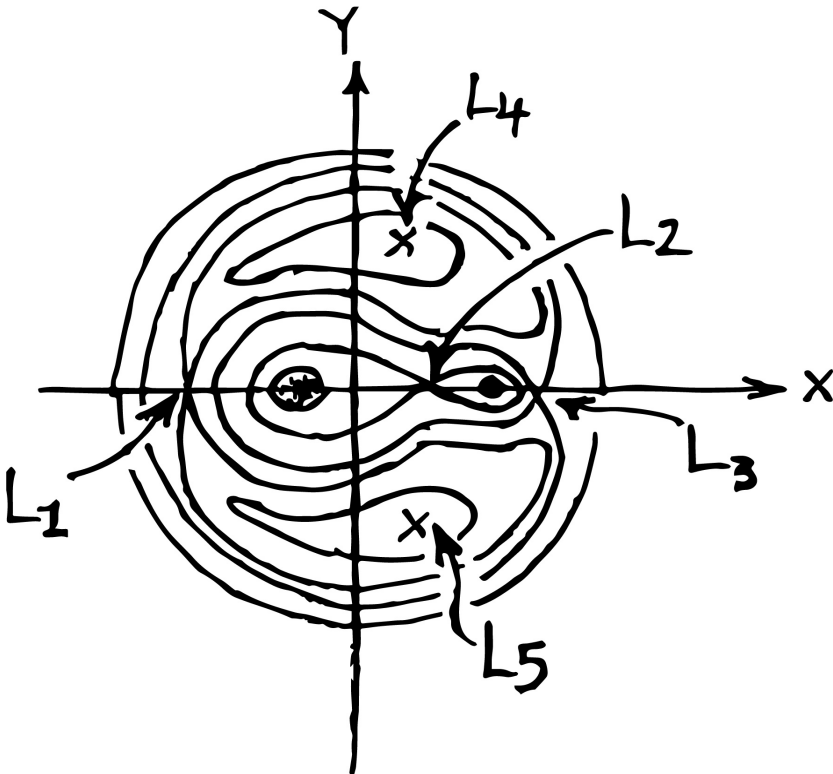


Figure 15.7 Zero Velocity Curves in the planar 3BP

elliptical orbit when there are four springs along the coordinate axes. That's precisely the Cassini curves at work, feeding directly into the tripartite 3BP id/ego/superego psyche (with the sweeping curves at the perimeter folding around into a sphere, bringing the theory full circle back to the nascent psyche), via sex, via the anal phase, collaborating Freud's psychosexual theory in its entirety.

One final figure and you'll be up to speed on the 3BP. Figure 15.8 is a plot of all the zero-velocity curves in the vicinity of the two primaries. You can see that Figure 15.7 is a section through this graphic in the plane defined by the two (orbiting) primaries.

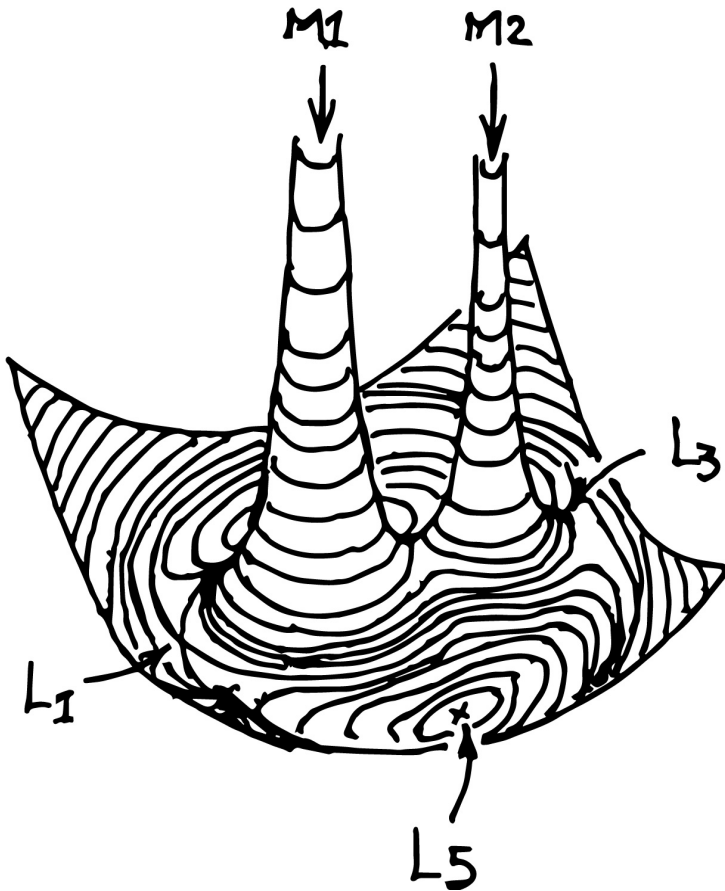


Figure 15.8 Zero Velocity Curves in the Full 3BP

That's about all you will need to know about the 3BP. It's all very mathematical, especially when you get out of the orbital plane. Keep in mind that these closed-loops are all stable orbits (zero extra energy needed to remain on them), and they are defined by math equations. These are not statistical probabilities; but, like you saw in the Earth-Moon system, actual math equations at work.

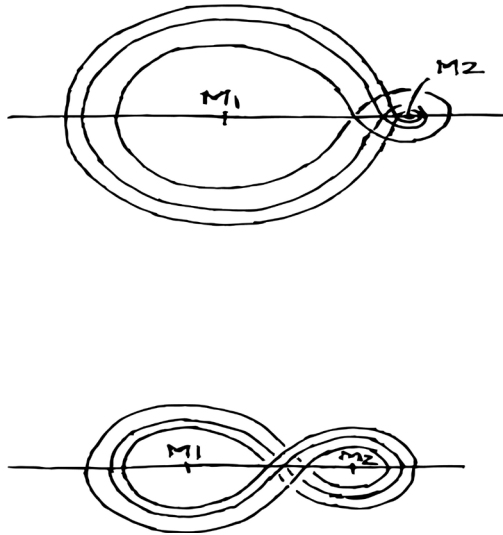


Figure 15.9 **Families of Free Return Loops**

16

Mars Pathfinder 2.0

Okay, so we have a handle on the 3BP now, which was supposed to help us resolve the whole anal phase sexuality issue, and whether it really is related to homosexuality as Freud believed; but, actually, the discussion in the last chapter has made the situation more complicated still. (Hey, it's about sex; what did you expect?)

As far as the Cassini curves go, this new approach seems to imply that there's a second physical force in play, in addition to inversed-squared gravity; and the curves aren't just a quirk, or an aspect of an "inverse squared geometry" because; well, it's expressible by an actual equation, which means it's a bona fide force (just like the force springs exert in mechanical systems).

The logical thing to do at this point is to test a real-world example, to examine the exact nature of this force or forces. We already have a full model of the Mars trajectory, each end of which is a 3BP just like we studied in the last chapter. I actually examined this situation in grad school when I was building Mars Pathfinder 2.0. I didn't try THIS out, meaning this Cassini theory; but I did set up the Mars algorithm to take tiny steps along the perimeter of Mars' SOI (using the end speed and direction when the s/c reached that SOI) to look for an optimal approach trajectory to Mars.

The theory I was applying at the time was to find the free-return loop for the Sun-Mars 3BP and if I could get my s/c on the tail end of that loop (given Mars is much, much smaller than the sun, the figure-8 shape for Mars is similar to the Earth-Moon loop but a lot smaller and tighter around Mars), then instead of having to

spend energy and thrusts to jettison the s/c off the heliocentric approach trajectory into Mars orbit; well, if you could just nudge the velocity vector just right to match the free-return vector, then it would magically swoop you down and close to Mars.

You can think of it like bullfighters target that little, curved channel – the sword is curved to exactly match that trajectory – through the spine of the bull that goes directly to the heart, an immediate kill, and two ears and a tail as a reward from the roaring crowd – versus jamming up the sword, getting the bull super angry, and having to get the clowns to keep the bull from goring you to death with its nicely curved horns.

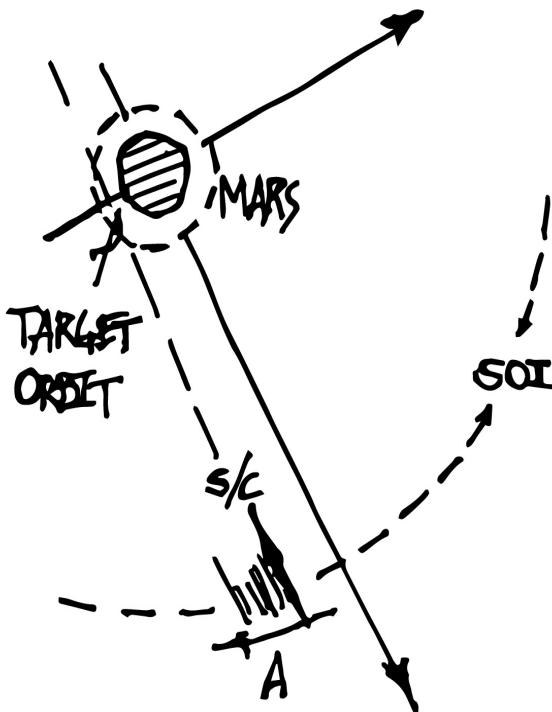


Figure 16.1 **Final Approach to Mars from SOI**

MARS PATHFINDER 2.0

Figure 16.1 is a graphic from my dissertation of this whole operation. My algorithm got me safely to a Mars landing, which confirms the entire trajectory (it also acts as a check against the ideal Hohmann Transfer – the minimum energy heliocentric interplanetary transfer - to which my velocity values were an exact match, confirming the validity of my solution; also that my optimization was working, because nobody ever beats the Hohmann, not in actual simulations, even on Cray supercomputers).

You can see in Figure 16.1 that the coordinate system is set up to point toward the Sun, and with the target as Mars. I stopped my computer integration upon reaching Mars' SOI then took baby steps along the SOI as indicated by the arrow labeled A. The idea was to sync with the Mars-Sun figure-8 loop and to catch a free ride to Mars, saving all the energy of the major thrust typically used at this point in the mission.

Recollect that the relative velocities of Mars and our s/c are very different; Mars is coming at us literally like a roaring train toward a car stalled at the crosswalk. It takes split-second timing to pull this maneuver off (the Russians finally quit after failing to land on Mars a dozen times; and while I was in grad school circa 2000, 3 or 4 Mars landers had been lost in this final leg of the journey, so it was a crucial issue to the space community). My hope was if you could get on that figure-8 loop it would swing you around very nice and secure and predictable, for a safe and happy ending. I just wanted to get a more dependable approach vector, but I got a whole lot more.

PARKING ORBIT CRASHDOWN?

Figure 16.2 is a plot of the thrust needed to reach the low-altitude circular parking orbit around Mars that was the final state of my model. The horizontal line at the top labeled “typical delta V”

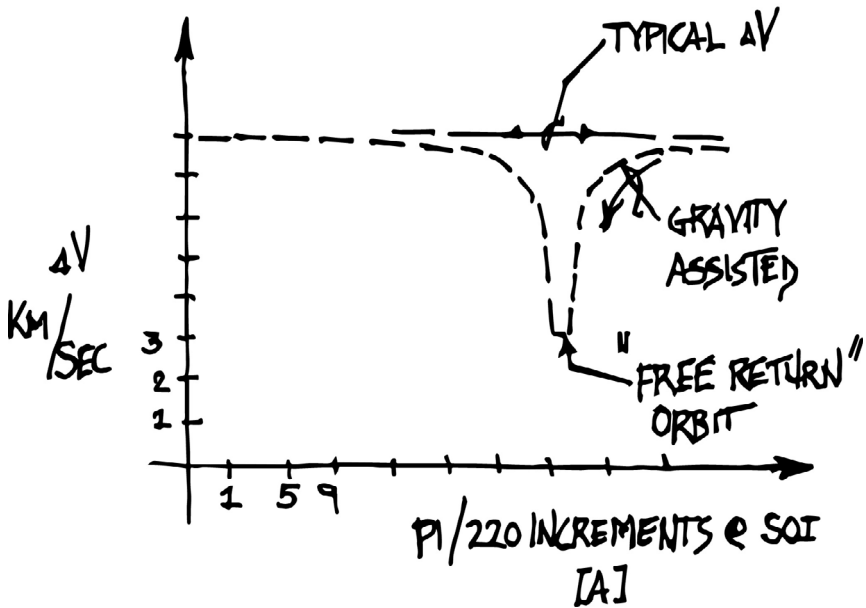


Figure 16.2 Thrusts Needed to Reach Mars Safely

is the standard thrust needed to plant your s/c in a low-altitude orbit; that is, the final thrust required, after reaching Mars SOI.

GRAVITY-ASSISTED TRANSFER ORBIT

As you can see in Figure 16.2, the gravity-assisted geometry of the solution cut that final thrust from 8 km/sec down to a little over 3 km/sec. Overall, this reduced the total thrust needed to reach Mars by almost 15%. I was already in hot water for my little program that did better than the standard genetic algorithm methods; this new result totally outraged the Aerospace Department, and I was expelled within a week. I was not put on academic probation or counseled; nobody took the time to even study my solution or to sit me down and ask me how I did it; just expelled.

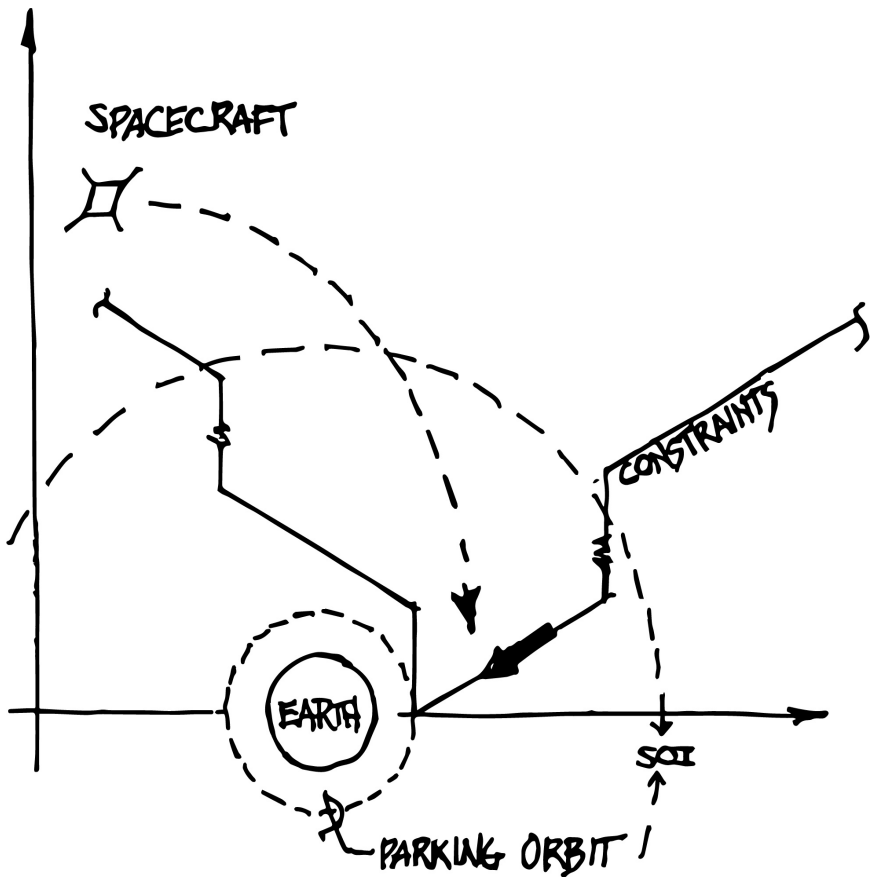


Figure 16.3 Earth Escape inside SOI

I never even had a chance to tell anybody that, hey, dudes, this is a 3BP simulation. We have a whole 'nother 3BP at the Earth end of the setup and, theoretically, you can save another 15% there, using this same methodology. As I mentioned before, having split up the problem at conjunction so that I could integrate the trajectory backward in time to Earth, the Mars Pathfinder code was already set up to do this same optimization at Earth's SOI. Figure 16.3 is a drawing from my draft dissertation at the time.

As you can see in Figure 16.3, it makes it look like the s/c is on a final approach to Earth and not going to Mars at all. The Department evidently saw this figure and thought I had the wrong idea about gravity because fully half of their comments on my project (done during the year after I was expelled, when I was appealing the dismissal) was a review of Newton's Law of Gravity, like a chapter out of a junior high physics book (hell, these days, more like grade school physics as smart as kids are anymore).

THE F- AND G-FUNCTIONS

Anyway, we were seeking insight into homosexuality versus the anal psychosexual phase. Does any of this decide the issue one way or the other? Well, (1) the dynamical model is where we supposed the anal stage was in the mission profile, (2) with aspects both as an infantile anal phase (at Earth) and what we alleged was a late-onset homosexuality (at Mars), (3) there is definitely a second force there, actual or perceived, either $1/r$ or an "inverse squared geometry" (or both), and (4) the solutions all involve a strong influence from the sun, external to our 2BP resolution, and not just with the sun as a linear perturbing force but as inverse-squared gravity in a full 3BP.

NOTE: In orbital mechanics, the "two body function" is a version of Newton's Law of Gravity used to determine the vector for a s/c in orbit.

$$(16.1) \quad \vec{r} = \frac{\mu}{r^3} \vec{r}$$

Where mu is the gravitational constant. There are two more functions that produce the same result called the f- and g-functions.

$$(16.2) \quad \vec{f} = \frac{\mu}{r^3} \vec{f}$$

$$(16.3) \quad \vec{g} = \frac{\mu}{r^3} \vec{g}$$

All three equations have the exact same form, but the latter two in addition to designating the position of a s/c in its orbit are two linearly independent equations (in mathematical terms, their Wronskian is nonzero; actually it = 1) that define a plane in 3D space, i.e., the plane of the orbit (16.1 does not define this plane). There are no f- and g-forces to underpin the functions; however, they do define an “inverse squared geometry” in the orbital plane, and we can recognize them here as a separate fractal level; one that co-exists with 16.1 but separate nonetheless; exactly the situation highlighted by the Mars example.

THE PSYCHE- AND SOUL-FORCES

So, yes, the anal phase is there, and it is associated with more than one aspect of sexuality, the obvious inverse-squared that underlies the entire psychosexual model here; but also more sublime forces that, even though the infant amidst the anal phase does not experience sexual attraction in the way that adults do after puberty; what exists can be interpreted by the child as very similar to its effect on the psyche, and therefore with sexual connotations.

All of these forces, bundled together, are represented by the sun in our Earth-Sun 3BP (as they were in the latent psychosexual phase description); and, well the moon is there too with its influence (female mensuration in our psychosexual model), which suggests – as observed already – homosexuality is spreading even faster among females, as lesbianism and bisexuality.

Sexual identity is as traumatic an event (if not more so) for children as getting weaned from the mother’s breast at age 1 or toilet training at age 2 or puberty around age 12, and we need to be just as careful and delicate and compassionate with that life event as with any other. You can err by being too lenient (I believe every child should be encouraged to a heterosexual identity via “tough love”) or by being too strict (forcing a child who has only just realized that men and women are different physically), and that TV and the media is absolutely no substitute for guidance

from parents and teachers (in an intimate setting, not a raucous classroom full of bullies, giggles, jerks, and activist kids).

Otherwise, if any of this offends the LGBTQ community, I apologize. My expertise is mathematics and orbits. I'm no expert in psychology and have been over my head since word one. I know even less about sexuality. I have tried to present a reasonable theory here, one that can be followed by the lay public, and that might yet be developed further by the psychology community. I'm clearly not a liberal and even trend more toward the arch-conservative side of the spectrum. Having made that clear from the very beginning, you're welcome to take that into account in evaluating anything herein.

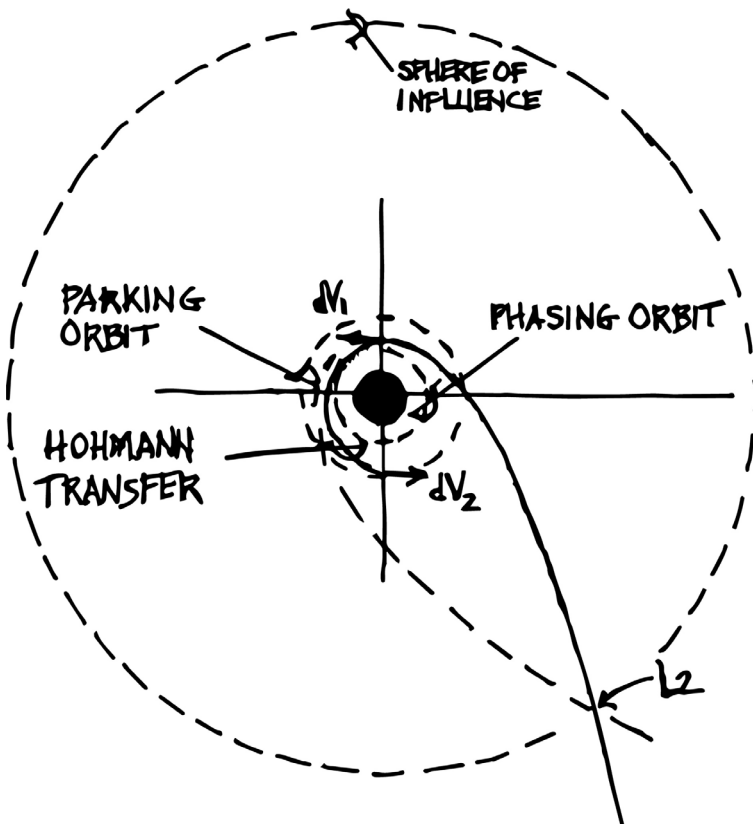


Figure 16.4 Targeting Mars via the Sun-Mars 3BP Geometry

A Subatomic Model

Personally, I'm very uncomfortable discussing anything to do with sexuality, and especially homosexuality. I don't have a clue if my ideas are reasonable or not; I just know that what I need right now is some hard-core mathematics to clear my head. I figure you the reader probably feel the same way, so we'll carry on with our Big Theory but absent all the controversy.

We've developed a robust conceptual toolset so far, from the 1BP, 2BP, 3BP, 4BP all the way up to the Many Body Problem. We used these BPs to build a whole new model of the psyche and tested our model in the real world with halfway decent results. Keep in mind that the whole point of this project isn't to establish ironclad theories but to simply lay out a wide range of ideas for others to consider and investigate further if they see the potential.

Our Force theme began as a fuzzy metaphysical entity, but we've refined it with some mathematical forces so that when I say, Force, the reader hopefully conjures up images of springs and gravity and maybe even electrostatic attraction, all applied to common psychology issues and experiences, relationships.

It's been a fun and exciting journey so far, controversial and thought-provoking. It might even be called fascinating by readers savvy enough to perceive all the ideas stacked into a fractal theory and who can imagine what this means and its consequences for further refinement by others. They might even recognize the crude outline of a Unified Field Theory (UFT) herein, where all four fundamental forces of nature (gravity, electromagnetism, the weak and strong nuclear forces) are presented in the same set

of mathematical equations. The 3BP already has electrostatics (the strong nuclear force) and gravity, the transistor model adds the weak nuclear force, and the psyche model indirectly adds magnetism – which we have identified as an “inverse square geometry” with more refinement yet to come.

A UNIFIED FIELD THEORY

This book, however, isn't about rigorous mathematics and sets of equations. It's about concepts and connections. A UFT here, if any, would be to just show that the same kind of force exists through a wide range of fractal levels in nature. That makes this more of a Theory of Everything approach; but again, we aren't about specifics but generalities, relationships not equations. As I mentioned in the first chapter, quantum entanglement is more of our style here – really far out there in the scientific worldview.

Basically, our guiding force has been geometry. Where does that geometry lead us now? If you think of our conic psyche model versus our patched conic psychosexual model, the super-efficient Mars final approach phenomena (a $1/r$ force, a $1/r^2$ force, and maybe even also a $1/r^2$ geometry), there's only one place on our conic section where these forces could coincide: at the tip of the cone. Our super-fast Mars trajectory is the patched conic equivalent of a “route of the ages” (from the Andromeda sci-fi series) that connects the upper psyche cone to the lower cone.

We've already identified the cone itself as a firewall protecting the psyche, what we call the soul. Everything we know about the psyche and soul has already been nicely modeled in the one upper cone. What's the bottom cone all about?

Geometrically speaking, the shell of the two cones is continuous. That means the soul extends throughout, from top to bottom of the double-cone geometry. Inside the upper cone is the psyche, with the subconscious that part lying below the horizontal reference plane to the real world, as in the iceberg model. What's inside the lower cone?

In the second, Jungian model of the psyche (Figure 4.4), the lower half of the figure was comprised of a collective consciousness. Could it be that this common, shared consciousness isn't subtracted from the original iceberg at all like we supposed; that our "iceberg" psyche remains intact; and that this collective psyche is what's inside that lower cone?

The geometry of the cone says that as an individual's social consciousness expands, the horizontal plane of reality moves upward, the volume in the cone below this horizontal plane increases, and you get a deeper subconscious. The universal trend in the reduction of nonverbal communication implies a shallower unconscious; with the balance of the volume "underwater" taken up by the social networking bubble values and morals. So, no, the lower cone isn't the collective psyche but something else altogether.

CONIC THEORY 2.0

Since our Force analogies have worked so well thus far, and we have no real physical designation of this Force in either the conic or patched conic models; and because clearly there are force or forces, known and unknown, acting throughout; well, let's just say that the Force resides inside that lower cone.

This inverted cone is a reservoir of personal potential, drive, and momentum that people access in the most desperate of circumstances: the mother who shows superhuman strength to protect her child when threatened by a charging bear or car or assailant; courageous acts by people who never knew they had it in them; the athlete's remarkable skill and power, when they "dig down deep" for that exceptional performance against the most daunting odds.

In real terms, it's a reservoir of willpower that's there when you need it. Athletes train for years to build out that infrastructure inside themselves, as do all the real and fictional masters of the mystic arts. Brilliant engineers, scientists, writers, and artists plumb those depths for the spark of inspiration that touches

millions through their work. It's something more than just the unconscious (and it's definitely not a collective subconscious because it's totally unique to the individual), something deeper, something much more powerful.

In our conic model, this psychic reserve resides in a cone with the apex pointing up. There's no downward limit to the depths this cone can reach. Creative people put together all the pieces of their problem until a sudden inspiration, like a Many Body Problem transition, puts it all together in a single, breathtaking idea, design, piece of music, or literary motif. Athletes use it to max out their performance with a supercharged burst of power. What's the next step, if not the Force?

In light of our work so far, we might assume that the infrastructure of this 2nd cone is similar to the psyche cone and that the horizontal plane moves downward (outward from the shared apex) as the Force grows, said plane representing a psychic connection to the natural world.

Many animals tap into this dimension. The hummingbirds that buzz around my house in the Appalachians every summer zip all the way down to Mexico every winter (burning literally half their body weight to make the trek clear across the Gulf of Mexico), then return to the exact same house and the same red-glass feeder year after year. Loons from Canada make the same voyage, overnighing here going both ways in their migrations, overnighing on the beautiful mountain lakes hereabouts. There are countless other examples in nature, where animals access what human science calls, somewhat cryptically, quantum entanglement.

THE EMPIRE STRIKES

Personally, I believe humans have long since bred this capacity out of the species. If we still had the capability, we wouldn't willingly be driving thousands of species to extinction every year, and the whole planet to destruction via global warming. Half of Americans believe global warming is a hoax. France tried to enact fuel tax

hikes to encourage energy conservation, only to have to back off because riots broke out across the spectrum. Nero is their hero, their spiritual guide, their oracle; as Rome burns.

Humans were originally one with nature. Then all the major religions made nature out to be the ultimate evil so that they could win converts. In the eyes of God, nature is still Satan incarnate, the abomination of desolation. So, by definition and by consensus, the spiritual 2nd cone in modern man is a dark, empty void, and the 2nd cone is a vague facsimile of its original strength if that much. (And the upper psyche cone is rapidly headed toward the exact same fate, by our own willing and eager choice.)

THE NATURAL WORLD

That's the fuzzy, conceptual place where we are right now. The 2nd cone isn't any more concrete than our psyche model. However, it's not just mental creativity anymore but physical creativity as well, exhibited by star athletes in exceptional performances that go beyond their own training and even their own expectations. The fact that it's physical means it must have a physical basis, and that the "cone of power" isn't just imaginary but very real.

NOTE: The super-fast Mars trajectory will later be likened to the complex plane in mathematics (first introduced here with Figure 6.1 versus the sine and cosine series), where one axis is the real axis (like we're accustomed to here) and the other axis is the imaginary axis (as in imaginary numbers, e.g., the square root of negative numbers). We've already seen how the two-body equation (16.1) and the f- and g-equations (16.2 and 16.3) represent real and imaginary forces in orbital theory. This suggests that what distinguishes these two cones is that the psyche is imaginary and the lower cone is real.

In light of our Big Theory, to reason out this Force physical we need the equivalent of a Mars Pathfinder algorithm, a hard-wired computer code simulating the patched conic method, but applied to our geometric cone method which so far is entirely virtual

(although the psyche does have a weak connection to the body in nonverbal communication). We need to build out our construction from the electrons on up. Somewhere in there is the potential to store energy, and the trigger to access this power is held by the psyche. Then the release is organized by the same mechanism that directs nonverbal communication.

We've compared the flash of mental inspiration into the Many Body Problem. It's likely that this burst of physical power, coordination, and foresight takes place by the same process. Bits of the power are stored all over the physique, then unified into a Many Body Problem fluid-flow by stress, fear, circumstances, or just plain willpower. And where do you store energy except in electronic orbitals. At least electrostatics is a place to start, and so start there we will.

ELECTRON CLOUD DISTRIBUTIONS

We're acclimated to discussions about orbitals, and so we begin with the Schrodinger electron cloud plots, roughed out in Figure 17.1. You know the most basic of these probability distributions already, the spherical distribution around the Bohr atom (one electron orbiting one proton as the nucleus, alias a hydrogen atom). You can see in Figure 17.1 that this is called a 1s orbital.

So, we're back in the real world now, at the subatomic level. What we're looking for isn't the psyche-like structure of the Force or how it manifests, but the very origins thereof. We've supposed that it's stored in a scattering of places which are triggered to release their collective energy in a Many Body reaction akin to static flow in fluid dynamics: an instant metamorphosis from a block of ice not just into a quantity of water but into a burst of steam to power the body's engine to action.

Star Wars calls these entities midichlorians. Scientology has a similar idea, believing that stressful events are stored in bundles of stress called engrams that lodge in the joints or organs and over time fester into discomfort, pain, disease, and even cancer.

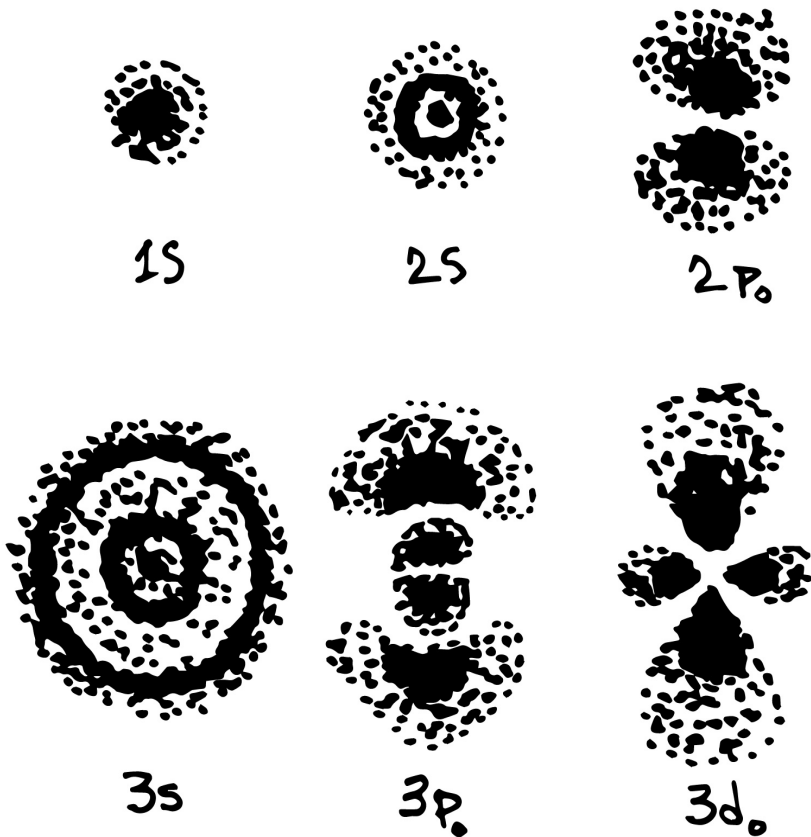


Figure 17.1 **Schrodinger Electron Cloud Plots**

Their Dianetics science is meant to “clear” these engrams from the body. Here we want to take the collective energy of these entities and to focus it; that is, to model the process that makes athletes great, that inspires poets, musicians, engineers, and scientists to greatness.

Here we’ll call these little buggers eigens, a mathematical term meaning “proper” or “characteristic” and leave the mythology to Scientologists and Star Wars fans. We’ve already alluded to this idea, suggesting that stress around a joint acts like atmospheric

drag, causing smooth elliptical skeletal motions to transition into circles and a locked shoulder (a very agonizing condition, that takes many months to overcome). The tentative model for this phenomenon was a spherical shroud of stress enveloping the joint (just like a real frozen joint, locked in a fistful of connective tissue), similar to the probability electron distribution in the Bohr atom, except now each point in the spherical cloud is a discrete particle of stress.

HIGHER FRACTAL LEVELS

This works okay as a conceptual model, but theoretical isn't good enough anymore. It's one thing to wave your hands and say the cloud plots in Figure 17.1 look just like outlines of the elbow joint (2p), the hip joint (3po), or the shoulder (3do). We're after an actual real-world model now. Or, rather, we're looking for a transition between our imaginary psyche model and the real world eigen theory.

The original incarnation of our psyche model, its most basic form, was the low-eccentricity ellipse, just beyond a perfect circle. This matches the first inkling of our new physical stress model, a spherical cloud of stress particles causing a locked shoulder. Perhaps the transition we seek is in that geometric configuration, from the 2D circle to the 3D sphere.

Consider that our low-eccentricity ellipse that's free to rotate in 3D generates the profile of a p-type electron orbital, as illustrated in Figure 17.2. Observe from the arrows that this rotation is around the x-axis. In complex analysis, the x-axis is always the real axis, and the y-axis is the imaginary axis.

Rotating around the y-axis generates our electron cloud, which is our imaginary psyche model. So here we have in the complex plane a mathematical connection between the imaginary psyche model and the real-world stress model.

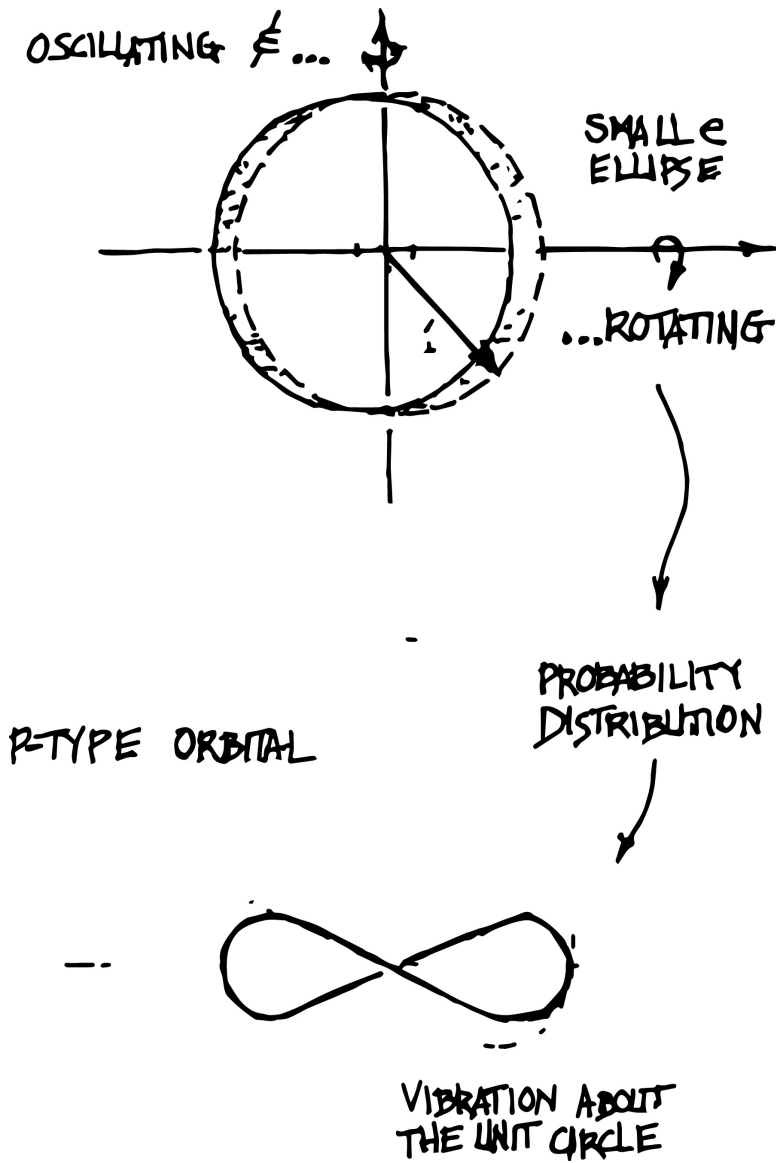


Figure 17.2 Math of a P-Type Electron Orbital

This conceptualization is in rotating coordinates, which is something we're comfortable here with thanks to the 3BP. We know that the 3BP exists at the subatomic level, right where we are at present, and we can even use our two 3BP masses and the Lagrange Points to set up the infrastructure needed for say a 3do orbital.

The key points are indicated in Figure 17.3. You'll see the nuclei correspond to the two primary masses (now charges), halo orbits, a free return loop(s), and an SOI. It's all quite intricate but dynamically something that's not unfamiliar.

Here the subtext is that the 3rd body zero-velocity curves (remember that the free return loop is a zero velocity curve) establish closed-loop electron orbitals.

A WATER MOLECULE

Now recall that the heliocentric part of the Earth-Mars interplanetary trajectory tied together two 3BPs, one at each end. If we can model a fairly complex atom as a 3BP then we can also interlock several such 3BPs into a subatomic matrix with a separate atom at key geometric points, as suggested in Figure 17.4.

With your newfound knowledge of celestial mechanics, you see that the colinear Lagrange Points tie down the internal structure of the core atom; while the more stable equilateral Lagrange Points L_4 and L_5 establish connection points for the nuclei of two more atoms.

This might be a model of the H_2O molecule, water: two simple hydrogen atoms (one atom with one electron) at L_4 and L_5 attached to one central oxygen atom. Here we see a free return orbitals acting as covalent bonds holding everything together. (Adjust the distances between the primary masses, and you can get the 104.5 degree angle of the covalent bond in a water molecule.)

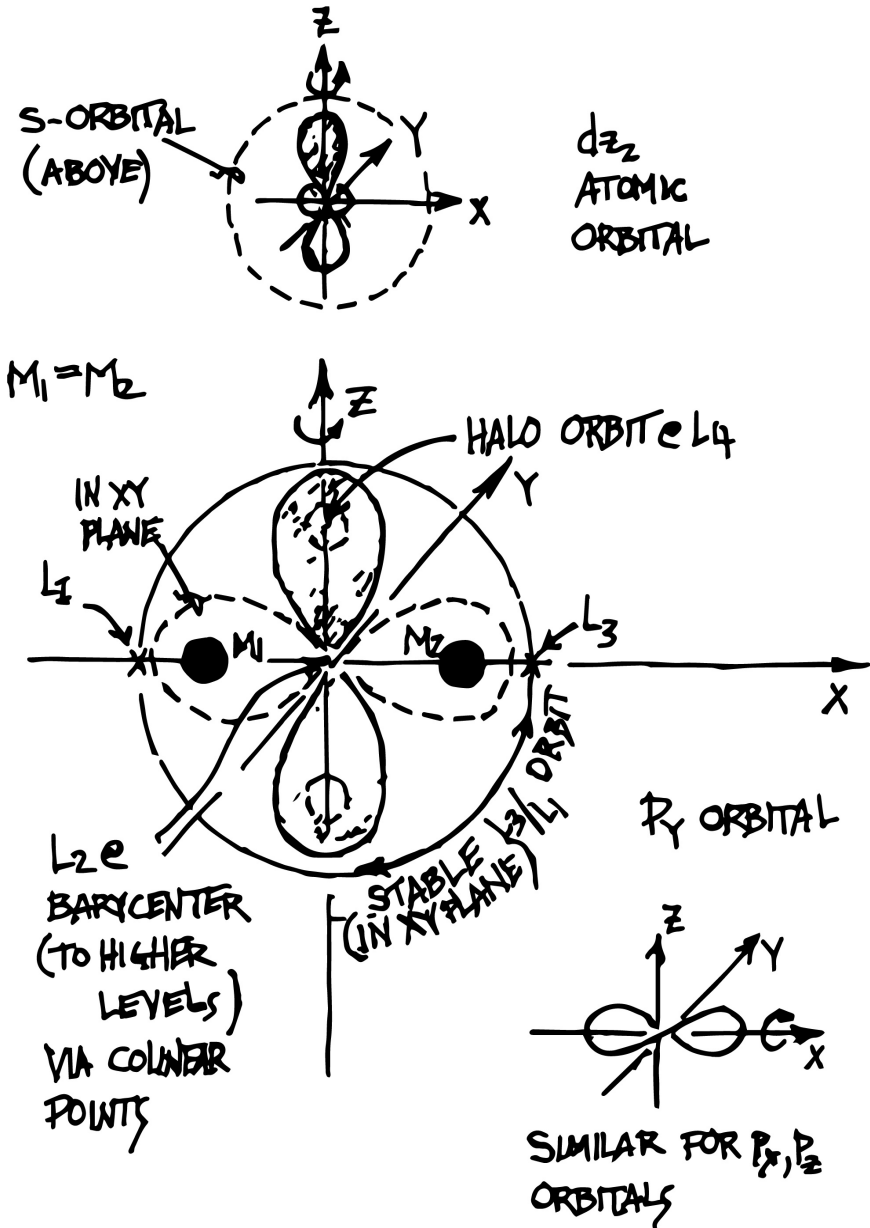


Figure 173 Using the 3BP to Model a Complex Atom

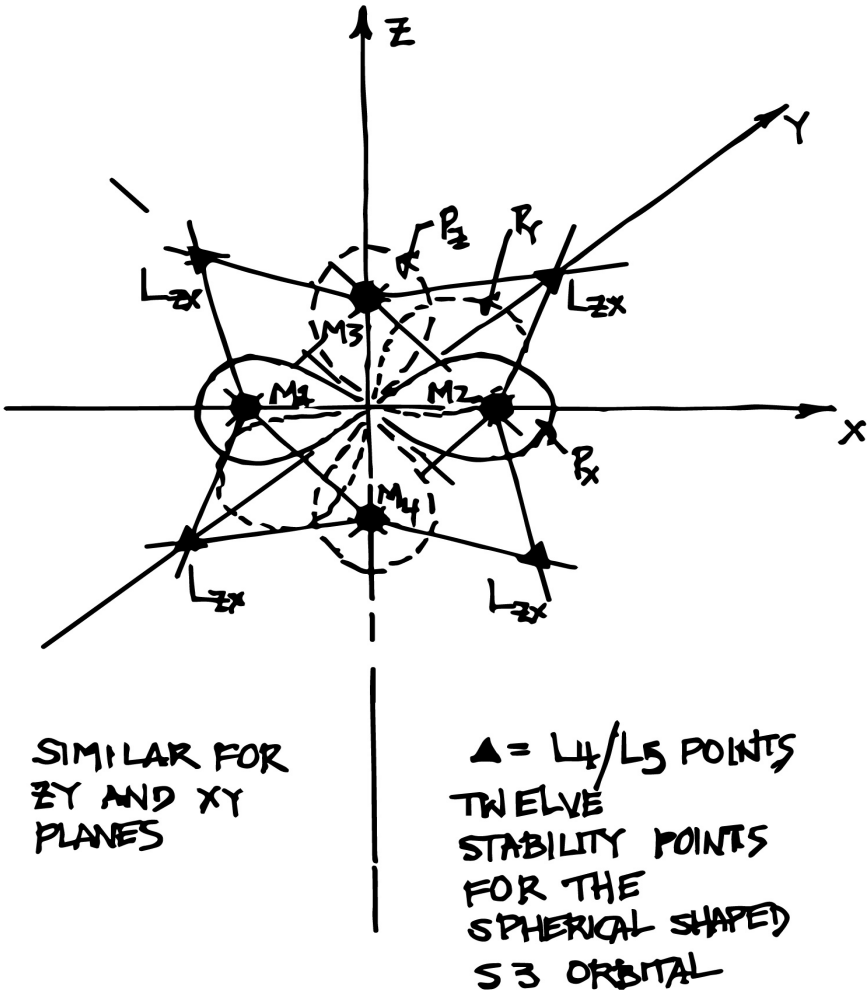


Figure 17.4 Covalent Atomic Bonding using 3BP Dynamics

Figure 17.4 isn't just a clever diagram either because we know that the same equations govern electrostatics as gravity. It's a lot more complicated than our "regularized coplanar" Mars 3BP simulation, but we know from Figure 15.5 that this kind of zero-velocity curves exist beyond the plane of the primaries.

The water molecule may be a lot more complicated than a simple Bohr atom (the hydrogen atom), but actual molecules in a

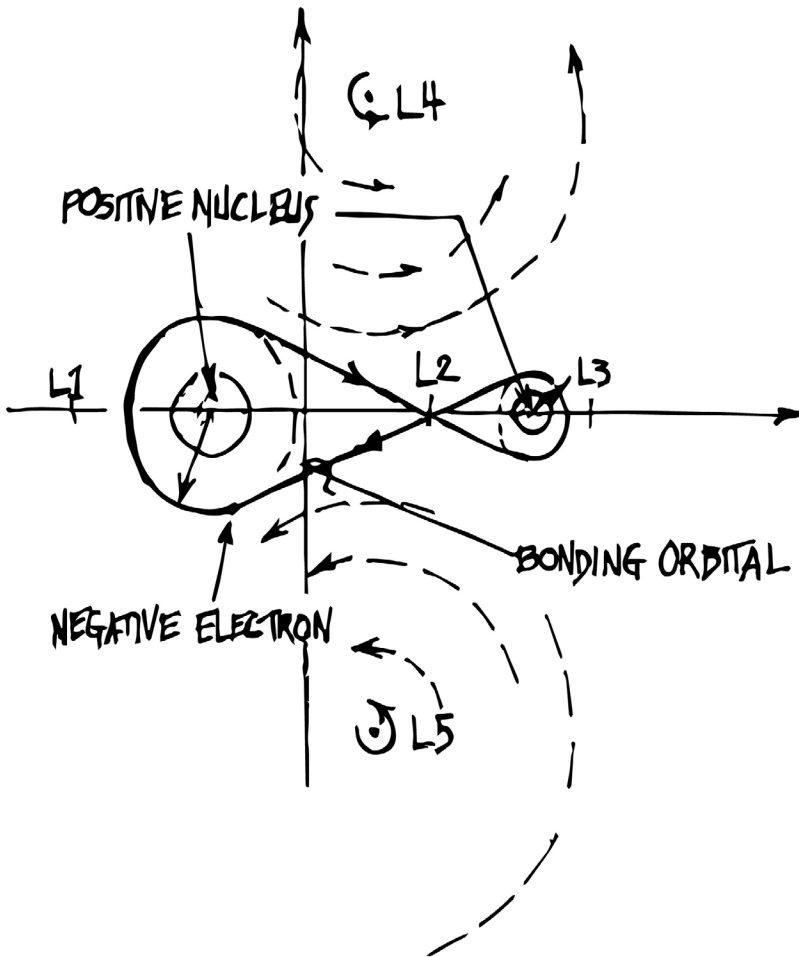


Figure 175 **The Free Return Orbit as a Covalent Bond**

physical body are far more complicated still; not to mention whole joints comprised of many different compounds.

Still, it's a baby step above where we were before starting this chapter, and we also have a whole new fractal level. Also, as far as the mathematics goes, complex analysis typically takes place in a rotating system, so its math jives very well with the $3BP$.

Where can our figments of stress reside in this basic diagram? The last two figures are built out of only figure-9 free-return p-type orbitals. Figure 17.5 is a detail of the bonding between the positive-charged nuclei and the negative-charged electrons.

The 3BP dynamic has a whole family of zero-velocity curves as you can recall from Figure 15.5. Any charged particle of any size (presumably much smaller than any electron) could be on one of these stable, closed orbits.

AT THE PHYSIOLOGY FRACTAL LEVEL

If this particle was represented as the usual probability distribution it would form an electrostatic field of sorts, a very weak field; but enough to slightly alter the geometry of the molecule, misaligning the crystalline matrix (if enough atoms had these spurious eigens clouding their geometry), causing friction in the joint, then over time damage or even disease. Purge these eigens from the tissue, and the joint returns to normal.

Theoretically, this is what happens every time you exercise. If you stretch first, this dislodges the eigens by disrupting their orbital path; then when you exercise afterward the dynamic stability of the eigen is completely decoupled, and the stress is burned away.

As far as Force goes, I suppose you don't want to exercise away these little bundles of energy quite yet but somehow store them somewhere they won't cause any harm to joints or tissues; or, at least, to purge the energy before that happens. Of course, this is a whole new concept that muscles can burn stress as fuel; kind of like the Biblical "manna from Heaven" that kept Moses and the early Israelites alive for 40 years in the Sinai wilderness with not much more than water from dew for sustenance. I suppose that's what the soul is all about, making this $E=mc^2$ transition of stress to fuel for muscle tissue possible.

Actually, we don't really need to identify a specific mechanism because we already have it in the psyche model. The same dynamics that operate in the psyche also exist in the 2nd cone. The psyche

is connected directly to the muscles of the body (that's how body language happens, all done by the subconscious), so theoretically this 2nd cone is too; or at least can be, with practice and training. The Force probably uses all the same connections; you just need rigorous training to fire up all twelve cylinders is all.

18

Human Physiology Fractals

A basic premise for the Big Theory is that patterns and forces at one level will somehow be evident at higher levels. For example, a free-return orbital in the electrostatic 3BP becomes an inverse-squared geometry in the next level with the p-type electron orbitals. At the next level above that, the figure-8 configuration becomes a covalent bond between two atoms.

Even though there are no math equations that can be cited to reinforce these orbital theories, the geometry is very compelling and insightful, especially when you invoke the Lagrange stability points as key anchors at each level. Current theory only has vague probability cloud distributions, whereas our math theory gives relationships in great detail and with a conceptual pertinence backing up the diagrams.

These are all aspects of the 3BP, i.e., the free return orbit is a zero-velocity curve in the circular restricted coplanar 3BP. Our psyche model got as far as the patched conic 2BP method, but nothing more. We have no idea the pertinence if any of the Lagrange Points (that is, the 3BP) in our psyche model.

Consider Figure 18.1. It pretty much summarizes everything we know about the 3BP. It was initially intended (circa 2000) to show how 3BP forces might contribute to the formation of Earth's moon out of cosmic dust. Or, in light of our current theoretical understanding, perhaps the accumulation of stress-energy by the psyche into an eigen.

In Figure 18.1, concentrate first on the five Lagrange Points. Imagine this diagram overlaid on the Shroud of Turn, the alleged

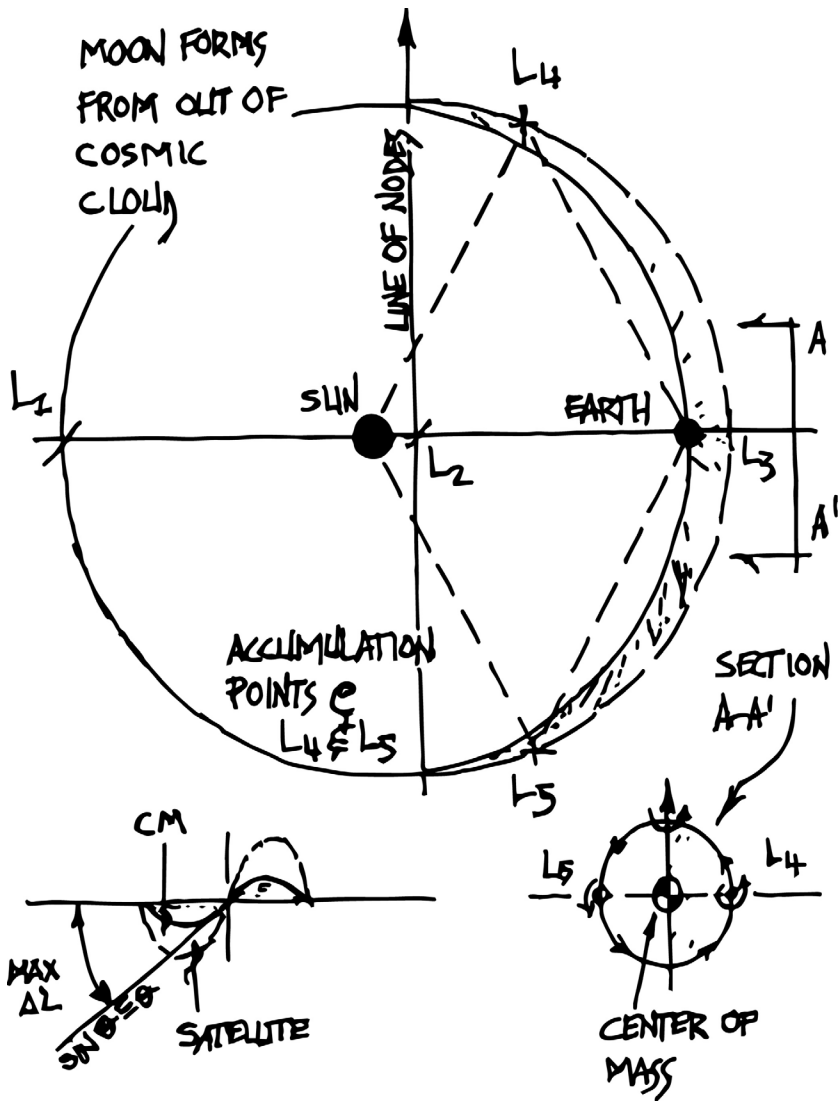


Figure 18.1 Cosmology, the Moon, and the Earth-Sun 3BP

burial wrapping for Jesus. L₄ and L₅ are the rusty 12-inch iron nails through his wrists, L₃ the nail through his ankles, L₁ the crown of thorns around the head (halo orbital), and L₂ the spear piercing his side (done to drain blood from the victim's lungs so that he did not asphyxiate before experience the maximum agony).

CHRIST CRUCIFIED

Other than the obvious spiritual implications, consider that crucifixion was a tried and tested punishment that the Romans used to quell dissent. It had previously been used as a form of capital punishment by the Persians, Carthaginians (to punish generals who lost important battles), and the Macedonians (Alexander the Great crucified the physician who unsuccessfully treated his close friend Hephaestion). 150 years before Christ, the King of Judah crucified 200 Pharisee rebels in the center of Jerusalem.

Historically, the Romans tried very hard NOT to crucify Jesus. They offered ten different alternatives, pushing each one very hard; because Jesus had not violated any Roman law. However, the Jews were very insistent. It's a pity the Romans didn't let the Sanhedrin brush off their tradition and do it themselves; although, in every sense of the matter, it was actually the Jews who did it, morally, legally, and spiritually. (Big Business these days venerate that whole episode go get in touch with their inner Jew, to crucify all us hapless consumers every Holiday season.)

There are many ways to publicly execute individuals, but the Romans used crucifixion, at least until Constantine (the first Christian emperor of Rome) abolished the practice in 337 AD out respect for Christ. In our psychology way of thinking, the crucifixion didn't just set a horrific example for any would-be rebel dissidents; it also calmed the faceless masses. That is, the Romans had refined its use over the years so that it "pushed all the right buttons" to subdue, civilize, and domesticate the peoples under Rome's rule.

In this analogy, we see a possible connection between our psyche model and the new physical model that we've just started working on. If you literally instill the fear of Isaac in the unwashed masses and short-circuit their ability to burn away stress via exercise, you eliminate the possibility of anybody gaining the upper hand over their psyche to then muster the wherewithal to stand up and speak out against Rome.

In terms of our model, if you "nail down" the Lagrange Points and subconsciously immobilize them in the general public by vivid visual cues, then you've paralyzed the psyche's ability to process stress into energy for use by the skeletal muscles. If nobody in the conquered lands can cope with the kind of stress it takes to go against Rome, then you have very effectively subdued them to your rule, benevolent or otherwise.

MODERN MAN CRUCIFIED

This is exactly the kind of powerfully influential effect modern advertising has on gullible individuals (made so by the lack of spiritual anchors but also by the total absence of a strong, healthy physical body via regular, strenuous physical exertion). Maybe that's why businesses don't typically go into the black until after Black Friday and the beginning of the mad rush for Christmas presents. It's apparent that they've commercialized the Holidays to the extreme, and the insane effectiveness of it all to their bottom line might be more than just clever marketing, but the application of a fundamental psychology principle.

Otherwise, if you exorcize the power of the image of Christ-on-the-Cross from a person's subconscious mind, then you free their psyche from a 2D oblivion to operate in its full 3D glory. This speaks to great individual independence, which Big Business doesn't like at all. They depend on brand loyalty and brand recognition for their profits. If they had to rely on the quality of their products to sell them, they'd go flat broke in no time at all.

Think about it. When you get all stressed out, where in your body do you feel that stress manifest itself? In the head with headaches; in the heart with angst and shearing spasms of pain; in the wrists maybe too, and the ankles. How do you get yourself back to normal – people usually drink, smoke, eat, gossip, sleep, do drugs, fidget, take aspirins or tranquilizers or something even stronger – whereas all you really need to do is to get out there and exercise, walk, swim, jog, stroll, or work out at the gym. Get down off your cross and help your body to get all that stress out before you develop an autoimmune disease like arthritis or heart problems or cancer.

HUMAN SEXUALITY AS A FRACTAL LEVEL

There's one other remedy for stress that people turn to: sex. Like that's really going to solve any problems, depending on sex for stress relief. No wonder almost all marriages these days end up in divorce. No wonder practically all kids are like ignored entirely by their parents. No wonder more than half of couples get married for reasons other than love, notably financial security. Because the only significance they give to sex is as a sensual way to purge stress – except that using sex that way increases the stress load, not the other way around, because it trivializes the whole relationship thing and superficializes what should be a major pillar of your social support network, your spouse.

How can the 80% of the world's population that lives in abject poverty keep having kids, kids, and more kids – when they know damn well that their offspring will live their same miserable, horrific life? Apparently all those people don't give a damn about their own children. Otherwise they would have just one, and focus all their financial resources on ensuring that child has a better life (and not depending on government largesse to raise their children, either).

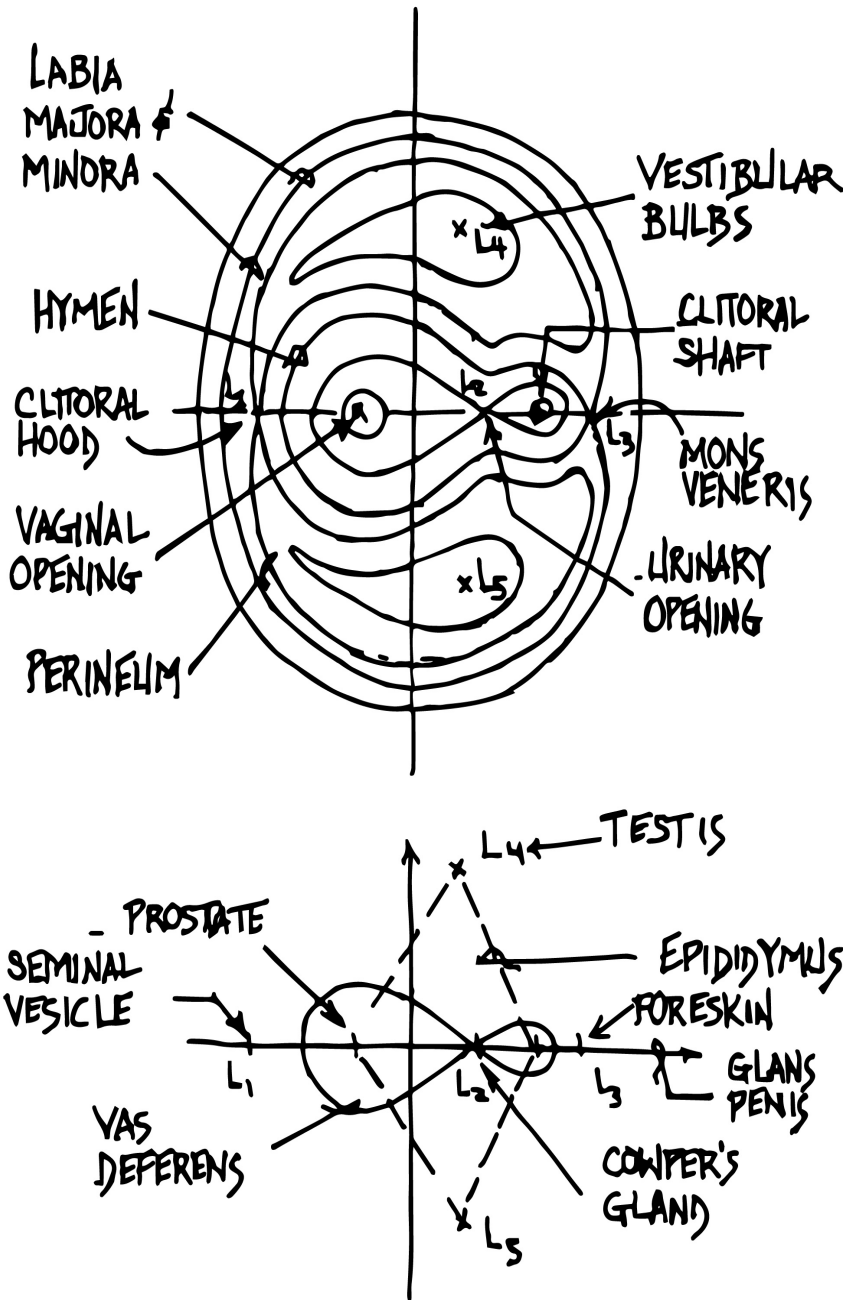


Figure 18.2 The Male and Female 3BP Anatomy

The facts certainly support a psyche connection here. Even rats know better than to have a litter when conditions are unfavorable; people can't make that distinction, not even when their own survival depends on it. Maybe it's because virtually all advertising has a subliminal sexual connotation; like a buxom broad in a string bikini has anything to do with sucking on an ice-cold beer (phallic symbol).

And you wonder why liberals despise religion, especially Christianity? Because of Jesus' prohibition against "lust in the heart" or lust in thought or any form whatsoever. Boy, did he ever hit the nail on the head with that one. Go around saying that these days and you'll get crucified all over again.

Be that as it may, our task now seems to be to establish a sexual aspect to the 3BP, and fortunately (maybe not) we can do so with some clever diagrams. Figure 18.2 shows a fairly interesting correlation between the male and female sexual anatomies and the 3BP. Hopefully, the reader is by now fairly versed in these zero-velocity curves and can pick out all the Lagrange Points. If not, then this will be a good exercise. (And, hey, if sex sells why not pull out all the stops in our Big Theory here?)

MALE & FEMALE SEXUAL PHYSIOLOGY

We can cite some more zero-velocity curves that are even more revealing. Figures 18.3 and 18.4 are sketches of a couple more stable orbitals in the 3BP. They aren't anything we've seen before or can recognize from our topographical plots because the orbital loops are either out of the plane of the two primaries, in a 3D Three Body Problem, or some combination thereof.

As stated before, the closed-form mathematical solutions to the 3BP are actually quite limited. These and many other solutions (closed, stable orbits) are found all the time via computer models and advanced mathematics (which, I dare say, sometimes involve statistical probabilities).

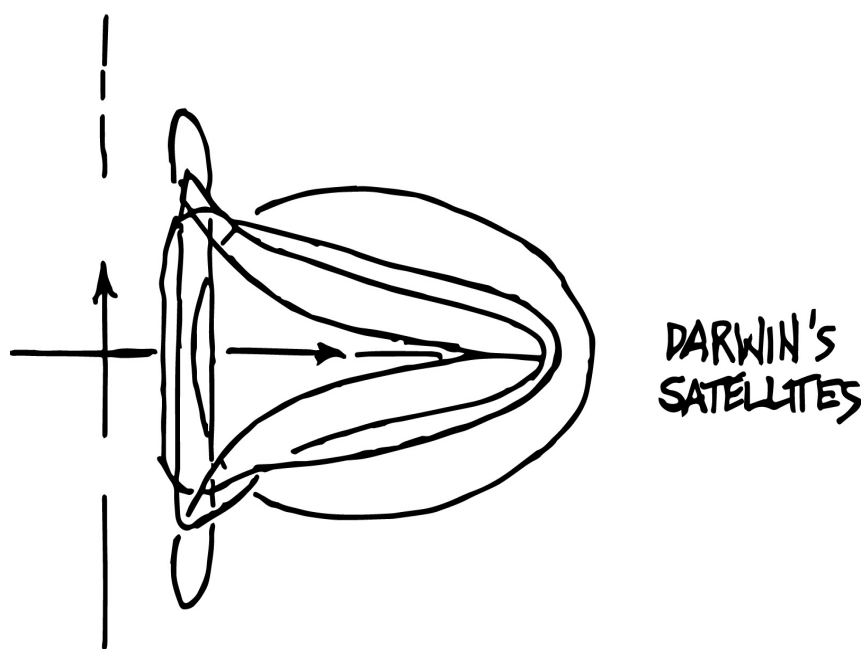


Figure 18.3 The Female Vulva

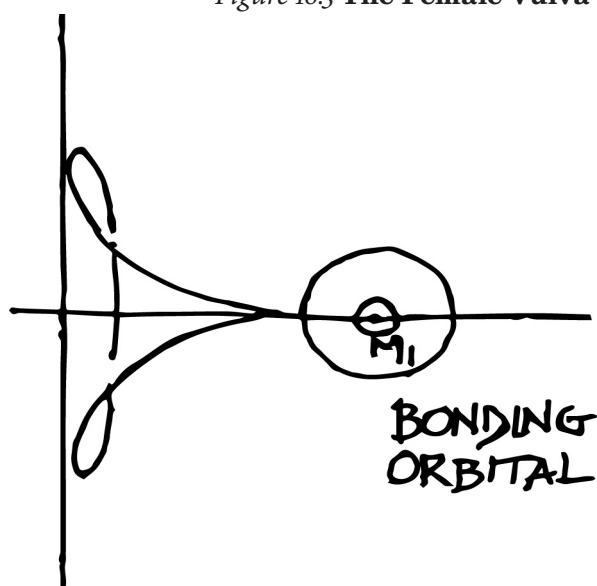


Figure 18.4 The Male Sexual Organ (circumcised)

As you have probably forgotten by this point, these 3BP plots are actually as many new fractal levels, and indicative that the underlying Force or forces that we've been investigating from the subatomic level upwards are manifest in the human physiology – just as we saw beginning with conception and the zygote.

OCULAR 3BP

And, no, this kind of phenomena are not limited to the sex organs. Consider Figures 18.5 and 18.6, which are a cross-section of the eyeball and a very similar 3BP graphic (this one is back to the circular, coplanar restricted problem but unlike what we've seen before because here there's a much more significant difference in the mass of the two primary bodies).

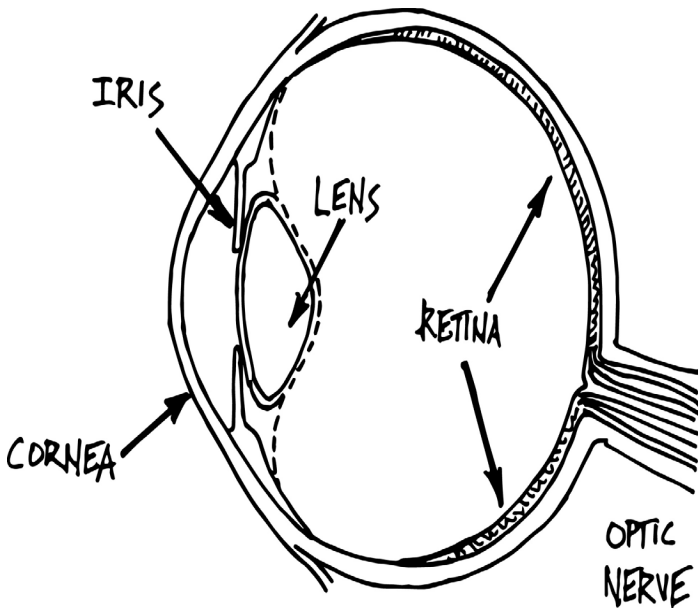


Figure 18.5 **Physiology of the Human Eye**

AUDIOLOGY FRACTAL

You may have noticed that all of the 3BP analogies have been static. Figures 18.7 and 18.8 suggest a dynamic evolution for the human earlobe. They are two plots with slightly different primary mass values that suggest how the 3BP might coordinate the development of any given fractal level. As before, these are zero-velocity curves or closed, stable orbitals in the usual Three Body Problem.

I'm sure there are many more such physiology examples among the hundreds of stable orbits found in the 3BP. The point is that the Force we started off with at the zygote level (egg meets sperm) has come full circle to womb meets penis) has turned into a major, organizational, life-force geometry at the physiological, anatomical level. Wahoo!

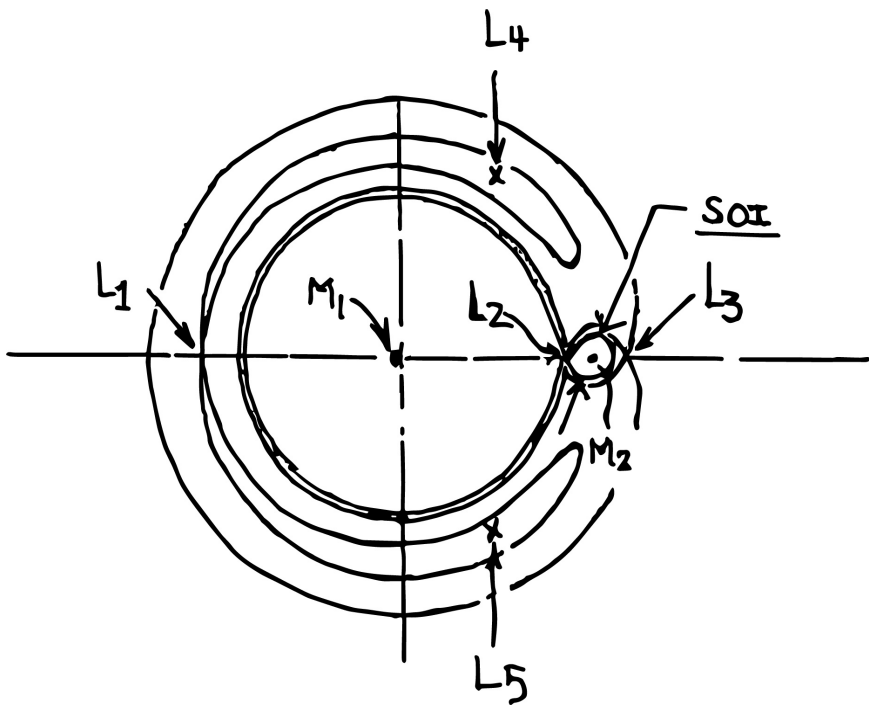


Figure 18.6 A 3BP Graphic and the Human Eye

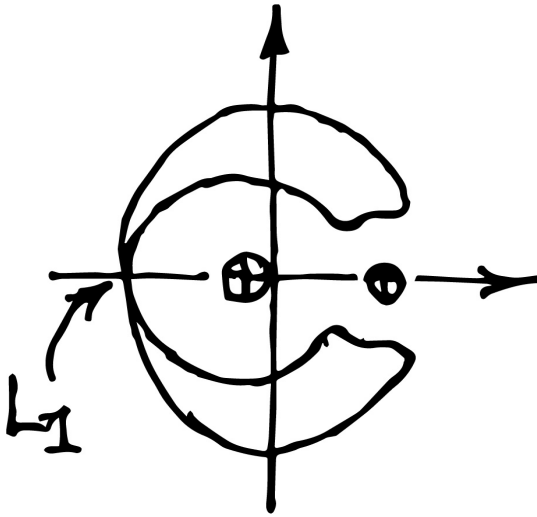


Figure 18.7 **An Early-Stage Human Earlobe**

What, you're offended that I dare allege a connection between the vaunted Force and sex? Hello. Jedi fighting Sith with phallic-symbol light swords? I bet gays get a real hard on watching the action of rod vs. rod in hot, sweaty mortal combat between two hunks of human specimens. Sure as hell doesn't do squat for me.

Hey, the only Jedi figure in all of Star Wars who was in love with a woman was Anakin Walker in the Phantom Menace, alias the future evil Darth Vader Sith Lord extraordinaire - and we're clearly cautioned (in the entirety of the Star Wars saga) against such blasphemy because a weakness for the flesh is destined to turn you to the dark side of the force. (No this is not homophobia or bigotry; it's just expressing the verifiable truth about Hollywood in the kind of dramatic terms they can understand.)

I realize that all the far-left liberal bigots in Hollywood are totally opposed to heterosexual relations but, Gooleee Sergeant Carter, isn't this going a little too far? Except, well, celestial mechanics IS the dark side, so perhaps our anthem should be that you can have your woman and have romantic love and sex, too.

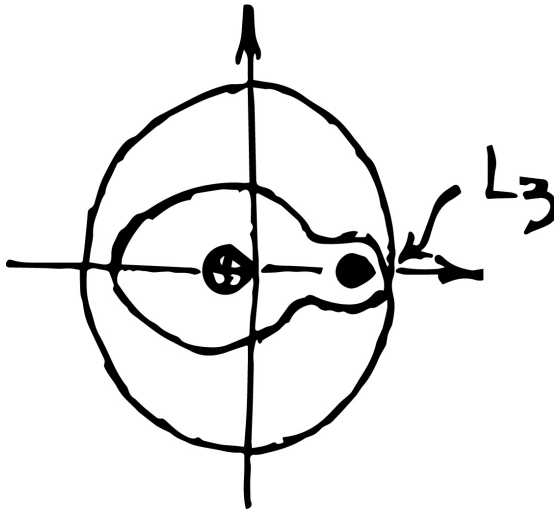


Figure 18.8 A Later-Stage Human Earlobe

Otherwise, if it's now quite clear by now, maybe I should state \ the obvious: the Force is stronger in females, very much so. Why? Just look how much more intimately intricate their connection to the 3BP it is than in male physiology. The nurture the Force from the womb onward and their physique is infused with the 3BP from top to bottom (literally). The problem is that Hollywood is under contract to Big Business to target their products to an exclusively young, male audience.

THE LIBERAL WAR ON SEXUALITY

Be that as it may, the almost universal use of the pill by women (masculinizing her hormones) has eliminated their edge in the Force. Although the nearly as frequent use of Rogaine by men (feminizing his hormones) has put the advantage back to the female. Then again, the way modern society forces women to be narcissistic and continuously attentive to appearances (fashions, silicone enhancements, cosmetics, bling, Facebook perfection,

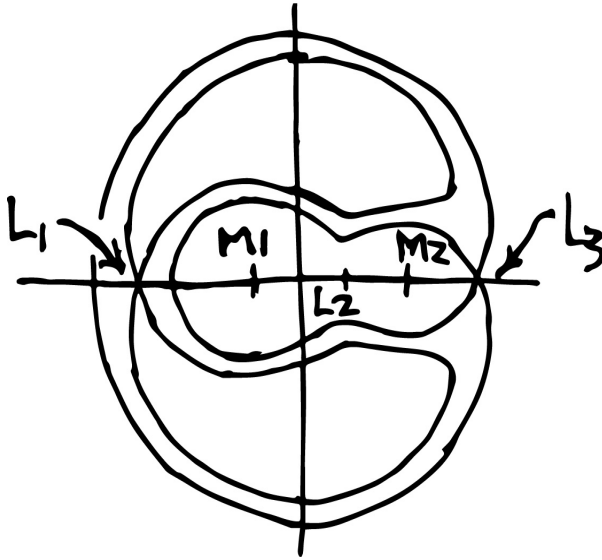


Figure 18.9 **The Human Face Zero Velocity Loop**

etc.) takes a bit notch out of their individuality. Yet, the same is happening with males now, thanks to decades of brainwashing of children from the cradle onward via TV, movies, videos, and music – now men are every bit as narcissistic as women, probably more so.

All of which virtually eliminates the 2nd cone in both sexes, which voids any possible access to the Force. The obesity epidemic and the collective hatred of exercise seals the doom of humanity, which is now well along its way to eliminating the top cone by the slow, relentless encroachment of “the collective” on the individual conscience.

It’s a Borg world now. Resistance is futile.

Actually, resistance is impossible, thanks to the virtual crucifixion of the human psyche by Big Business compliments to the ubiquity of the FAANG collective.

Part Three

Time

Deus ex Machina

Our journey into the human consciousness has taken a curious turn: the deeper we go, the more complicated the math we need to use. It's like drilling beneath the surface of the Earth. A post-hole digger will get you a couple of feet. Large diesel-driven augers that fit on the back of a flatbed truck can go a few hundred feet down to reach the water table. But you need a giant oil rig costing billions to sink a three-mile hole into the ground to extract oil or gas.

Those hydrocarbons aren't just sitting down there in a giant underground pool, either, but trapped in the porous rock structure. The petroleum comes out by virtue of surface pressure (or washed out using fracking techniques). It's a very complicated operation, drilling for oil, and it's getting more difficult all the time.

Similarly, stress isn't just resident in the body in pools of charged energy that you can get rid of quickly. Rather it's lodged in the tissues, and (perhaps) you even need to apply pressure to dislodge it. Think Army drill sergeant screaming at you to run faster, or gimme ten more pushups you lazy excuse for a human being.

The original tool in psychology was the iceberg theory. That's about as far as you can go, using statistical methods to model the mind: a post-hole digger. Analytical talk-methods have built an elaborate superstructure to get a little deeper, but not much better than a water-well auger.

One thing's for sure, however: there's definitely a lot of pressure built up down in your psyche. We may not be able to vent it in a controlled burn to use it as a Force to power the body, but it

definitely improves the mental health if these stressors can be gotten out of the psyche.

Psychology as we know it definitely has its limits. All the really bad mental illnesses can only be treated by “fracking” the psyche with hash chemicals, often just powerful tranquilizers. Otherwise, all the worlds religions wouldn’t be alive and well, trying desperately to cure the mental issues people have that psychology either ignores or can’t treat, or have simply taken off the list of mental illnesses.

Narcissism almost didn’t make it into the Diagnostic and Statistical Manual, 5th edition. It’s so common, what’s the use in labeling everybody narcissistic?

FRACKING MATH

As our own exploration drilling operation progressed, our mathematical drilling rig has become more sophisticated. From the simplistic iceberg, we proposed a conic section model: a water-well setup that got us a little deeper, with a little more precision (hopefully). We elaborated on this into a robust orbital theory where the conic shapes became trajectories, and the static psyche was put in motion under the duress of various life circumstances. We still bottomed out fairly shallow, at the apex of our upward-pointing conic.

Then we looked across the landscape and saw church spires in the distance, and like Don Quixote charging at a windmill, we set our sights on the soaring superstructure of churches, representing the powerful drilling rig we need to get deeper into the consciousness, into the soul. We know there are vast reservoirs of stress, anxiety, guilt, and unresolved issues buried deep down inside the soul, but we don’t have the conceptual tools to build ourselves a fancy drilling rig to go any further.

We can either continue our quest or just follow the example of modern psychology, and back off on some of the moral pillars of civilization. Teenage sexuality has long since gone the way of

prohibitions. Now it's childhood sexuality. Divorce is almost a virtue. Heterosexuality is ridiculed. Extramarital sex is a lifestyle choice. Incest is a tangible danger in any soap opera or telenovela these days, oftentimes not discovered until after the fact. Anything Hollywood can do to create conflict, drama, anxiety – and violating the commandments are just the ticket.

How many trillions of sins has the Church forgiven for the 11 million illegal immigrants in the United States? Every day they lie to get driver's licenses, bank accounts, insurance, and a hundred other things. They do so year after year, and if they couldn't go in and confess, they'd be psychological vegetables by now. And the Church never assigns as penance for their sins to pay their taxes, to pay for their child's education and healthcare – sins against whole governments, entire cultures.

What's the solution? To forgive all their trespasses (and those of all the businesses who have gotten rich off their cheap labor) and reward them with citizenship? Now the liberals want open borders.

Like, there are already over seven million unfilled jobs in America – the most ever - and nobody qualified to fill them, and we're going to welcome millions more who have even fewer qualifications still?

THE FORGIVENESS OF SINS

We're standing where John the Baptist and Jesus Christ were two millennia ago: hundreds of years and thousands of moral transgressions had built up a mighty load on the subconscious of the Jewish faithful. Only the wealthy could afford the animal sacrifices and penalties to unburden their conscience at the Temple sanctuary.

Then John the Baptist came up with the brilliant idea to just forgive everybody their sins for free. All you needed was to submit to the Will of God and take a plunge in the waters of Galilee. The results were literally miraculous: Jesus' ministry is a clear testament to that.

Since then, the Church has evolved, partly by design and partly by trial and error, into a complicated infrastructure that has relieved people of the burdens placed upon them by civilization, in complying with a steadily increasing number of new laws, morals, virtues, and ethical commandments. However, just like psychology works better when you have some concept of God or the divine or some kind of higher power, giving your psyche a robust disciplinary tool to self-correct itself; religion works because the idea of God is sufficient to coerce the soul into giving up of all those pent-up transgressions.

Science has changed all that. It's secularized religion, and popular culture has diminished God into a kind, gentle, loving entity that gives you practically everything you ask for. Not the sort of thunder-bolt earthquake figure wielding 12-inch nails needed to wedge all those the sins out of your subconscious mind.

We need a powerful new math to dig deeper into our conic model, into the 2nd, lower cone; to unleash all those buried issues and stressors; and well, if the infrastructure remains intact, we can use it to store Force that can be accessed in a time of need. So athletes can burn through that last 100 meters, so scientists can penetrate the veil of probability to pose new theories and Laws of nature, so artists of every ilk can create new works even though all the easy melodies, themes, and subjects have already been duplicated and reduced to cliché status.

AI VERSUS JOBS

The unspoken blue-collar folks need their own Force as well, now that robots and artificial intelligence are taking over all the easy, mundane jobs; and the only genuinely stable jobs are far beyond even a high school education.

The unwashed masses can riot all they want, vote themselves a higher minimum wage, or even emigrate to a whole new country altogether; that doesn't change the fact that if you don't have the skills or the education, you're not going to get a job, period.

Doh! Except they already have their secular solution: narcotics, caffeine, alcohol, tobacco, marijuana, violence, sex, gangs, sexual perversion; take your choice, choose one or choose them all – Hollywood’s fav smorgasbord access to the subconscious that they teach all the rest of the world by example. Hurray, no denial, no penance, no humility; no dieting or exercise, either. Hollywood celebrities are your gods. You don’t have to be good or righteous, kind or decent, honorable or noble; all you need to be is - narcissistic.

Don’t believe? Just google your virtual idols, the FAANG gang; your way through the Pearly Gates is through conspicuous consumption and rank materialism. Oh, wow – that means I’m already there. Awesome, momma.

For those of you who were thinking of a slightly more conservative, old-school approach to spiritual fulfillment, we continue our quest with a whole new mathematics model; well, the same model, but a new math: complex analysis. For our mathematically-challenged audience, this probably seems like we have one foot in the grave and another on a banana peel. Perhaps a few diagrams and some verbiage will help to calm your trepidation.

SPIRITUALITY & ORBITS

Earlier we mentioned that a low-eccentricity ellipse is just a circle plus a sinusoidal wave (the sine wave adds to the circle on the half of the circle along the + x-axis, and subtracts from the circle otherwise; just as the sine wave is half positive and half negative). Another way to get to a low-eccentricity ellipse better exemplifies our current position between the psyche and the soul, reference Figure 19.1

In orbital mechanics, the mean anomaly is the angle that the s/c makes from the positive x-axis, which defines its position on the elliptical trajectory. In Figure 18.1 you can see that the central planet is situated at the main focus. Once the s/c reaches the + y-axis if you switch the vector to the empty focus, you’ll trace out the left half of the ellipse.

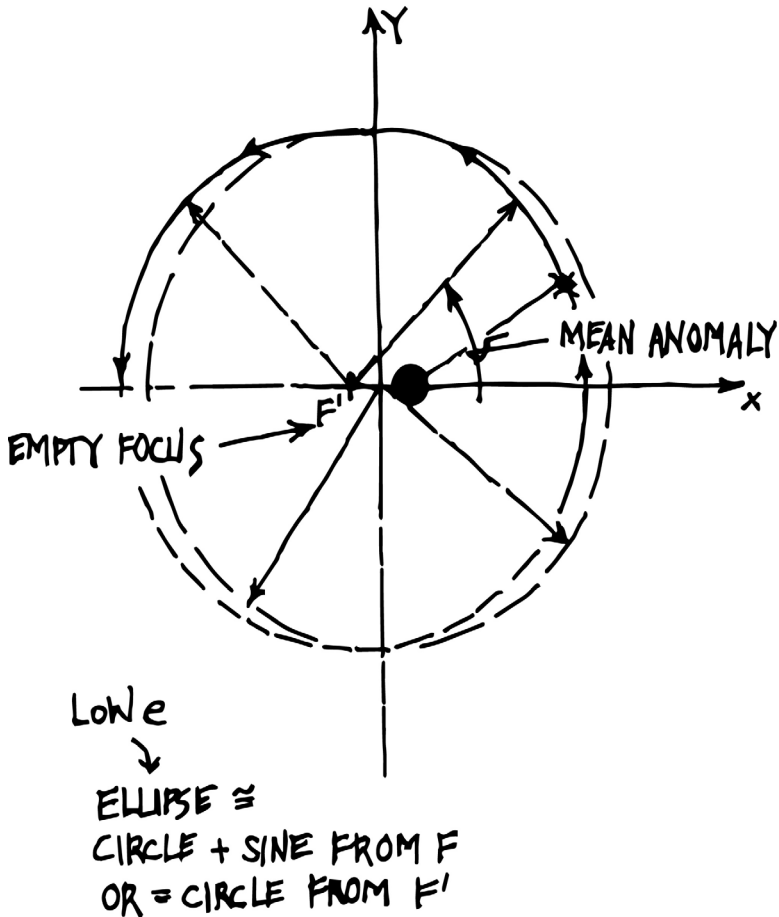


Figure 19.1 Foci vs. a Low Eccentricity Ellipse

If you think of Figure 19.1 as looking from above at our conic psyche model, then every major force that throws the psyche off balance moves your center of mass slightly off center, transforming your nice circular (we always try to have everything nice and balanced) perspective into a low-eccentricity ellipse. Depending on where this force comes from, the major (long) axis of the ellipse can change, but it always points in the direction of the force acting on it.

If you have a weak $\mathbf{z}$ cone, which we tentatively call the soul, then a really strong force can alter the whole cone, changing the orientation of the $\mathbf{z}$ -axis (the centerline of the cone, perpendicular to the $\mathbf{x}$ - and $\mathbf{y}$ -coordinate axes in Figure 19.1). That's not what you want at all. You want a deep "keel" that balances the dynamical system back to unity after every jolt, no matter how strong. (This balancing cone is how they represent orientations in astrodynamics, which has a full body of math supporting all the angles and forces.)

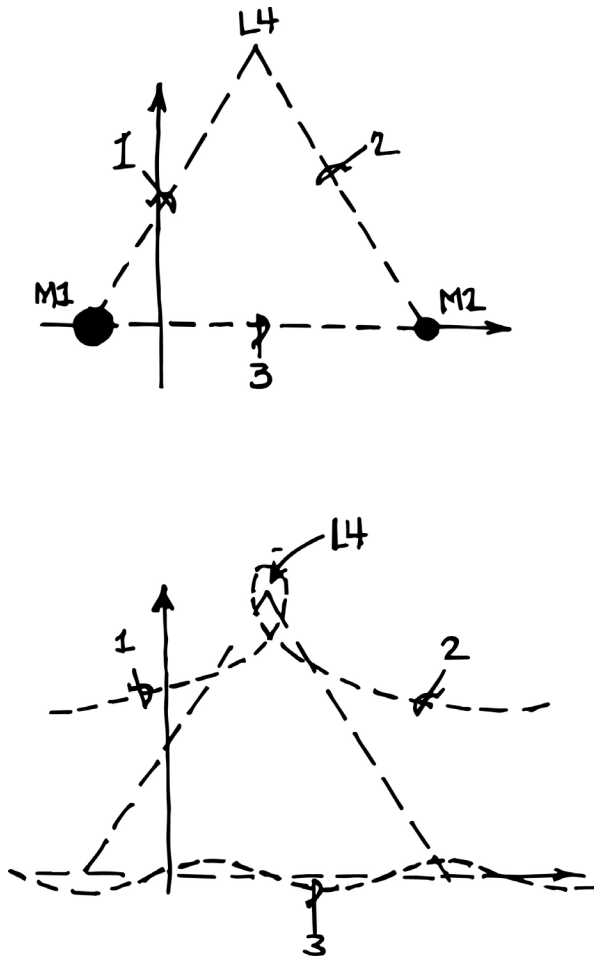


Figure 19.2 $\mathbf{L}_4$ in Rotating and Non-Rotating Reference Frames

Recall the equilateral Lagrange Points in the 3BP. Asteroids orbit L_4 and L_5 in the Sun-Jupiter 3BP; they orbit these points because there are many perturbing forces (mostly from the massive outer planets but also from other asteroids) that act upon the Trojans or Apollo Asteroids, but these halo orbits are still very stable. Absent these perturbing forces they would just stay put at L_4 or L_5 ; but even with external forces, they still remain stable.

We're accustomed to seeing the Lagrange Points in rotating coordinates (the top of Figure 19.2) where they really do look quite stable. However, in real life, in non-rotating coordinates, the path of these asteroids is quite complicated. They don't move in a nice, smooth arc around barycenter like Jupiter, but dance a loop around the stability point.

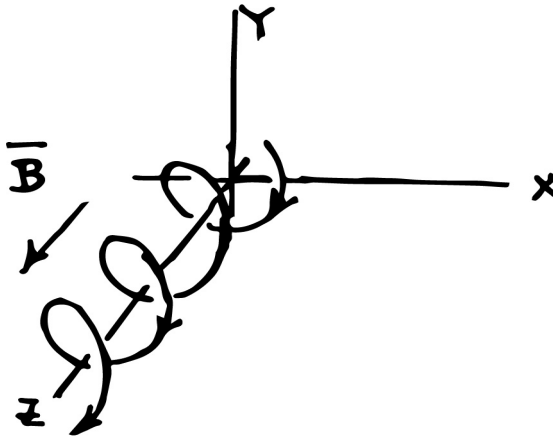


Figure 19.3 **Non-Rotating Coordinates**

In mathematical analysis, there is a famous law attributed to Joseph Fourier, that any kind of curve can be reproduced precisely (even square- or triangle-shaped curves) by an infinite sum of sine and cosine functions. In our case, we see the reverse: sinusoidal variations sum up into a regular pattern of motion around the Lagrange point. (Fourier analysis was initially developed to study orbital motions.)

FOURIER ANALYSIS

The power of Fourier Series (as these infinite sums are called) is that it takes a very complicated pattern and represents it as a sum of much simpler, sinusoidal curves. Often, you don't need the whole infinite series, but the first few terms are quite accurate; such as our approximation of the low-eccentricity ellipse. (Remember how we can get an accurate sine or cosine value with just a few terms of their infinite series.) This simplification by Fourier analysis is like taking a musical melody involving many instruments and reducing all that music down to notes on a sheet of music.

In our case, we see that the motion of the Apollo and Trojan asteroids looks very complicated in rotating coordinates, but a lot simpler in non-rotating coordinates, especially when we realize that this motion is around fixed points in the Sun-Jupiter 3BP.

What we've done is to transform our system from the time domain into the frequency domain. We've been doing just that all along when we hold the two primary masses fixed on the x-axis and look at the motion of the 3rd body relative to this arrangement. Consequently, the zero-velocity curves are in the frequency domain; we know that the free-return orbit, for example, rotates with the second, less massive body: the figure-8 rotates in real space coordinates.

TIME VERSUS FREQUENCY DOMAIN

In complex analysis there's a mathematical shorthand for all of this using exponential notation, such that the rotating phasor in Figure 19.4a projects into a sinusoidal wave in the time domain; whereby you can also use phasors to represent the position of the Lagrange Points as in the bottom half of the figure.

Presenting data in the frequency domain is very revealing. Consider Figure 19.5 which is a plot of global warming temperatures over the last 100 years, showing a steady trend versus the norm circa 1950 (y-axis goes from -1° F to $+2^{\circ}$ F).

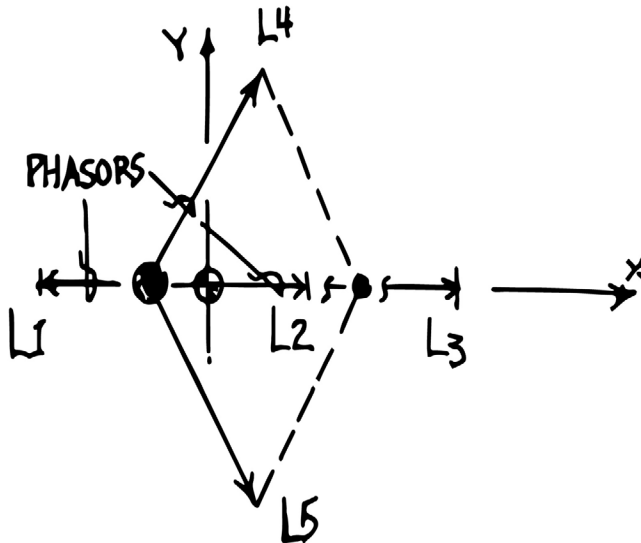
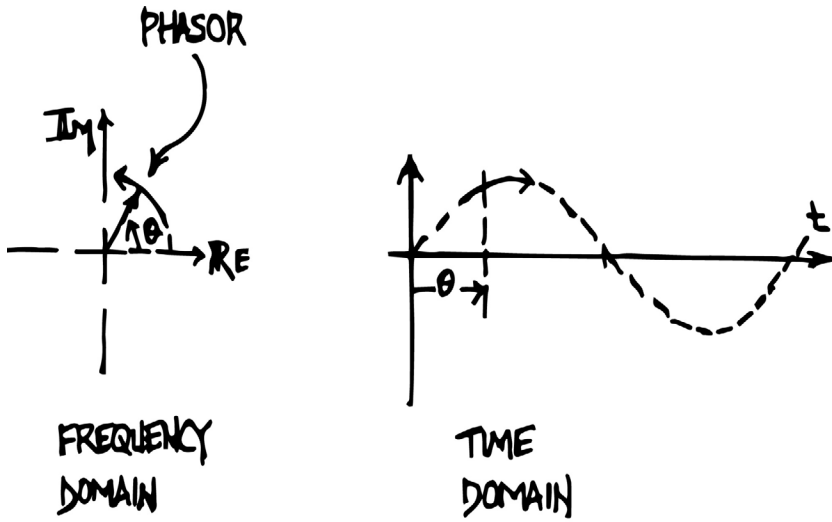


Figure 19.4 **From the Time to the Frequency Domain**

If you looked at this data real time, even going fast-forward, you would hardly notice any correlation. However, if you look at it

in the frequency domain, it's quite a conclusive match. Which is to say that global-warming deniers look at the situation in real time, and they can always say last winter was extremely cold, how can there be global warming? We know that's a load of crap because weather is short-term and climate is long-term; time-domain vs. frequency domain. Morons vs. realists.

We seem to be implying, hereby, that issues with the soul are more long-term than the short-term dramas that cause problems with the psyche. That's why you can often overcome a phobia or personality disorder in a few visits (with lots of practice, of course) to the doctor's couch; but spiritual issues like evil, corruption, or moral turpitude are long-term habits that rot your soul away; and for which the antidote (if not the remedy after the fact) is regular visits to church and/or church functions, plus regular prayer and contemplation.

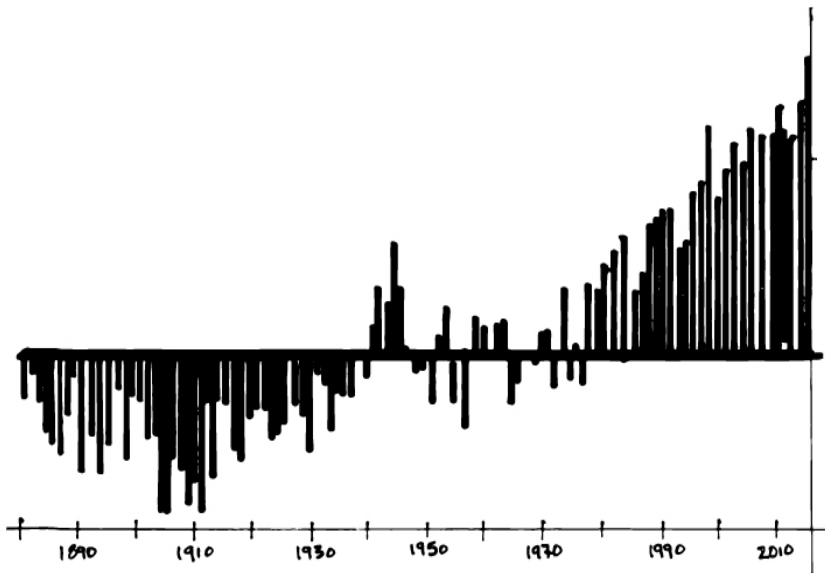


Figure 19.5 Global Land and Ocean Temperature Departure from 20th Century Average, January-October

Bottom line, we're just where we need to be in our Big Theory. However indirectly, we've arrived at the intersection between the real and the imaginary, the grave and the banana peel; and we look into the abyss and see the abstract complex plane – but when we realize this new math place is really just a different way of looking at things; well, isn't that what spirituality is in the first place, a different perspective on life – one that subtracts out all the daily dilemmas and leaves the Big Questions? So, yes, complex analysis is the next logical step in our journey of discovery.

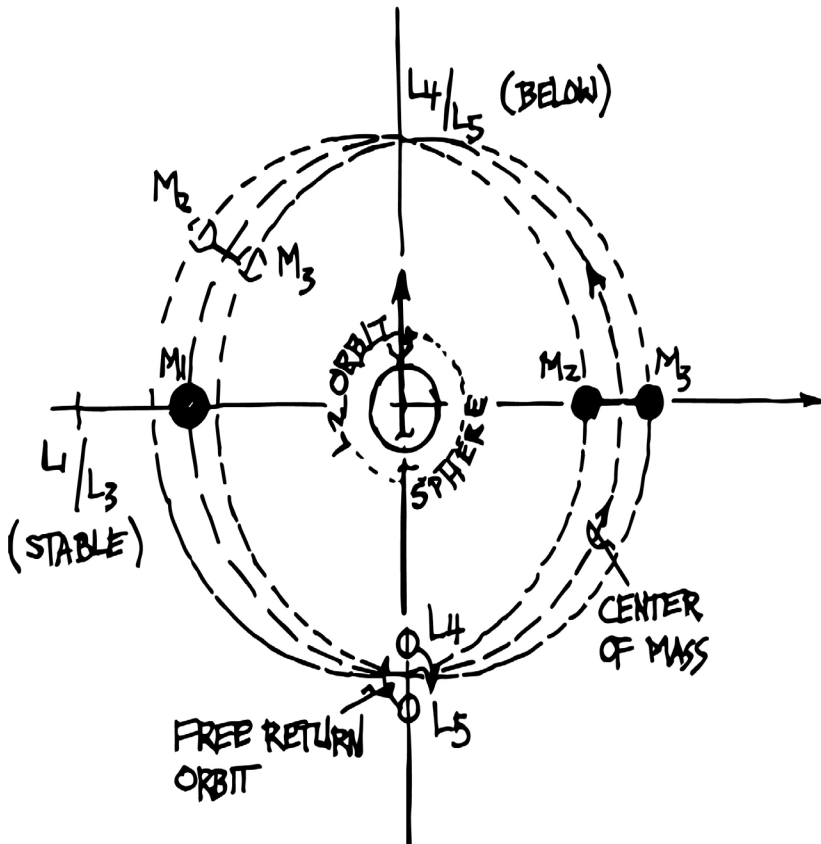


Figure 19.6 Earth's Equatorial Bulge as a 4BP

The Invariant Plane

Complex analysis is complicated, even for math gurus. The time domain is like eating. The frequency domain where complex analysis lives is like dieting: hard work and precious few rewards. So instead of going directly into this mathematical quagmire, we'll have a little fun with celestial mechanics and what we'll call the Ten Body Problem: the sun + nine planets, alias our solar system.

Our method will be as before, to first introduce the orbital theory and then explore its facsimile in our ongoing psychological model. With the psyche model, we had a starting point for our graphics, the iceberg theory. There is no such model for the soul; well, we saw a diagram from the Kabbalah, but it's a combination of the psyche, the soul, the spirit, and many other abstractions. We've already set up the psyche as the top cone, and are moving forward on the assumption that the soul resides in the bottom cone.

As far as soul models go, in our new fractal way of thinking astrology is about the closest approximation out there. Over half of young people consider astrology as a science (nobody thinks of religion as a science). Other than the astronomy calculations they do to determine the position of the moon and planets on your date and hour of birth (we like orbits here, which is a plus), it's all kind of intuition on the part of the reading. Which isn't quite as scientific as psychology diagnoses, but the soul isn't as scientific as the psyche either, and it's always been accessed via intuition, meditation, or "divine providence."

All the complicated maneuvers we've done with orbits makes

astrology seem somewhat simplistic, like a string of baubles hanging above a toddler's crib.

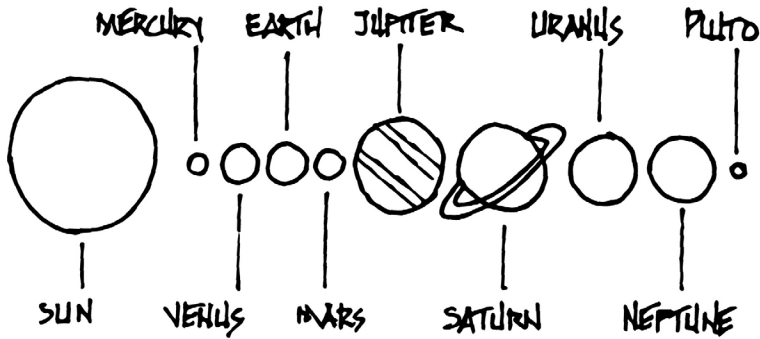


Figure 20.1 The Solar System Family

We started our psyche model from the cradle, even before the crib actually; that worked out okay. So, we might as well follow suit with the soul model. At this point, all we need to assume is that, like the moon's orbital period (27 days) and the average woman's mensuration cycle (21 to 35 days), the heavenly bodies have a subtle influence upon the human soul. Whereas the lunar force is known, as an inverse-square gravity, the astrology force is at best an inverse-square geometry, if only because astrologers base their uncanny insights on a careful calculation of the actual position of the moon and planets.

THE INVERSE PROBLEM OF CELESTIAL MECHANICS

A formal description of solar system dynamics is as an inverse problem. That is, given a huge body of data on a dynamical system, you sift through it all and try to find some symmetry to it all that you can represent with an equation, thus simplifying the data and hopefully leading to a better understanding thereof.

Our primitive ancestors stared at the slow motion of the planets across the landscape of the night sky for a hundred thousand years, trying to figure out the dim little lights that moved a lot faster than all the other objects (other than the moon, that is; which they simply worshiped, and so they didn't have to figure it out at all, like with the Sun).

Ptolemy Soter in ancient Egypt was the first person to model the motion of the planets. Logically, his model put the Earth at the middle of the coordinate system, and this resulted in a somewhat complicated pattern for planets. Copernicus put the sun at the center of these motions and greatly simplified the model. Kepler looked even closer at the data, gathered by Tycho Brahe, and came up with three laws that explained the movement of the planets.

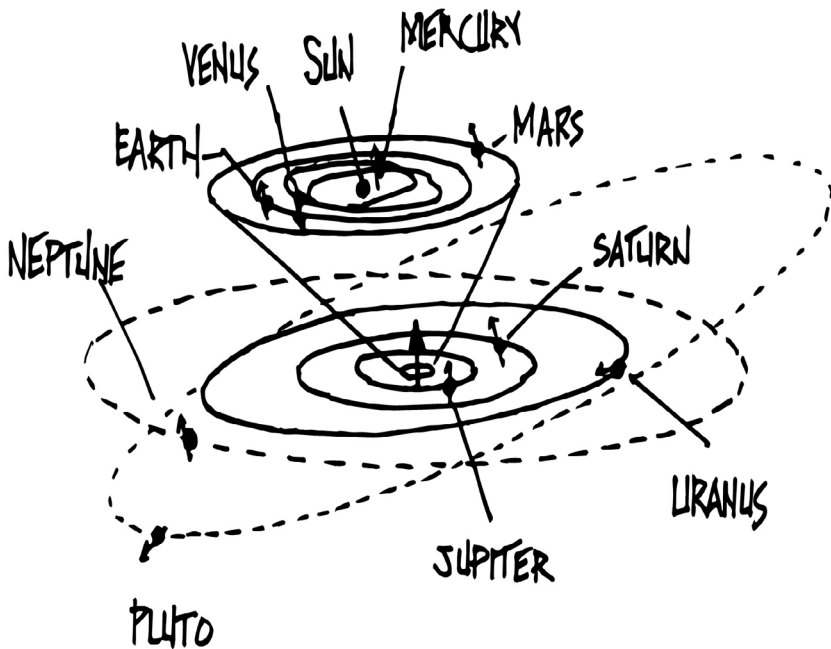


Figure 20.2 **The Copernican Solar System**

Astronomers don't really think of the solar system as a dynamical problem per se. They don't even try to explain why the eccentricity of the planets orbits is as it is; their axial inclination, rate of rotation, and so forth (collectively these are called the orbital elements). Workers in celestial mechanics call it the Ten Body Problem, the sun + nine planets and try to explain all the orbital elements just like we have with all facets of the 3BP and its siblings. And so, figuring that if the 3BP is so much more complicated than the 2BP, then the 10BP must be astronomically complicated; well, there's this institutional momentum in celestial mechanics to take on the 10BP as kind of the grandmaster's ultimate challenge.

THE TITUS-BODE LAW

Actually, astronomers did think about the 10BP, for a brief time; when their science was young, and they were still finding new planets. Their contribution to the 10BP is known as the Titus-Bode Law. This relationship was used to find Ceres (in the asteroid belt) and Uranus. It's a simple algorithm that states that the distance of each planet from the sun in astronomical units according to the function.

$$(20.1) \quad A = 4 + x$$

where $x = 0, 3, 6, 12, 24, 48$

There is no other explanation for the planets' orbital distances, and this law is so straightforward as to fulfill the golden rule for scientific explanations of complicated phenomena: simplicity. So let's, for argument's sake, think of it as a real physical law. Call it a subtle aspect of some inverse-squared geometry or just a projection of our fractal model upon a higher-order scale; it's all we have at this point to spur our investigation onward.

Now, our current astronomy is still somewhat geocentric (Earth-centered) because the motions of all the planets are studied relative to the ecliptic, Earth's orbital plane. That makes sense for astronomers because all their observations are from observatories on Earth or orbiting Earth. But for celestial mechanics and the abstract mathematical analysis of dynamical motion an Earth-centric system less than satisfactory.

After Copernicus published his heliocentric model, which has the planets in nearly circular orbits around the Sun; there was an explosion in our understanding of the cosmos. What would happen if our current geocentric model used in astronomy was transferred to a new heliocentric plane? Would that offer a new understanding of orbital motion? We've done many such transformations so far, and they've all been interesting and insightful, so let's apply our techniques to the 10BP.

A COORDINATE TRANSFORMATION

We first pose the problem in mathematical terms: Is there a transformation (i.e., into a new plane) that minimizes the out-of-plane motion observed (exaggerated as drawn) in Figure 12.2? That is, the $2/3/N$ Body Problems are all much, much simpler when all the motion is in the same plane. If we can regularize Figure 12.2 so that all the planets reside in a much more coplanar system, the mathematics might also be greatly simplified, as we've seen with the circular restricted 3BP.

That is, relative to this new celestial plane, the planets are just in elliptical orbits with the sun at one focus, but each planet is in a zero-velocity curve around its own stability point.

What are our criteria for a successful transformation? This new plane should allow a simpler, more intuitive way to study the motion of the planets. It should also permit greater insight into orbital motion in the solar system than our current theory that's based on the ecliptic.

The general idea is to find a special coordinate system about which the motions of the planets is symmetric. We approach it mathematically as an inverse problem, where you take a collection of data points (in this case the known positions of the planets) and try to find a model to explain their behavior.

Think of this method as taking Tycho Brahe's raw astronomical data and trying to figure out the motion of the planets. We first need to establish a reasonable coordinate system, and logically we crunch the 3D data points and find an average in three dimensions. That is, if you take raw data in two dimensions and find the average you end up with two perpendicular axes; if the data is in three dimensions you look for an average that ideally will be a flat plane.

DATA REDUCTION FORMULA

So, I analyzed the raw data for the positions of the planets in their orbits according to the following sequence of mathematical operations:

1. The position of each planet at 0° heliocentric longitude is calculated from the orbital elements for the current epoch
2. A linear least squares fit is made of the nine data points from (1), thereby defining a line with slope and intercept that bests fits the data
3. This process (1,2) is repeated at 10° increments through 360° of longitude

Figure 20.3 is a plot of the slope of these 36 lines, forming a regular sinusoid. If the intercept for these lines was zero, this would define a perfectly flat plane in 3D space, exactly what we are looking for. Figure 20.4 is a plot of the intercept at the origin (the sun), approximately a sinusoid. We'll ignore this variation for the moment because it's a tiny variation (relative to the scale

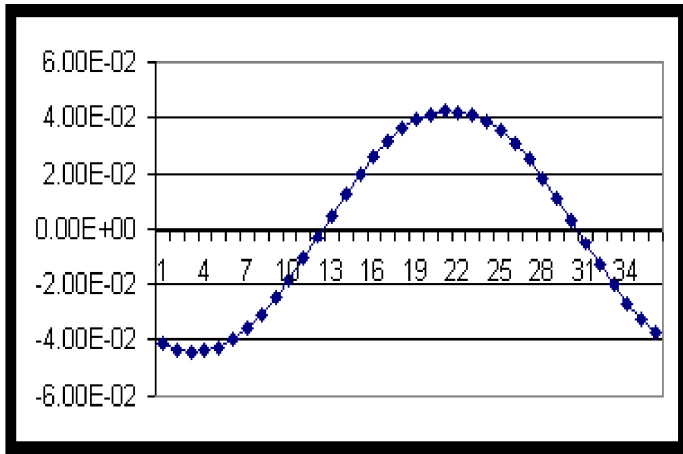


Figure 20.3 **Slope for the Invariant Plane**

we're working at) that will affect at most only the orbit of Mercury. From Venus on out, all the planets will see just a nice, flat plane.

Now to calculate the positions of the planets with respect to this new symmetric plane. If this coordinate transformation from the traditional ecliptic plane is going to be useful, it must prove to be a better model.

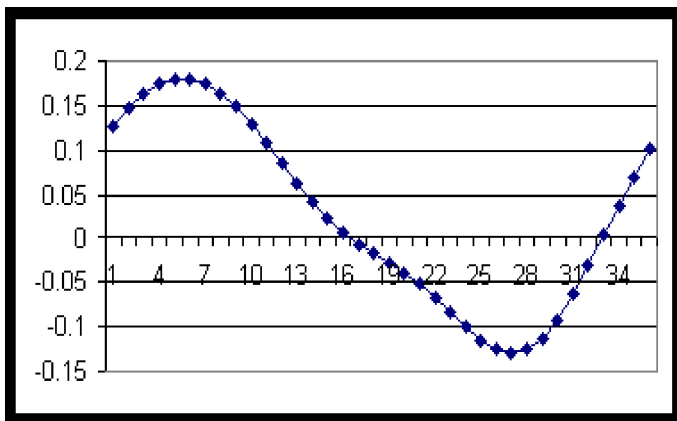


Figure 20.4 **Intercept for the Invariant Plane**

Figure 20.5 shows the motion of all nine planets versus this new coordinate plane. Observe that all the planets (except Mercury, Venus, and Pluto) are sinusoids exactly in phase; that is, with the same leading phase angle (they each start at the same point on the curve). Venus and Pluto are exactly 90° out of phase (the same relationship between sine and cosine), also with the same leading phase angle.

(Note: The source code used to do the least-squares curve fitting and to generate these three graphs is included in an appendix.) Venus and Pluto exhibit retrograde rotation (they rotate on their axis opposite to the direction of all the other planets), which may explain their different leading phase angle.

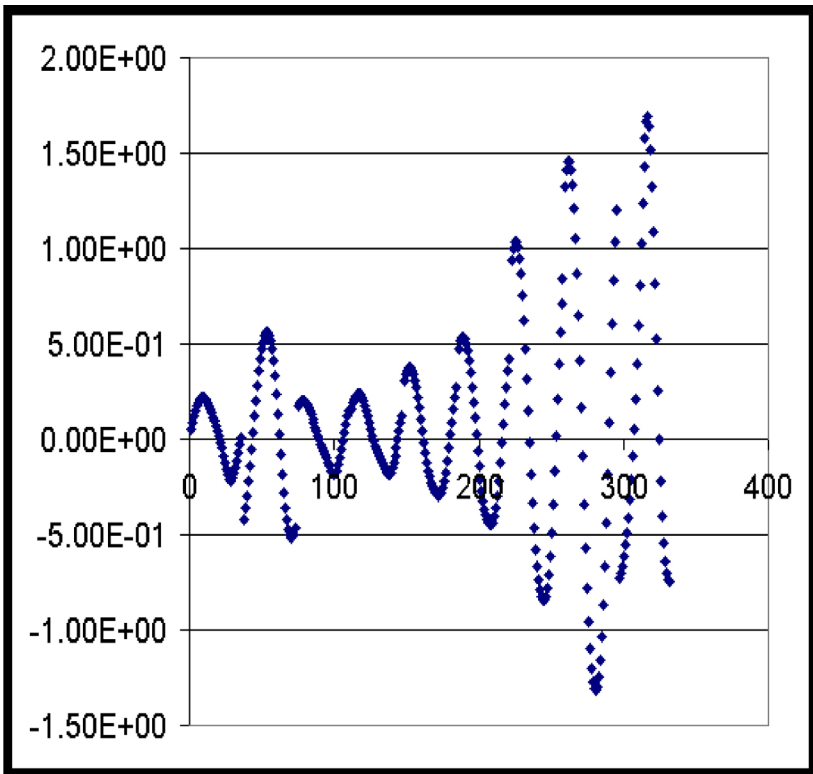


Figure 20.5 **Y-distance versus the Invariant Plane**

Mercury's orbit, which already has some peculiar eccentricities in the precession of its orbit, is closest to barycenter and the variable intercept; taking this into account could put it in the same phase as the other planets. Moreover, even this crude evaluation suggests a ready explanation for (1) the bending of light by the sun and (2) the anomalies in Mercury's orbit.

Figure 20.6 looks at the hard numbers to find some kind of symmetry. In the figure (2) is inclination to the ecliptic.

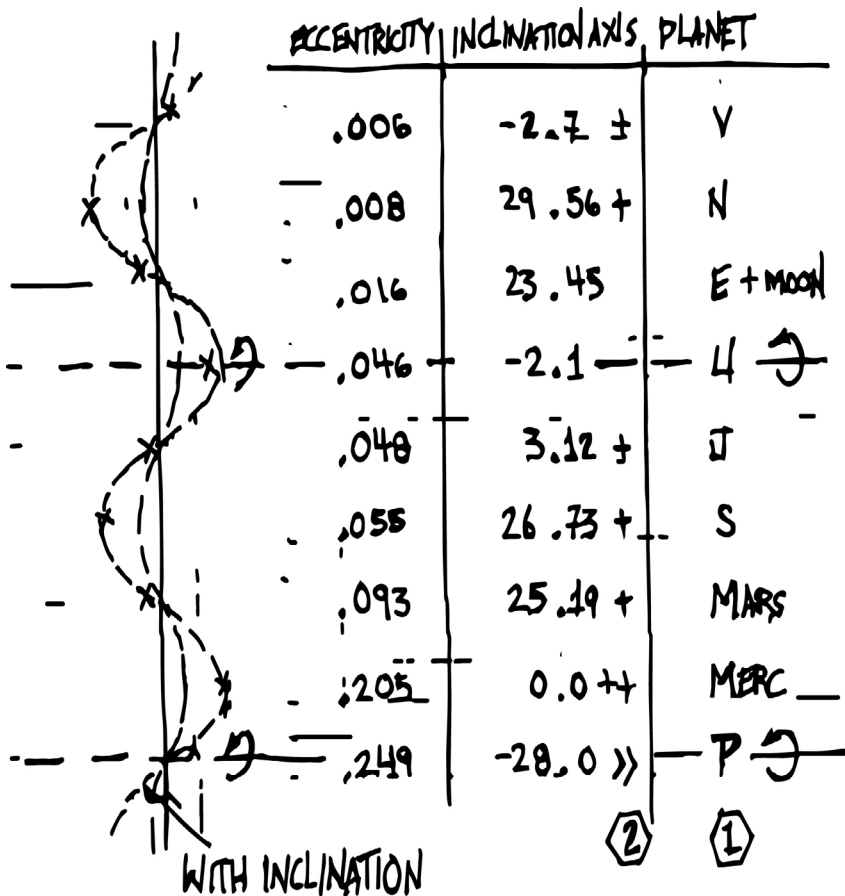


Figure 20.6 The Inclination of the Planets Axis of Rotation

A GEOMETRIC DERIVATION OF RELATIVITY

Figure 20.7 is a sketch of the behavior of the invariant plane near the origin of the solar system, in the vicinity of the sun. This first-approximation graphic suggests the presence of forces sufficient to cause the precession of Mercury's orbit, as well as a Relativistic "distortion," to cause the bending of light as observed during eclipses. These are two phenomena that are not explained by classical mechanics; only Relativity explains them.

So, our basic transformation to a new, symmetrical reference plane has paid dividends already: it suggests a non-Relativistic explanation for two of the most important "proofs" for the Theory of Relativity. This is undoubtedly a whole lot easier and more intuitive than the immensely complicated tensor calculus (which is as much more difficult than calculus as calculus is to arithmetic) needed to work with Relativity theory.

As long as we're into Relativity here, we might as well go for broke. Celestial mechanics has always been at odds with Relativity theory. We believe there are perfectly rational explanations for the Relativity phenomena that don't require abstract mathematics and the warping of the space-time continuum. We prefer a simple explanation, like offered here: the heliocentric plane of reference is just distorted a bit around the sun because the flat plane fitted to the outer planets has a little disruption in its geometry near the origin (which isn't the Sun, by the way, but barycenter).

BENDING OF LIGHT BY THE SUN

You can almost do the standard gravity fly-by calculations of a ray of light passing the sun: Light has a dual mass-energy nature. If you assume light becomes a photon (mass) as it gets closer to the sun, then the gravity of the sun will bend that photon exactly half of the amount predicted by Relativity. So, theoretically, our little geometric anomaly here only needs to cause the other half of the angle to get the precise angle observed. Or, you can just cite the

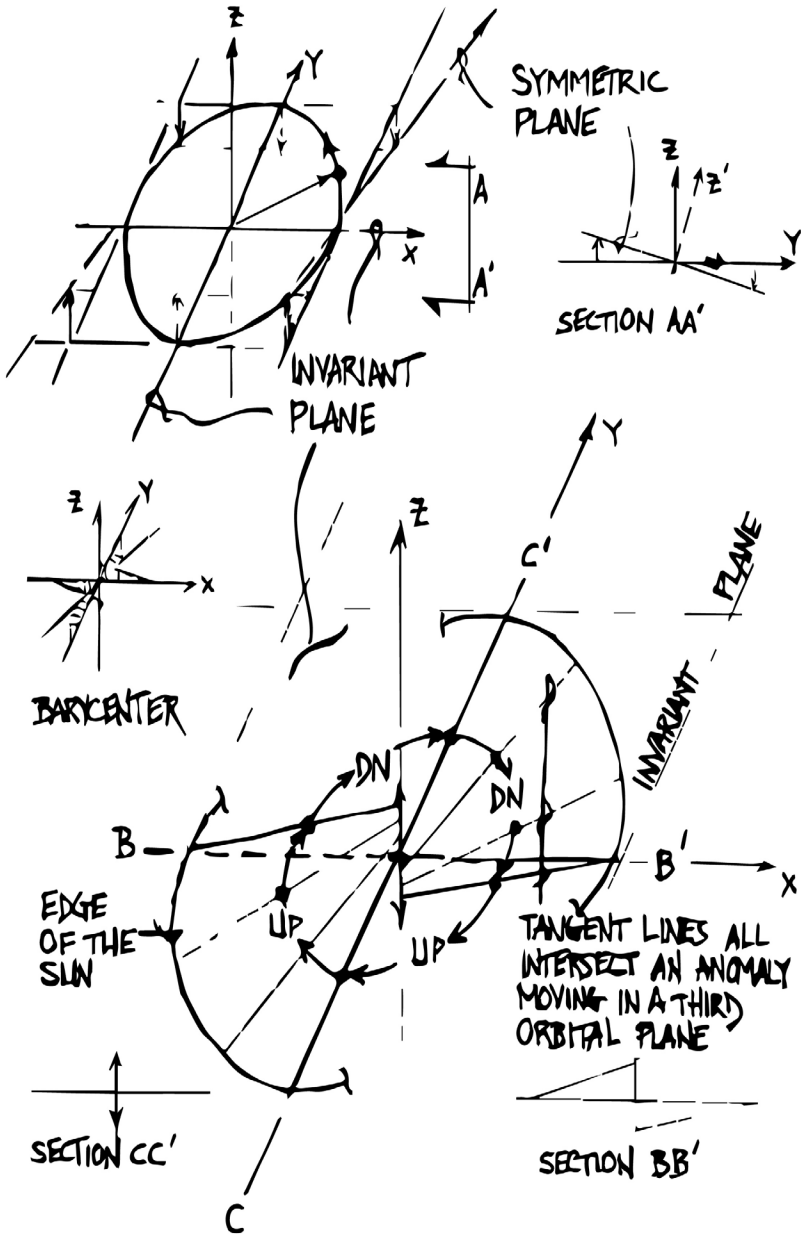


Figure 20.7 A Geometric Derivation of Relativity

ubiquity of the double-helix in nature (like, only the DNA of all plants and animals), and say that two photons intertwine as they approach the sun, and the total angle equals precisely as observed.

Our geometric distortion also suggests a force (or geometry) that causes the precession of Mercury's perihelion (one of its orbital elements), which was the second most important unknown from the history classical (Newtonian) mechanics that was explained by Relativity.

THE RELATIVITY CONSTANT

A third "proof" is the so-called Relativity constant in the determination of satellite orbits around Earth. Basically, they model the gravity field of the Earth using a 100-by-100 matrix, then calculate the path of the satellite using a computer simulation with this huge matrix representing Earth, and compare the results of this massively complex calculation to what is actually observed in a real satellite. The difference in the two values is called the Relativity constant. Notice that this gravity matrix has 10,000 variables, typically derivatives, all of which must be approximated numerically. Many of these variables have a sine or cosine function (or other such "constant"), in one format or another; which we know are really infinite sums and never exact. Crunch 10,000 such approximations and what's left is noise, numerical garbage, not ironclad proof of Relativity.

In other words, you can't just write off our symmetric plane theory here because it clashes with Relativity. Or if you really, truly insist on doing so, celestial mechanics has an answer to that objection too.

POINCARÉ'S RELATIVITY

The original Theory of Relativity wasn't derived by Einstein but by a worker in celestial mechanics, Henri Poincaré, who published his work 20 years before Einstein. Poincaré's Relativity was based

on an aether, Einstein's on electromagnetic concepts. Which only makes people laugh, because aether is something from – well, astrology, fantasy films, and magical incantations.

Not hardly. You've learned about the Many Body Problem, which studies the forces on a small n th body that is influenced by Many primaries (as in tens, hundreds, even thousands). The net result of all these forces is the exact same as static flow in fluid dynamics. And a very thin fluid is an aether.

Poincare's Relativity, in proving that the Relativity phenomena only exist in the Many Body Problem, eliminates the possibility of the space-time distortion existing in the Sun-light ray Two Body Problem. So, if Relativity no longer explains that phenomenon, then what? Our little old "inverse squared geometry" is what.

A String Theory

If you hadn't already noticed, as our psyche/soul models became more and more intricate, explaining increasingly complex things, the scale of our model also increased: from cones to patched conic orbitals to the whole solar system. It's like we need bigger and bigger telescopes to see more details of the cosmos. Our Big Theory model of the solar system even got into Relativity, which is as about as large a scale as you can get; except that we're now in the realm of a model for the soul and; well, everything is relative in spirituality, isn't it?

Otherwise, we have a few more paragraphs of solid math – all of our BPs required a certain level of math or at least math comprehension, and the 10BP is no different. That's the only reason why our models are the least bit interesting, because we're building the infrastructure for something that's entirely abstract out of thin air (or perhaps aether), and if we didn't reference it all down to solid, verifiable math you're doing Kabbala abstractions out the wazoo. Been there, done that already.

So, we have a new symmetric plane for the 10BP. It passed our qualification criteria by suggesting several interesting new insights into solar system dynamics. We were looking for a perfectly flat plane; but, then again, the distortion at the sun has some intriguing possibilities, which may even turn into proofs.

Recall that we also had a flat plane in our psyche model. It was a handy idea, which we used to represent the sum total of outside influence upon our psyche – kind of a 2D version of the Many Body Problem, i.e., reducing a great many forces down to a

simple, encompassing entity. Going forward on the premise that the soul infrastructure might be a mirror image of the psyche (just like the double cones); if there was a plane in one, there should be a plane in the other.

We can further suppose that the soul's plane connects the soul to the greater unconsciousness of your community, your world, the cosmos. The deeper this plane resides in your consciousness, the broader the scope of your awareness: Mysticism 101. Or perhaps just astrology, which we all know is a science; and somehow it connects each human being to the heavenly orbits of the solar system.

THE SOUL DYNAMIC

So the philosophy is all consistent. The fractal theory part works reasonably well. We're still very much in the domain of inverse-square gravity which is our Force *du jour*. We had inklings of an inverse-square geometry at a few odd-numbered fractal levels; and we see the same propensity here, in the distortion at barycenter. Everything is lining up pretty well from top-to-bottom.

Geometrically, our upper cone had a well-defined horizontal axis (the invariant focus, the centerline of the cone), which presumably extends downward as the centerline of the soul cone. We alleged that the power of the soul in the real world is that it projects upward a shielding, firewall effect via the shell of the cone; alias, the cone itself.

The distortion at the center of the symmetric plane is at the centerline of our 2nd cone. That would seem to reflect a wobbly psyche above, which may be the case in many people who don't have deep convictions; it's not something we want to build into our model as a given. It's helpful as a spiritual deviation, but not as the ideal which is what our model should be.

We did, however, consider the soul to be in the frequency domain, which (somewhat simplistically) we related to a rotating coordinate system. Versus the psyche which is in the time domain and not

rotating (unless you're drunk or high, at which point the two cones detach, and the psyche is free to rotate). The connection between the two is kind of a universal joint like they have on auto transmissions.

A rotating soul would simulate a geometric distortion at the center, just like we saw in the rotating solar system. And dynamically a spinning top is infinitely more stable than a cone sitting on its apex (which is just about as unstable a geometry as you can possibly configure); so stable, in fact, that spinning tops are the working part of space gyroscopes.

Representing the soul as the equivalent of a spinning top is a very elegant analogy. It has the sense of a frequency domain, over the long-term; but giving the time domain, reality, a certain sense of depth, momentum, and continuity. It's tough to characterize happenings in a spinning reference frame from a fixed one, which explains why the soul is so mysterious – and so inaccessible too, aptly projecting a protective firewall around the psyche.

THE COMPLEX SOUL

So, we have the outlines of our psyche model here, which jive with our orbital model. You certainly need a fixed plane of reference to get an angle on a spinning top, and we have just that in our symmetric plane. Everything is fitting together nicely, so we're ready now to get back to the math and see if these new ideas pan out with our evolving model of the human soul.

We've said that looking at complicated dynamical systems in the frequency domain is a way to greatly simplify the presentation. We alleged that transforming the motion of the planets to a sun-centered plane puts us into the frequency domain, so let's test that supposition and see if we really do get a new and better perspective; not just at the solar system as a whole, but with the orbital motion of the individual planets.

The defining equation for complex analysis is the exponential notation for a rotating vector.

$$(21.1) \quad \vec{r} = e^{j\omega t}$$

Mathematicians sometimes call this function an “*amplitwist*” because it has two components: (1) an amplification, i.e., multiplication by a constant, and (2) a twist because the action of the exponential term is simply to rotate a vector by ω degrees.

Applying this logic to our 10BP, the amplification part is represented by the Titus-Bode Law. It takes all the constant out of the planetary positions and leaves just the twist part, i.e., the motion of each planet around a stability point.

Now we just need to transform the motion of all the planets to our new coordinate system to see how they move relative to our new sun-centered celestial plane.

THE SYSTEM WAVE

Figure 21.1 models the motion of all the inner planets, Earth’s moon, and the Trojan/Apollo Asteroids with a single helical wave pattern of fixed wavelength. What we are looking at in that figure is the side view of a prolate cycloid. This is a helix formed by the point on a rotating circle moving through 3D space.

Our psyche model began with the circle, fixed in space as a conic section. Our soul model begins with a circle too but moving through space. The projection of a point rotating on a circle fixed at its center is a sine/cosine wave. The projection of this point for a circle moving along its center is a helical wave. That is, if you look at the prolate cycloid from above (along its line of propagation) it looks just like a circle.

Animal and plant DNA are in the form of a helix just like this (a double helix). Electromagnetic radiation moves through space as a helix, as does gravity. Consequently, this model for our waveform is quite logical and represents the equivalent of an inverse-squared geometry.

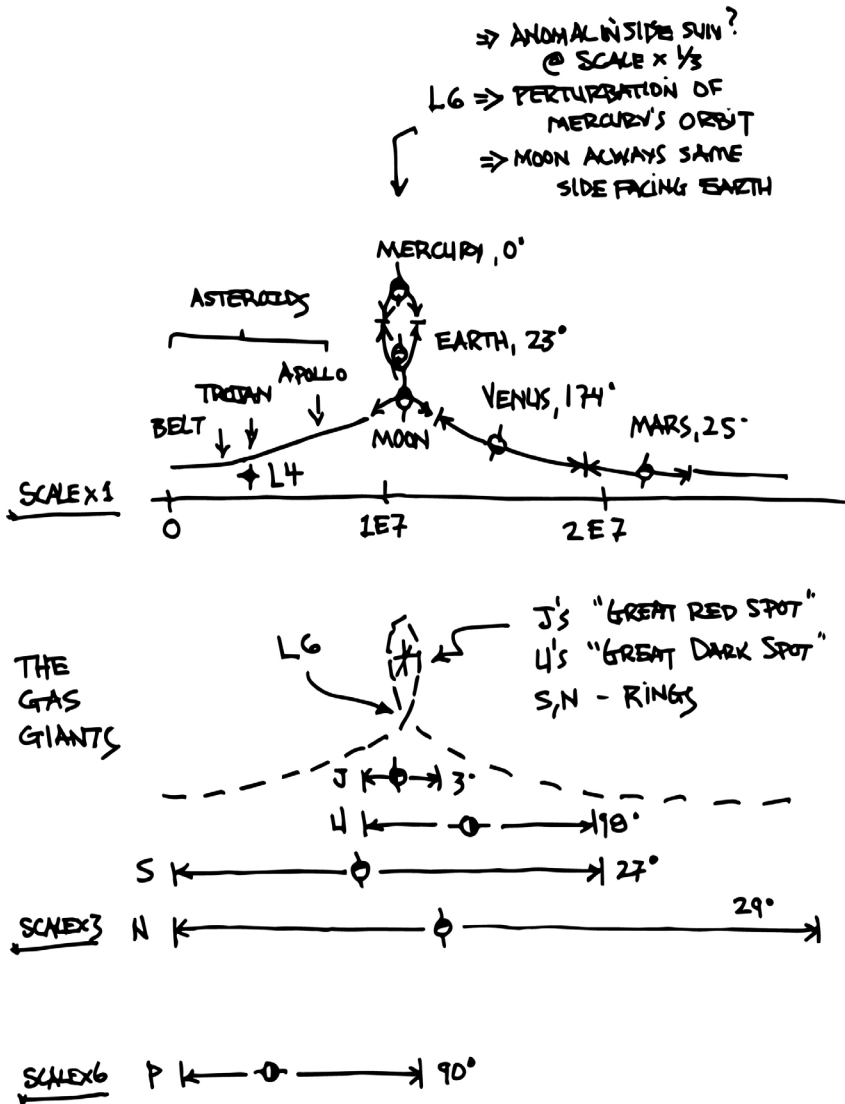


Figure 21.1 The System Wave

Referring to our model again and Figure 21.2, the outer planets are at multiples (they occupy several wavelengths), depending on their distance from the sun, which is consistent with the notion that the influence of gravity from the sun diminishes with the distance squared; that is, the more massive planets experience more destructive interference of the sun's gravity waves. (The relationship here seems more like a $1/r$ relationship, similar to that seen near the primaries in the 3BP; noting that Jupiter is so massive relative to the other planets that the Sun-Jupiter 3BP is a very general approximation for the whole solar system.)

INTERPRETING THE STRING THEORY

You can see that each planet, and the Moon, is fixed to this wave, like a fisherman's floating bobber (Figure 21.2). As the planet rotates the Sun, this bobber moves in a fixed range, which defines the elliptical shape of its orbit; and it always remains perpendicular to the wave, as if floating on water, just as the inclination of the axis of each planet behaves. Finally, the motion up/down as it moves around the Sun defines the inclination of the planet's orbit to the Invariant Plane.



(Correlating these ideas to our Big Theory of fractals, this “floating bobber in a wave” representation suggests an inverse-squared geometry; perhaps even a minimal description of the fluid dynamic in the Many Body Problem.)

In this simple diagram, we have explained four orbital parameters for each of the planets:

(1) the inclination of its axis with respect to its orbit, (2) the inclination of its orbit with respect to the Invariant Plane, and (3,4) the minimum and maximum distances achieved as it moves in an elliptical orbit around the sun.

You'll notice that Mercury's orbit is among the strangest, as expected. Also, there's a unique relationship between the Earth and our Moon (which always faces the same aspect to Earth), which

has never been explained. Several other perplexing mysteries of the Solar System are explained by this model. For example, Venus' bobber is upside down because it has a retrograde rotation.

This new model of orbital motion shows in a single context (i.e., a single prolate cycloid, which is a helix seen edgewise) all the orbital parameters of the planets: eccentricity of the orbit, its inclination to the celestial plane, orientation of the planet's axis of rotation, and direction of each planet's rotation on its axis (4 unknowns x 9 planets = 27 variables). The only flaw with the presentation is the average orbital distance from the sun has been factored out by considering only the vibration of each planet around its "Lagrange" stability point.

INTO THE COMPLEX DOMAIN

If we now consider the "system wave" analysis in light of the amplitwist representation of complex functions, the Titus-Bode Law takes the orbit of each planet (the amplification part of the function) and eliminates its average orbital. What remains after applying the Titus-Bode Law is a planet moving around a single stability point (think Lagrange points). This orbital motion of each planet is the twist part of the function. In other words, the above action on the orbital motion of the planets simply transforms the motion into the complex domain.

What remains is Figure 21.1, a single wave that explains all the orbital motion of the planets that remains after transforming coordinates into the new invariant plane and applying the Titus-Bode Law. This is a remarkable result, and tying it all together as a complex function further strengthens the theory.

The Titus-Bode Law is almost a $1/r$ relationship, especially among the outer planets where the each planet is roughly twice as far from the sun as the previous one (that is the 0.4 factor in the equation become insignificant). Recall that the innermost zero-velocity curves in the 3BP follow a $1/r$ relationship as illustrated

by the Cassini curves. Put those two together and you have a $1/r$ force throughout the solar system.

ANOTHER CASSINI GEOMETRY

The outer planets' motions are only approximated by the "system wave," although it's not unexpected that the power of the "inverse-squared geometry" is strongest near the sun and diminishes for the outer planets. That is, we've seen in the Mars problem that both the $1/r$ and $1/r^2$ geometries (i.e., the f - and g -forces, both inverse-squared but not a "time domain" $1/r^2$ force like gravity) exist close to the primaries; then just $1/r^2$ beyond; and it's not unreasonable that a further reduction in this geometry happens far beyond the primaries (in this case the sun and Jupiter). Note: the previous paragraph referred to a $1/r$ force; this paragraph refers to a $1/r$ geometry.

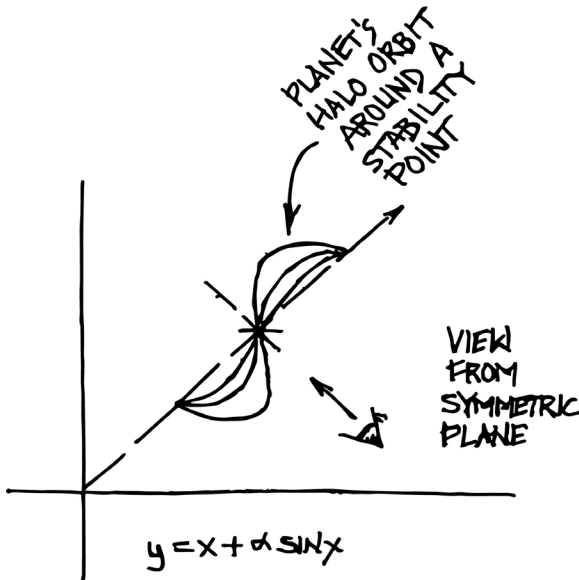


Figure 21.3 A Hysteresis Loop

We're accustomed to the 3BP stability points defining long-term-stable orbital motion. Think of our graphic here as a stability wave. This is a common phenomenon in electromagnetism (and the theory of vibrations) called a hysteresis loop, as sketched in Figure 21.3.

Now, recalling the motion of the asteroids around L_4 and L_5 in the Sun-Jupiter 3BP, a detailed look around these equilateral stability points reveals a series of "porkchop" zero velocity curves around them in the broader problem as reproduced in Figure 21.4.

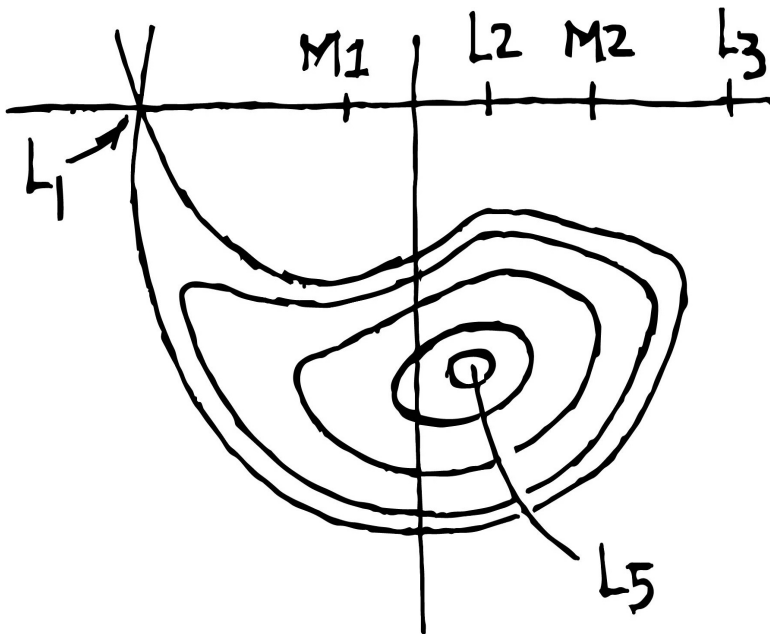


Figure 21.4 **Zero Velocity Curves around L_5 in the 3BP**

Combining the concepts of the last two figures, you can summarize the hysteresis phenomenon as in Figure 21.5 where hysteresis is a familiar free-return, figure-8 loop when perceived in rotating coordinates.

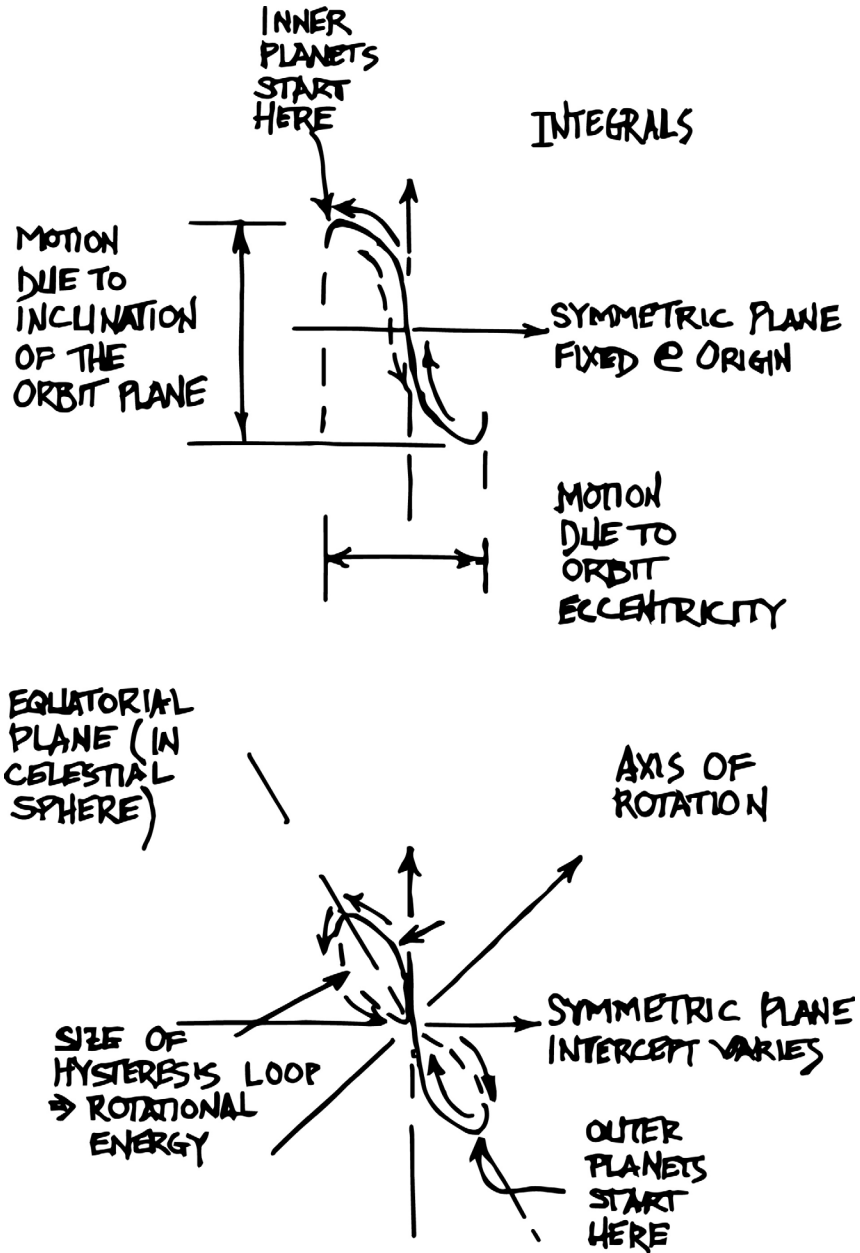


Figure 21.5 Hysteresis in the 3BP

Finally, in our “stability point” studies here, the system wave of Figure 21.1 itself has an integral stability point the middle of the loop (the central axis of the helix) which in our fractal way of looking at everything, presumably links the solar system to a higher level in the galaxy. We can call this single stability point “Stability Prime” or in our spirituality model “God” or just plain “the Great Spirit” as far as astrology is concerned.

THE “SYSTEM WAVE” THEORY

Analytically, these are all tentative generalizations at best. The model has some fascinating aspects and a good correlation to planetary motion in some regards. Calling the prolate cycloid loop a stability wave helps because it makes the requirement for a perfect match less constrictive, and finding some features shared with a dominant Sun-Jupiter 3BP is helpful as well. But, hey, it’s a 10BP, and the last thing you might expect is a perfect fit. We can call this a “restricted, inner-planet Ten Body Problem” and leave the full McCoy for others to reason out.

In any event, we have managed a half-way decent mathematical construction, showing that our new symmetric plane is one step forward. It gave us a Gordian Knot of a solution, but we still have a couple of chapters left to try and figure it all out. At the very least, we’re at the “iceberg theory” point where we began our psyche model, and that’s really all we were looking for. The business we’re in here is metaphysics, not astrophysics.

Actually, we’re not really even after a model for the soul now. That’s only a means to an end. What we’re truly seeking is the Force and a model of the human soul/psyche/spirit that allows a person to access said Force. This whole “system wave” theory may be a Big Theory pushed by a washed-out aerospace engineer; but, hey, you can’t hardly deny the amazing symmetry (after all, we’re trying to match a model to 27 independent, wildly nonlinear variables for God’s sake) here, and with the symmetric plane.

Sure, maybe we can’t pinpoint an exact force or equation

like gravity to explain all of this, but our old “inverse-squared geometry” isn’t entirely out of the ballpark. It’s not a grand slam home run, but it’s at least a lucky base hit. Enough to get you to thinking hard that there really is a force making it all happen; a force bigger than gravity, bigger than the 3BP, on the scale of Relativity.

If you the reader is among those who think of astrology as science, then this is a pretty damn compelling theory we have here. Think of the planets as each representing a major religion (by order of size: Christianity, Islam, Hinduism, Chinese traditional, Buddhism, Primal-indigenous, African traditional, Spiritism, Judaism, Shinto) and what we’ve captured here is the fundamental quintessence of what connects them to people, an “envelope curve” of spirituality, exactly what we were set as our objective in the very first chapter. If you believe in Christ, you can add a whole new fractal level: you have 12 planetary disciples here – the nine planets + Earth’s moon + the asteroids + the sun.

What do we have metaphysically? We have a symmetric plane deep in the subconscious that links you to the living force on planet Earth, and outward beyond into the solar system. We have a symmetric geometry that links the solar system to the cosmos beyond. Both concepts are integral to our Big Theory of fractals (we jumped from the 4BP to the 10BP, but we’ll fill in the missing levels soon enough), which follows the progression of our Force from the big-bang beginning.

What we have, in other words, is a Force and the math to prove it.

A New Model of the Solar System

We find ourselves at the limit of celestial mechanics. Beyond the level of the solar system, Relativity takes over. It's called astrophysics, and Newton's law of gravitation is nowhere to be seen, even though the 3BP exists between stars, groups of stars, even galaxies; each with the same intricate set of zero-velocity curves we're familiar with. Not even the Many Body Problem is mentioned in Relativity's statistical view of what they call gravitation (versus what we humbly call gravity in Newtonian mechanics).

There was a brief discussion at the end of chapter 20 regarding the main proofs of Relativity and how workers in celestial mechanics view that theory. Mathematicians are a little more diplomatic about their objections to Relativity, but instead, let the facts establish their feelings.

What makes Relativity work mathematically is the Lorentz transformation which is a linear transformation of space-time that maps one observer's description of an event to how another observer views the same event. We've done transformations here in real space, and mathematically they're a 3×3 matrix (3 dimensions to 3 dimensions). The Lorentz transformation also includes time, so it's a 4×4 matrix (3 dimensions + time to 3 dimensions + time). Everything in Relativity theory is built upon this one amazing, unique, brilliant, genius Lorentz transformation.

The only problem is that mathematically there's absolutely nothing unique about the Lorentz transformation. In fact, it's just one of a considerable family called Mobius transformations.

Every single Mobius transformation (and there are thousands of them, theoretically an unlimited number in fact) yields a unique Lorentz transformation of space-time. The brains in astrophysics take this idea in stride and say there are simply an infinite number of parallel universes, each with its own unique Lorentz transformation.

HAWKING'S STRING THEORY

The famous body of work pioneered by Stephen Hawking called String Theory is the crowning achievement of astrophysics of the modern day. And yet there is no proof whatsoever that any of it is valid (that's why he never got a Nobel Prize); in fact, there's a famous proof that says String Theory can never be proven based on actual physical phenomena. Ditto, one must assume, for all the other parallel universes astrophysics is now consumed with.

The exact same situation exists with subatomic physics above the level of electrostatics: nothing but statistical theories. Now they've even jettisoned statistics and simply build computer models (based on statistical theories that they think explain subatomic dynamics) which they treat as actual, physical systems and base their new theories on how those computer models behave. (Which is more or less what astrophysics has been doing for fifty years.)

You may have noticed that celestial mechanics is the complete opposite: if you can't base your equation or theory or computer simulation on actual, observable, measurable natural phenomena then it's not worth the time of day. The "string theory" presented in the last chapter was in fact based on nothing but hard facts, actual data.

In fact, when I originally discovered the "system wave" theory circa 1980, I used that prolate cycloid to trace out patterns for all the Schrodinger electron cloud plots, suggesting a mathematical rather than a statistical basis thereof. NASA evaluated this project and sent me the letter in Figure 22.1.

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas
77058

NA

MAR 29 1982

TAB BOOKS INC

AH6

MAR 23 1982

Mr. William H. Clark, II
Route 2, Box 388 D
Leander, TX 78641

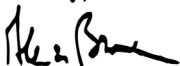
Dear Mr. Clark:

We are returning your "Journal of 21st Century Technology," and appreciate your allowing us to review your scientific paper. As you know, the Johnson Space Center's activities are almost entirely devoted to the development and flight of the Orbiter vehicle--a pretty straight forward concept which utilizes existing aircraft and spacecraft technology to build and fly an aerospace vehicle. However, we do some advanced technology development within our Program Development Office, and it was to that organization that I directed your paper.

Your work was reviewed independently by both an engineer and a physicist. Although their backgrounds and scientific/engineering interests are different, both came to the same conclusion. Your concepts about the Unified Field Theory appear to be so profound that you are years ahead of the present scientific thinking in the areas in which you delved.

Given our present financing and direction from Congress, NASA does not currently have the ability to investigate your proposal in greater depth. We do thank you for your interest in manned space flight, and wish you the best in your future endeavors.

Sincerely,



Glen E. Brace, Chief
Personnel Services Branch

Figure 22.1 The NASA Letter

HELSTAF PRESENTATION

I had no idea what they meant by the Unified Field Theory. I didn't even know what the whole analysis meant at all. I was just an out-of-work exploration drilling engineer fooling around with some planetary data tables and flashed on the idea of explaining all the motions of the planets with a single equation. The original presentation was even more rudimentary than what I've shown here because it was done with just a pencil and paper and a few rough hand calculations (there weren't even hand-held calculators back then).

Unable to find work as an engineer, I enlisted in the Army and got a job at White Sands Missile Range as a weather observer. I bought an Apple IIE desktop computer (with all of 486 of RAM on a giant floppy disk) and arranged to work nights at the weather station so that I could work on a computer model of my theory. I presented my findings to the Chief Scientist and a couple of his engineers at the High Energy Laser lab there at White Sands, thinking there might be laser applications. No luck, it was too theoretical and unproven.

I got out of the Army not long after that, got back into engineering, and made a reputation for myself as a consulting engineer in the commercial construction industry in Austin, Texas. I got laid off in 1996 and, again, my thoughts wandered back to my old NASA research (which I had long since tossed in the trash). While I was building up a client list for my new practice as a consulting engineer, I took an afternoon class at the University of Texas.

THE THEORY OF ORBITS

It was called Theory of Orbits, taught by none other than Victor Szebehely, the foremost worker in celestial mechanics of the 20th century, if not of all time. (I didn't know it at the time, but that class was the most advanced class in celestial mechanics at Texas,

and it would be four years of grad school before I could really understand the material, if even then. Of course, it was way over the head of everybody in the class, so no big deal.)

I reworked my old NASA research and presented it for my class project. Professor Szebehely loved my “inverse problem of celestial mechanics” and said that “all you need to do is to add time to your equations, and you’ll get your name lit up in lights.” He encouraged me to enroll in grad school and wrote me a letter of recommendation. I was admitted the following fall. He passed away not long after that, and my new advisor was Roger Broucke, the second most important worker in celestial mechanics of the modern day, and arguably the most celebrated researcher of the 3BP of all time.

(Dr. Broucke retired a semester before the sh*t hit the fan over my Mars computer program, and passed away not long after that. I was the last grad student at the last university to offer celestial mechanics as a major in the whole world.

“YOU NEED TIME”

The project I presented in Szebehely’s Theory of Orbits class was a lot more sophisticated than my Apple IIE simulation at White Sands because this time I found the symmetric plane, and after cranking the planetary positions relative to that new reference plane (a linear transformation, by the way), the curve matched the planets much better than before.

I still had a long way to go, understanding this system wave thing. It wasn’t until long after I was booted out of grad school for my Mars research that I really understood the Big Theory the way I have explained it all here; only a short while before I wrote this book in fact; with many areas ironed out as I write everything down.

The answer to Professor Szebehely’s comment that “you need time for your equations” is that you don’t need time there because it’s all in the frequency domain.

Which sounds like a cop-out because the model is still quite crude and not at all logical, despite its relative simplicity and accuracy. However, mathematically it really is in the frequency domain; and that puts it at the same level of Relativity because the coordinate transformation using the new symmetric plane is actually a transformation into space-time.

Which means that the distortion at the sun in the symmetric plane is exactly the same as Relativity's space-time distortion.

To retrace our steps a little, Mobius transformations are mappings of the complex plane. Mathematically it's easier to see from the equation for a Mobius transformation.

$$(22.1) \quad M(z) = \frac{az + b}{cz + d}$$

where a, b, c, and d are complex numbers

This applies to Relativity's Lorentz transformation; ergo Relativity is also a mapping in the complex domain. In a kind of warped way of thinking (pun intended), then, if my symmetric plane exhibits a space-time distortion just like Relativity, which is in the complex domain, then by definition the system wave generated using this transformation is also in the complex domain.

THE MOBIUS TRANSFORMATION

Which helps to explain the analytical basis of it all, but doesn't do squat to explain it in logical, real-life terms. We need to take a few aspirins, roll up our sleeves, and jump into complex analysis to see how this all works. Which is really hard to do because the complex plane is incredibly abstract. There are no physical analogies that we can use to show what happens there in a way that you can understand like we've been doing all along.

We'll need to build our own model from scratch, starting from the ground (or the atom) up.

Right now, however, we're way out there in astrophysics land; and we need to step back down from where we are to pick up where our subatomic theory left off a few chapters ago. Consequently, the rest of this chapter is devoted to those fractal levels we skipped when we jumped from the 3BP to the 10BP. It will be kind of a fun breather from all the heavy math because, well, there's absolutely no math where we're going, just pure imagination.

THE ROUTE OF AGES

We'll start off with the largest-scale planet among our slideshow, Saturn; and more explicitly Saturn's ring system. Before going there, consider Figure 22.2 and a projection of the equilateral Lagrange points into 3D. (This reminds me of a graphic in the *Andromeda* sci-fi TV series for the "route of ages," a fictional portal through space-time.)

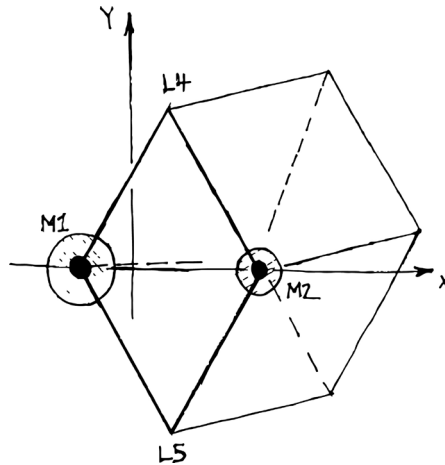


Figure 22.2 *Andromeda's "Route of Ages"*

You can see the Figure 22.2 cubic geometry duplicated in Figure 22.3, then used to organize some interesting phenomena in the Saturn system: rings as halo orbits around the colinear Lagrange

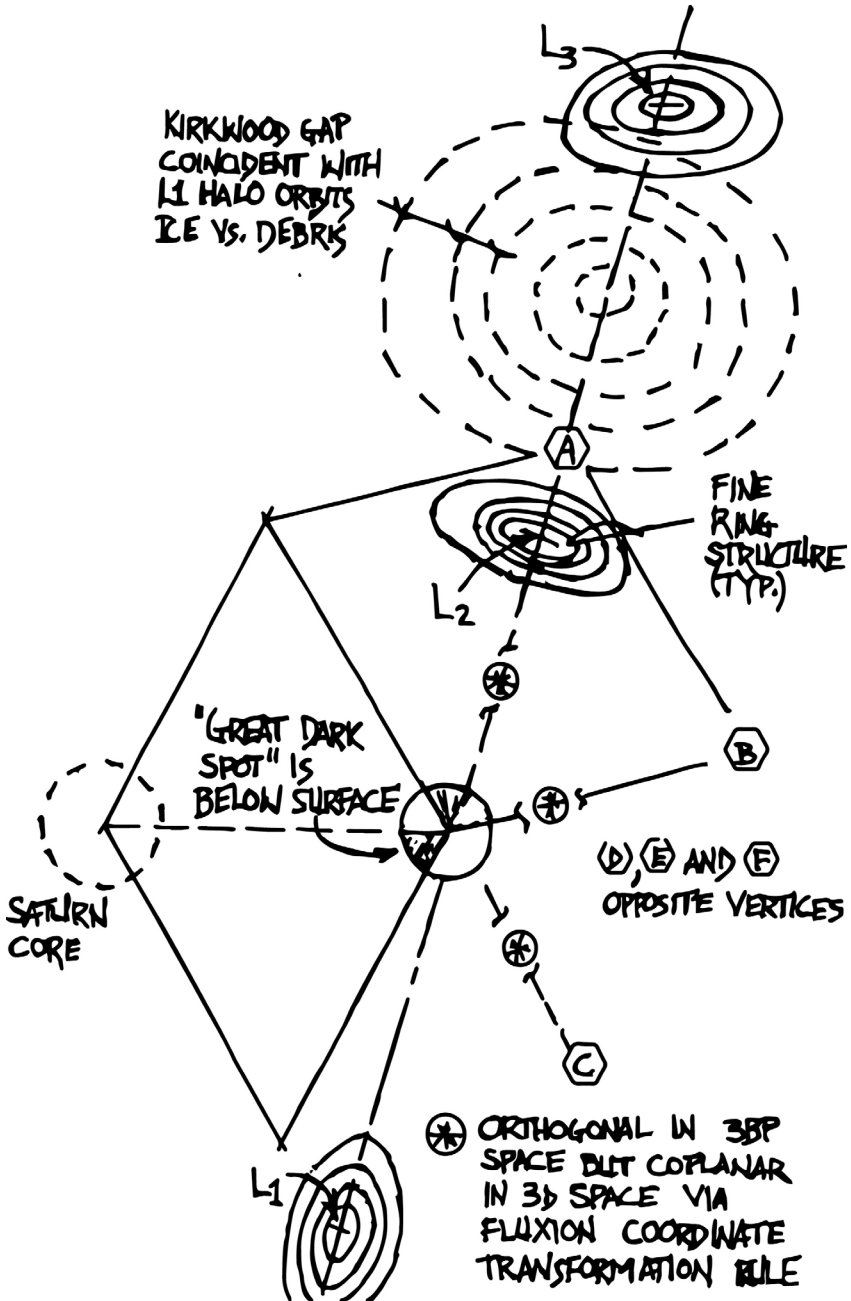


Figure 22.3 Saturn as a 3BP

points, the Kirkwood gap between certain rings, and the dark spot just below Saturn's surface clouds.

What happens in this figure is that the entire structure rotates Saturn's core keeping the "Great Dark Spot" as a primary mass as indicated. This is, of course, a rotating system within the already rotating 3BP system; which, oriented correctly gets you back into a real-time coordinate system so that the halo orbits become rings around Saturn.

Try and get your head around that, if you can. (The idea is that 3BP don't have to be isolated but can be interlocked as in our atomic crystal matrix, or embedded, as suggested here.)

JUPITER'S GREAT RED SPOT

We now apply a similar set of criteria to Jupiter and the "Great Red Spot" in Figure 22.4. We don't know what exists inside the clouds of Jupiter, but here we suggest two areas of higher mass that can each be represented by a point mass (remember the hollow sphere gravity analysis). Position these two masses as the primary masses in a 3BP, and at L₃ in this system, you get a stable "Red Spot" of swirling gasses.

Remember that L₃ is an unstable colinear Lagrange point, but in this system, it might have enough influence to organize a relatively constant spot on the surface of the planet. We also see the motion of mass inside Jupiter itself, around these two primary masses, projecting eddies on the surface above the equilateral Lagrange points.

The general idea here is to suggest how 3BP dynamics can exist inside a gas giant and organize the mass in new ways not explained by current theory.

Granted, you would think that Voyager and other fly-bys of Jupiter (observation of comets in the Jupiter family, etc.) would have shown two large, distinct masses; unless our measurements weren't accurate enough to detect them; or maybe even there's a

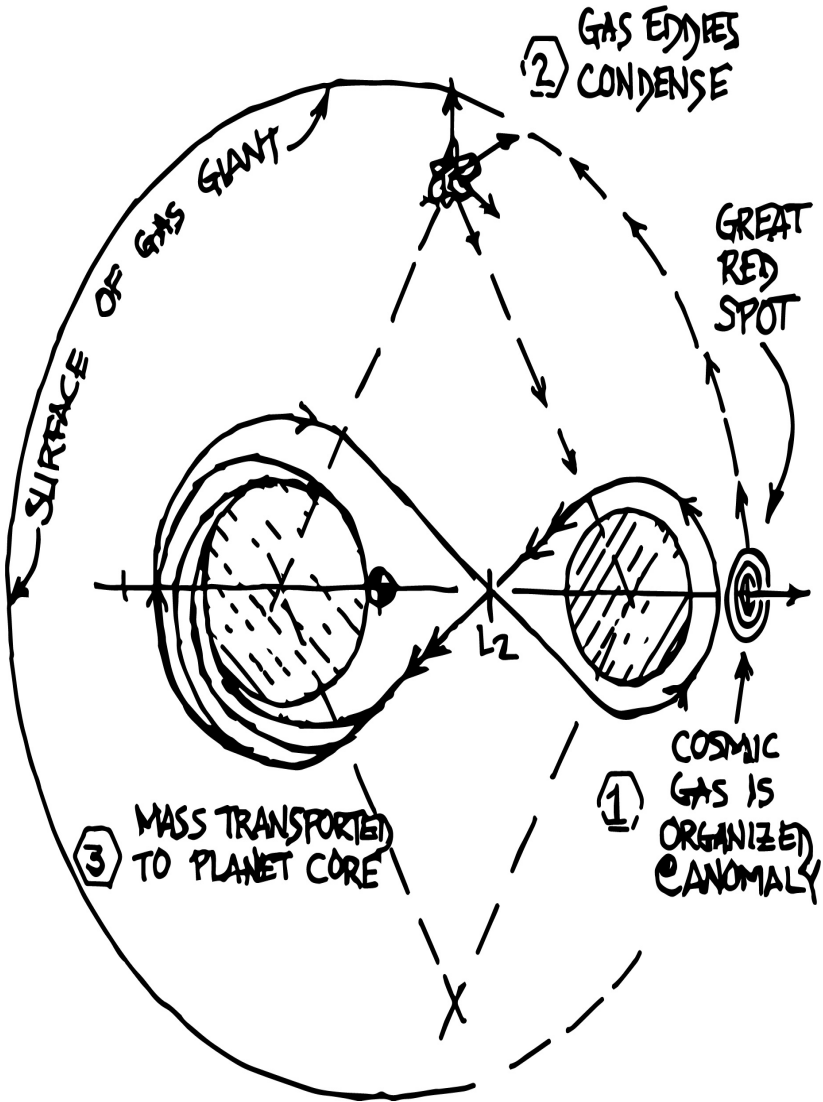


Figure 22.4 Dynamics of Jupiter's Gas Cloud

threshold velocity where a s/c or comet zooming by would only see the center of mass and not the two separate masses.

PRECESSION OF MERCURY'S PERIHELION

Figure 22.5 suggests a role of barycenter in the perturbation of Mercury's orbit. Technically it's called "precession of Mercury's perihelion" which means that some unknown force causes Mercury's elliptical orbit to rotate such that it's perihelion (closest point to the sun in the ellipse) slowly rotates, 5600 arcseconds per 100 years, where there are 3600 arcseconds in a degree; hence 5600 arcseconds is roughly 1.55 degrees.

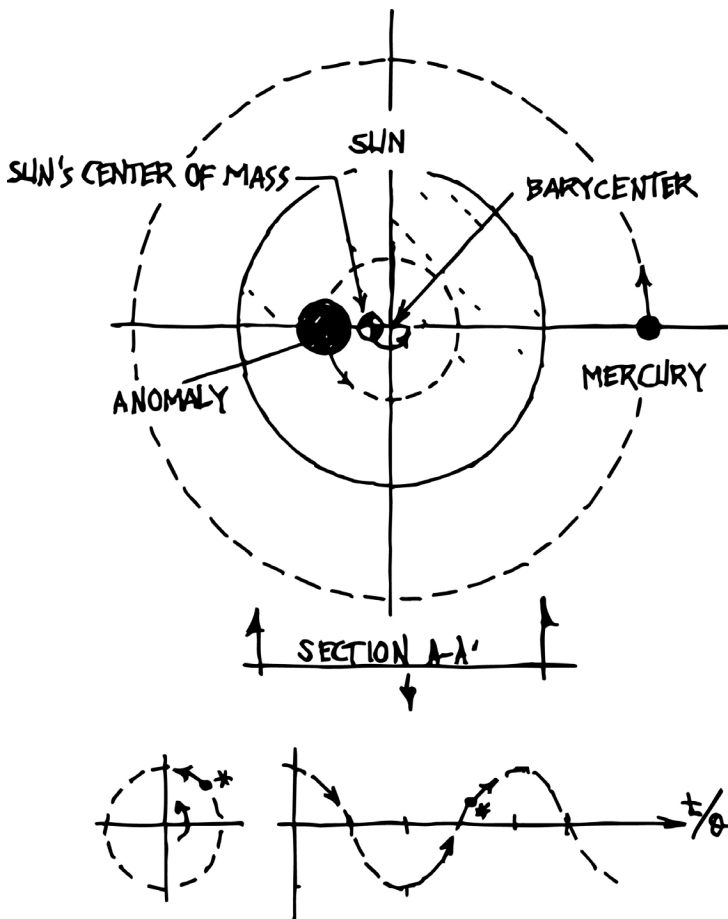


Figure 22.5 **Precession of Mercury's Perihelion**

The implication of Figure 22.5 is that for a planet as close to the sun and barycenter as Mercury (which orbits the sun every 88 days), where barycenter is basically the center of mass for the Sun-Jupiter system (following Jupiter around in its orbit, and located at roughly the edge of the sun's corona); then you might actually have a gravity force on Mercury from barycenter as well as from the sun.

For example, putting Mercury on a zero-velocity curve in the sun-barycenter 3BP. Or Mercury might actually orbit barycenter and not the center of the sun; especially when barycenter is at the empty focus in its orbit, which would have a dynamical resonance, perhaps enough to cause the precession.

Dynamically, in our new understanding of the 3BP, that puts Mercury in a halo orbit around L_3 as illustrated in Figure 22.6.

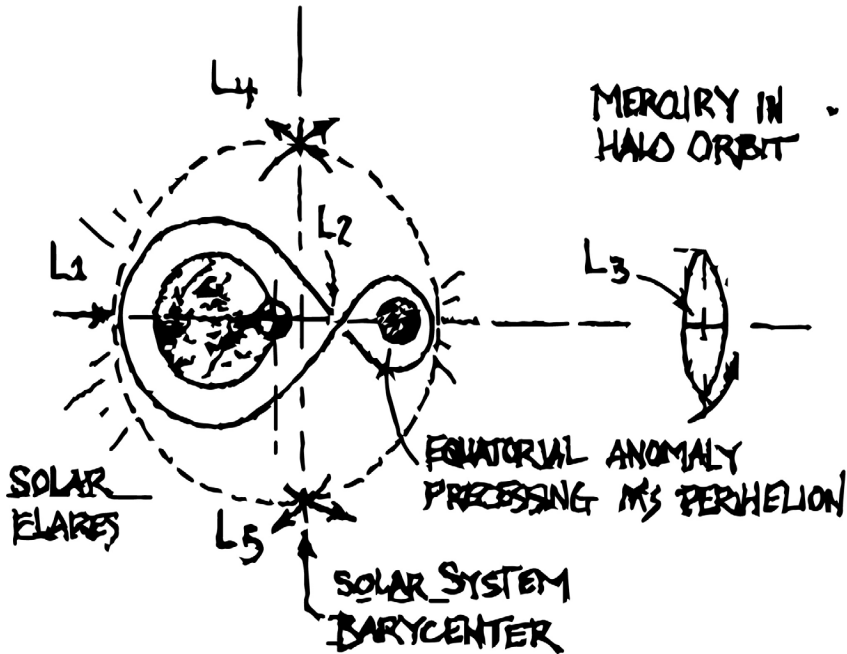


Figure 22.6 Mercury in a Sun-Barycenter 3BP

THE BERMUDA TRIANGLE

Keep in mind here that this is more of an exercise to test your knowledge of the 3BP than an actual theory because current models for Mercury's orbit include Jupiter (and all the other planets) as a perturbing force anyway. What we're saying here is that barycenter asserts a force greater than Jupiter's perturbation. Certainly a simpler explanation than Relativity's time-space distortion.

We now get back to Earth, with a fun explanation in Figure 22.7 for Stonehenge and the Bermuda Triangle, the Pyramids, crop circles, you name it. All you need is the Earth's core mass

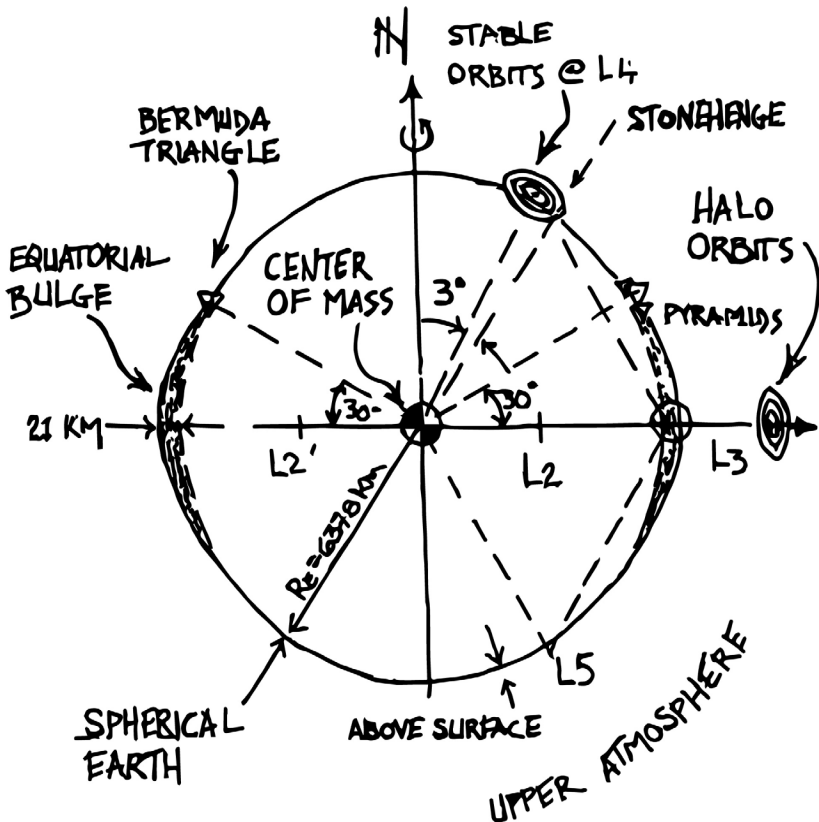


Figure 22.7 Subtle Effects of “3BP Geometry”

and one more primary mass inside the planet to simulate a 3BP superimposed on the average mass distribution of the planet. That is, if we can model the Earth as a 100x100 matrix of discrete patches of mass like the do for satellite analysis (which can pinpoint discrete masses as small as large oil reservoirs under the surface); why not superimpose “3BP geometry” on top of that? (That is, replace gravity forces with “inverse-squared geometries” in a 3BP.)

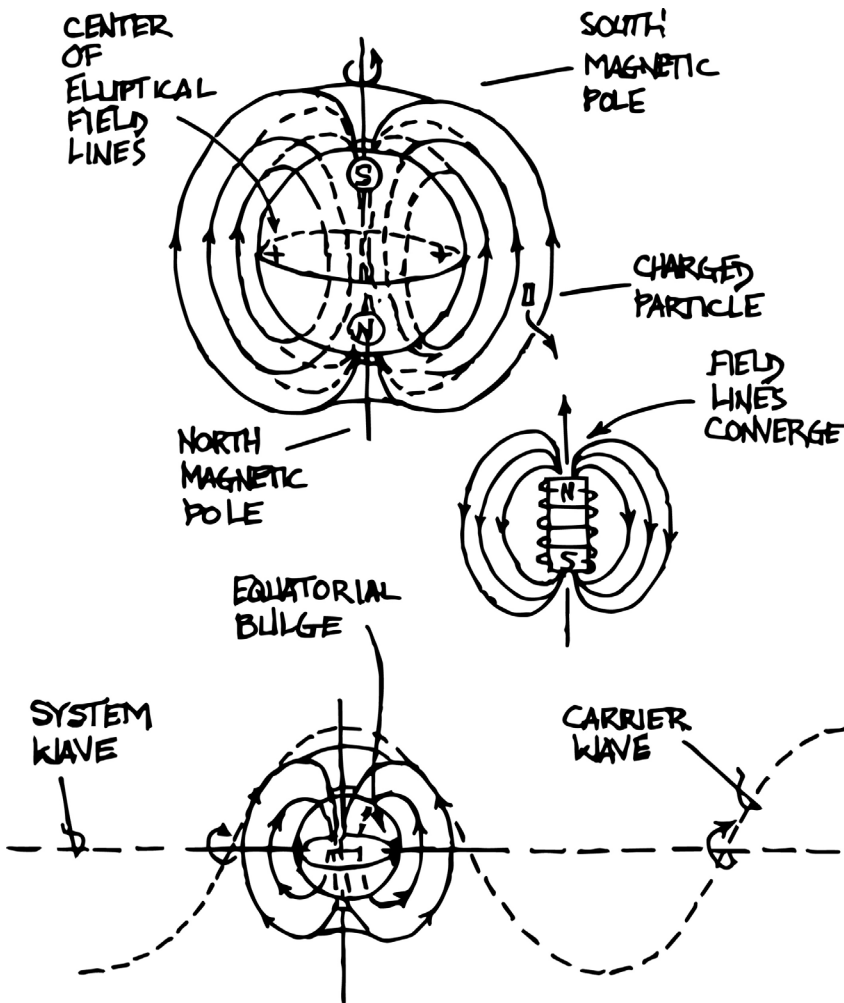


Figure 22.8 Earth Versus the System Wave

Einstein's Relativity theory is based on electromagnetic phenomena. Gravity waves, predicted by Relativity but which have only recently been proven by actual measurement and observation, propagate through space the same way as electromagnetic waves like sound and light.

The Earth's magnetic core generates the Van Allen belts around the planet (which protect us from the extremely lethal solar radiation) which might be electromagnetic enough to, say, orient the planet like a fisherman's bobber versus the gravitational flux (wave) from the sun, just like we proposed with our system wave string theory.

EARTH ON THE SYSTEM WAVE

We have a second Theory of Relativity, from Henri Poincare', which proposed that space acts like an aether (a derivation from the Many Body Problem), or a very thin fluid. Since Einstein and Poincare each came to the same Relativity Theory conclusion; well, a series of gravity waves equals the equivalent of an electromagnetic ocean. Both (either) of which simulate the kind of medium that would support our "fisherman's bobber" theory in real space-time.

Differential Equations

Our graphical approach here in building the Big Theory is not without precedent. Isaac Newton published *Principia* in 1687. It was over 1000 pages (and very small print, at that) of pure logic and basic line diagrams. He used simple geometry to create the calculus, then used that new mathematics to define force, and then elaborated the force idea using many more diagrams to devise the defining equation for gravity.

Another example is Einstein's General Theory of Relativity, published in 1915. Einstein assembled a wide range of ideas from many sources (Michelson, Lorentz, Poincare, and many others, none of whom he gave credit to either in the paper itself or afterward, even informally; to the point where most people think he also invented tensor calculus, which was published by Levi-Civita and Ricci-Curbastro in 1900) and compiled it all into Relativity (which itself came from a term "relative theory" coined by Max Planck in 1906). Unlike Newton, however, Einstein used nothing but math.

It wasn't really that difficult a math, just 4×4 matrixes representing linear coordinate transformations; which compared to the wild math out there now is like comparing kindergarten blocks to a Cray supercomputer. Einstein's true genius was in organizing the thinking of many different people and doing the Many-Body-Problem transformation for an output: producing a nice, smooth, consistent fluid flow.

Arguably, Christ did the same thing for philosophy, assembling a large body of knowledge from his Jewish upbringing and condensing it into a short, pithy spiritualism. Jewish scholars have always

called Christianity Judaism lite, although a more appropriate term might be Judaism deep, as we'll see in a moment.

This is not to hold Christianity above all others out there. We're not here to judge or preach, just to establish a strong foundation for what's to come: if you're going to build a soul model, it's best to set it up using the most common religion out there. Christ is considered a major prophet in Islam. His belief structure is, if begrudgingly, somewhat respected in Judaism.

The Christian ideals, in secular form, permeate the entirety of western civilization. Christianity itself has billions of followers and many major sub-religions from Catholicism to the Protestant religions to Mormonism. So, if you're going to build a model of the soul, the fundamental tenets established by Christ would be a good place to start.

THE TRINITY

And we aren't talking about all of the Christian fundamentals, just three of them, the Trinity: Father, Son, and Holy Ghost. This concept is not important to us just because there are three of them, or even that the 3rd one is much, much smaller relative to the other two, but because the Trinity is the simplest, most profound model in all of religion. And, of course, it also jives nicely with our 3BP here, in the same way, that it has resonated with so many of the faithful over the millennia.

The problem all of this is leading to like I've said: complex analysis, where we will be building our soul model, is very abstract. We've been pushing abstract to the limits of the reader's imagination for a couple of chapters now, and if the dialog were to suddenly jump into the abyss of complex analysis, all would be lost.

When we switch our approach into the frequency domain from the time domain, we need at least something that we recognize and glom onto, and the Trinity is just the thing. We're very comfortable with the 3BP. We don't even mind the rotating coordinates that much anymore. There have been plenty of real-world examples to

further our understanding and even some outrageous theories that suggest far-reaching applications of the 3BP in what has heretofore been the exclusive domain of astrophysics (and subatomic physics).

The problem is exactly that the 3BP is already in rotating coordinates, but isn't formally in the frequency domain. Like with the Saturn theory in the last chapter, we need to put the 3BP in the frequency domain and to rotate the coordinates all over again. That kind of jumbles everything together like with the Gordian-knot system-wave string theory, which we're hoping to unravel into something more sensical.

Christ has given us the brilliant idea of the Trinity, which is a close analogy to the three bodies in our 3BP: two primaries (Father, Son) and one small 3rd body (Holy Spirit). This is very nice because your author here is clueless as far as religion goes, but presumably, the Jesuits and Vatican experts and righteous evangelicals can tie the Trinity to many of their practices, rituals, and beliefs.

All we need to do here is to put this intangible Trinity into our psyche/soul model, in the lower 2nd cone, and get that baby spinning like a top. Sure, all of this happens in the complex domain, but now thanks to the Trinity; well, we can cheat a little bit by using complex-domain objects as our three bodies and do our diagram thing safely in the real-world time domain.

A REVIEW OF CALCULUS

Let's get back to the math now and review the math we know so far, with a little help from Newton's brainchild, the calculus. We need to build at least a rudimentary math explanation for how we're getting ourselves magically into the frequency domain.

We know how to designate a position of an object formally as a point in an x- and y-coordinate system, with perpendicular axes. That object can move with a constant speed, where speed, which we'll call velocity here, is the rate of change of position. Acceleration is the time rate of change of velocity.

(23.1) $r(x, y) = \text{position}$

$$v = \frac{dr}{dt} = \dot{r}$$

where dr = change in position and
 dt = time interval of change

$$a = \frac{dv}{dt} = \dot{v} = \frac{dr^2}{dt^2} = \ddot{r}$$

dv = change in velocity

These can be represented shorthand using the dot notation (which originated with Newton, by the way), which means time rate of change. This lets us describe the acceleration as the time rate of change of the time rate of change of position.

(23.2) $r = \text{position}$

$$\frac{dr}{dt} = \dot{r}$$

$$\frac{dv}{dt} = a = \dot{v} = \ddot{r}$$

Newton next defined our old friend force is defined mathematically as mass times acceleration.

(23.2) $f = ma = m\dot{v} = m\ddot{r}$

You can represent position as a vector now (we saw this before as a rotating vector of constant length that traces out a circle, which projected forms a sine/cosine wave). The little arrow on top means it's a vector.

(23.2) $\vec{r} = \text{position}$

$$\vec{v} = \text{velocity} = \dot{\vec{r}}$$

$$\vec{a} = \text{acceleration} = \dot{\vec{v}} = \ddot{\vec{r}}$$

From which we get the equation for Newton's definition of force.

$$(23.4) \quad \vec{f} = \dot{\vec{p}}$$

Which says that the direction of the force is the same as the direction of the velocity, which is a statement of one of Newton's laws of motion: every object will remain at rest or in uniform motion (constant velocity, zero acceleration) unless acted upon by an external force.

THE DOT NOTATION

The dot notation is described as a derivative: velocity is the derivative of position, acceleration is the derivative of velocity, and you can also have higher orders of derivatives for the time rate of change of acceleration, and so forth.

We can now state Newton's law of gravity in terms of his calculus.

$$(23.4) \quad F = G \frac{m_1 m_2}{r^2}$$

Or we can use vector notation, multiplying top and bottom by r so that we can have an r vector to designate the direction of our vector. G is the gravitational constant and m_1 , and m_2 are the two masses, which are both constant.

$$(23.5) \quad \vec{F} = G \frac{m_1 m_2}{r^3} \vec{r}$$

Notice that the r in the denominator is a constant, not a vector; so that $(\vec{r}/r)$ just gives the direction of the vector (with a

length equal to 1, called a unit vector). This quantity, with a unit length and just direction, is usually denoted by $\hat{r}$ which changes the equation to:

$$(23.6) \quad \vec{F} = G \frac{m_1 m_2}{r^2} \hat{r}$$

Where remember that $F = ma$ or in our dot notation

$$(23.7) \quad F = m\ddot{r} = G \frac{m_1 m_2}{r^2} \hat{r}$$

This is our differential equation for the force of gravity. The engineering disciplines represent all the forces on an object using differential equations written in three dimensions (for a real-world problem in 3D). If there are two forces on an object, for example, you have a system of two equations.

Take a 3BP for example, which is a mathematical study of the gravity force from two large bodies on the 3rd much smaller body. So you have two differential equations each with three coordinates for an (x,y,z) position through time.

ASTRODYNAMICS & EIGENVALUES

Leonard Euler devised a method to find principle axes in rotating systems (what is now known as astrodynamics, essentially the study of how external forces like gravity cause a spinning top to gyrate, precess, nutate, and so forth). Any system of two or more differential equations has (hopefully) eigenvalues and eigenvectors.

Eigenvectors (or anything close, if possible) are important in the analysis of almost any system that can be represented by differential equations. Eigenvalues in a mechanical system, for example, indicate natural frequencies of the system (if you vibrate a bridge at its natural frequency the vibrations will increase exponentially and destroy the bridge; this actually happened with the Tacoma Narrows bridge in Washington state, 1940).

Eigenvalues of an electrical system indicate the natural frequency as well; that frequency at which catastrophic growth occurs. Obviously, engineers don't ever want that to happen.

The locations of the five Lagrange points in the 3BP were found using a stability analysis of a system of differential equations. The equations for each point had an eigenvalue. The two equilateral points L_4 and L_5 had eigenvalues with no real part, just imaginary; whereas the less stable colinear points L_1 , L_2 , and L_3 have at least one eigenvalue that is real and positive.

Which shows how we use complex analysis to study the stability of engineering systems, by (1) representing the forces by a system of differential equations, (2) forming a matrix out of those equations, and (3) studying the eigenvalues (among other things) and where they line in the complex domain.

Complex analysis is used in control theory, in the optimization of practically every kind of engineering system: mechanical, electrical, pneumatic, electronic, and so forth. Technically it's called systems and control theory. This is more or less the role assigned to the soul in our mechanical model: integration of systems (e.g., mind and body in nonverbal language), and the optimization thereof, if not the outright control (as some people consider organized religions).

COMPLEX ANALYSIS

We have accomplished a few things in this chapter, despite all the math. We've shown that the Lagrange Points were found using the equations of motion and then evaluating the eigenvalues. We've shown why only diagrams have been used so far to illustrate the 3BP. You now know the significance of our psyche/soul eigens (bundles of stress) which you might call accumulation points for stress, or natural frequencies of the system.

If you vibrate (exercise) the system at just the correct frequency (weights, aerobic motion) the eigens will go the opposite of accumulation: dissipation.

The math equations, differentiation, and vector notation are needed to understand the following equation, which is the defining function for complex analysis.

$$(23.8) \vec{r} = r e^{j\omega t}$$

This is a vector with the tail at the origin, defined in the complex plane where the x-axis is the set of real numbers, and the y-axis is the set of imaginary numbers (multiples of the square root of negative one).

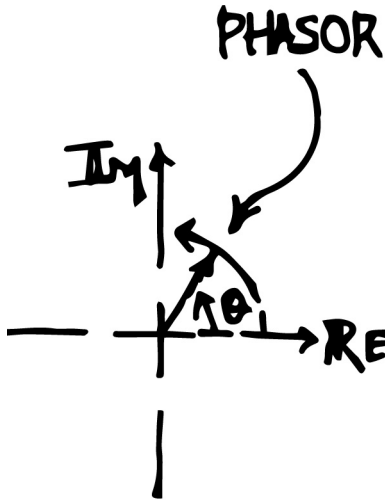


Figure 23.1 Rotating Vector in the Complex Plane

The magnitude (length) of the vector r arrow equals r , and its direction is defined by the exponential function $e^{j\omega t}$. Where e is the exponential series that we've seen before, raised to the $j\omega t$ power, where t is time and ω is the angle from the origin counterclockwise from the x-axis, and j is the square root of negative one.

Multiplying r by $e^{j\omega t}$ simply rotates the vector r by an angle w .

This is our old amplitwist idea: a complex number can be broken down into a constant and a twist, or rotation.

This innocent little equation is used in the analysis of virtually

every engineering system. The math is usually done using electrical notation because it's very convenient to model mechanical and other systems using electrical analogs.

Which brings up our last system to investigate, alternating current, which is always studied using exponential notation, so the system and control analysis is done in the complex plane. Alternating current has three phases: positive and negative (equal values) and a small 3rd ground current. You guessed it, the perfect system for our new eigen soul model of Trinity.

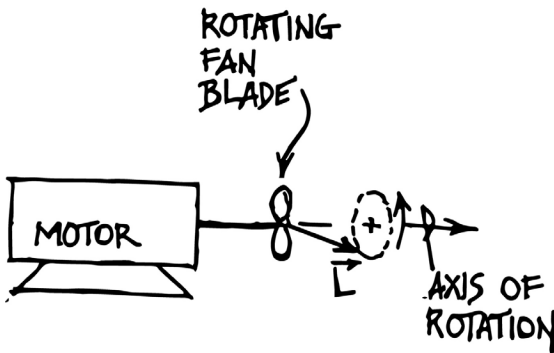


Figure 23.2 A Motor-Generator 3BP

The nice part about alternating electrical current is that, among other things, it's created by generators (a coil rotating in a magnetic field) and then used to rotate motors (charging the outer coils to cause the inner magnetic core to rotate). It's all explained mathematically by the pretty abstract theory of electromagnetism, but we can get by with just diagrams from here on out and leave all the abstract math to others.

So, with this chapter we've passed our baptism of numbers and are now safely in the frequency domain, which we have hereby set up so that all our new ideas can all be explained in real-world time domain terms; because (1) our three bodies are abstract eigens,

and (2) we're in a rotating motor/generator system aligned to our already rotating 3BP coordinate system.

You might think of it as our clever reverse Lorentz transformation from a bizarre world where everything is relative to a tangible world where we have recognizable models for our spiritual approach to celestial mechanics.

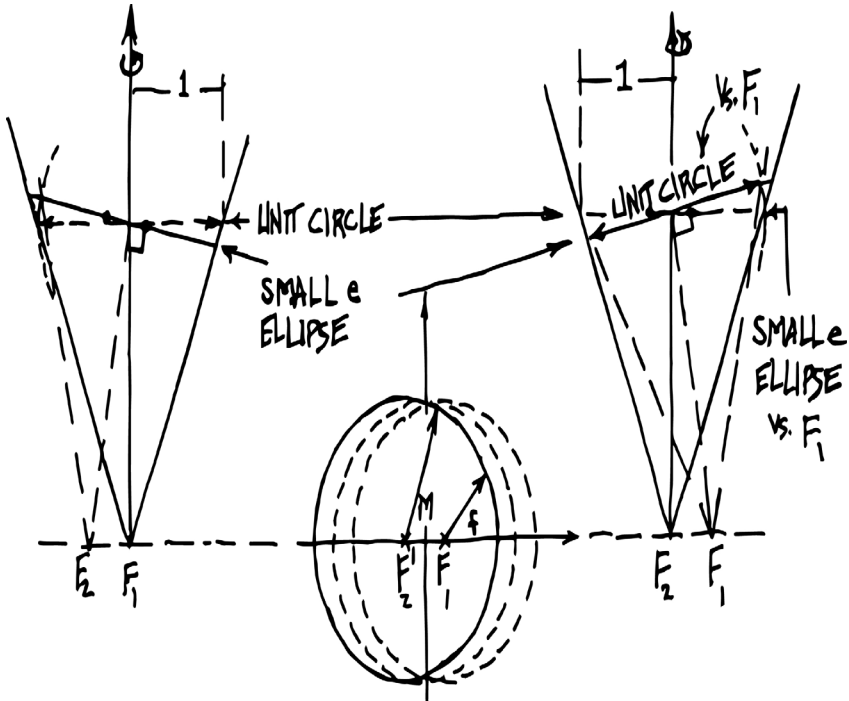


Figure 23.2 Vibrations of the Unit Circle (radius=1)

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The Sin of Lust

It' doesn't take elaborate 3BP diagrams to show that there's a deep, intimate connection between sexuality and the psyche. The connection of sexuality to the soul is a little more subtle, asking the question: what are the wages of lust as a sin, if such it is?

Our society teaches children from a very early age about sex. Video game and cartoon girls invariably have big breasts, supersized even. Girls learn right out of the gate that the way to get a man is through looks, uber-sexy looks. Boys learn that sexy girls are the only ones that matter, trophy babes. These attitudes are reinforced 24/7 in popular music, films, videos, and tv shows throughout the psyche's growth years (virtually all of it tailor-made for their exact age). Shallow sexuality has been permanently hard-wired in the psyche long before every child reaches puberty, the very first time when they actually have bona fide feelings of sexual attraction.

Teen fashions and advertising key off this strong sexual theme to put what they've learned about sexuality into actual practice, dressing provocatively, and for all occasions – not just the vaunted prom, homecoming, or even a dance party at your BFF's house. And yet, it's not at all about sexuality because they haven't ever even had sexual feelings, but about filling a role that has been created for them by our sex-obsessed cultural overlords.

Now add smartphones and social media to this controlled environment. Texting has replaced much of the face-to-face interactions involved in growing up; pushed, again, by advertising because they don't want you to have friendships from whom you

learn sexuality the old-fashioned way; they want you to learn sexuality from their glitzy, provocative cues, so that they can hook you for life on fashions and superficial appearances (which you must polish and perfect with expensive jewelry, clothes, cosmetics, shoes, lingerie, and hair treatments; the older you get, the more it costs).

BODY LANGUAGE

The power of advertising is evidenced in the reduction of nonverbal communication from 80% to just 65% in the last decade. Big Business is winning, and that was before artificial intelligence and 5G broadband (think more and faster advertising, and real-time matching ads to your personality profile, maybe even your exact mood at the moment).

Body language is the connection of the mind to the body. It all happens automatically, and it's not directly influenced by a person's psyche. You may show depression in your facial gloom or slump of the shoulders, but that's still body language happening – relaying your feelings at the subliminal level. That implies the soul is at work in nonverbal communication.

If everybody wore special glasses that filtered out all sexuality, what would happen? People would have to assert their sexual attraction via nonverbal signals. Women, in particular, would have to depend on personality to snag their man. Everybody would ditch their smartphones. Sexting would seem like really shallow and irrelevant because nobody would have whole film clips of visual pornography in their heads to colorize the sexy texting.

Kids would form close relationships by talking, play, sports, and other extracurricular activities. They'd learn how to use body language to flirt, settle conflicts, even to fight for the person they're attracted to. They'd become nonverbal warriors, bursting with personality, uniqueness, and independence – because absent fashions and sexual connotations, that's how they'd stand out of the crowd, to the opposite sex.

Kids are so totally unfit in relationships that they have to appeal to teachers and adults to settle petty disputes that used to be resolved on the spot. That's what the total absence of roundhouse schoolyard play has done to them.

Which leads us to the idealized character in the spiritual sense: impeccable moral fortitude, staunch individualism, and gracefully courteous. In the modern texting childhood, absent all of the subtleties of nonverbal signals, moral fortitude is attributed to bullies, staunch individualism to rejects, and graceful courtesy to homosexual inclinations.

THE NEW WORLD ORDER

The idealized youth these days uses all their moral fortitude to self-discipline yourself into complying with politically correct norms; staunch individualism is limited to projecting sexuality via fashions and crude, lude body language; courtesy is a raucous, narcissistic assertiveness projected by their inexperienced skillset as bawdy arrogance.

The liberal elites look at the downfall of such groups like the Boy Scouts as a triumph. How dare they teach skills, hobbies, and values to kids – all children and teenagers need to know is right down there between their legs, waiting to be aroused. Who needs physical education classes in primary school to vent all that pent-up energy in constructive ways? They should be at home, planted on the sofa, playing video games (full of half-naked objects of sexual desire), consuming fast food and energy drinks, wallowing in righteous obesity.

Exercise and fitness are a sin. Fat is a virtue, so much so that both men and women grow up with breast envy and pack on the pounds so they can out-cup-size the next guy and gal. Everybody dreams of a summer vacation in New York City, that liberal mecca, where women can go bare-breasted in public; the little boys to ogle, and the pubescent girls to joggle.

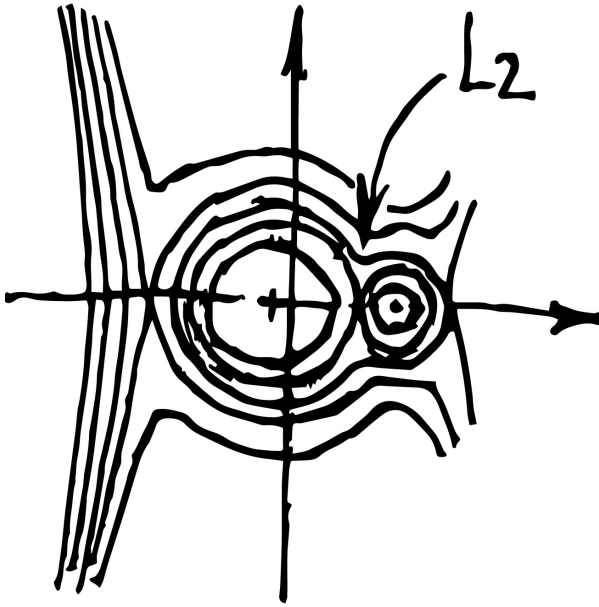


Figure 24.1 **The FAANG Collective**

Christ said that lust is in the eye and heart of the beholder. If he were around these days, he would also say the women who go around flaunting their attributes are halfway guilty of the lust they engender. It's one thing to get all gussied up for a fancy dinner date or a gala social event, but to bare 98% of your flesh on a public beach? Do women actually get aroused at all the little boys staring at her cleavage? Likewise for the little girls, staring at his rod jutting in that string bikini.

Personally, I consider it a psychological assault, some of the outfits women wear. Are they so desperate for attention – and so uncreative in doing so? They'll get just as much attention just being cute, happy, even loud – but wearing lingerie to the grocery

store? Don't women realize they can project even more (much more) sexuality via body language, especially if they have a fit, well-toned body? And you complain that the only men you can get are superficial one-night-stands?

RELATIONSHIP SEXUALITY

This is not a condemnation of women, but a condemnation of the culture that has made them this way. Who values grace and posture anymore, in men or women? We place a premium on a chubby body draped with expensive clothes (most of the high-fashion clothes women wear, by the way, are made by slaves working in more inhuman conditions than any plantation back in the day). We assign absolutely zero value to a cute, perky individual, oozing personality and pure *joie de vivre*, sporting a physique schooled in ballet or soccer.

Where are the guys who know squat about romance by the time they actually want to court a woman? Who learns kindness, courtesy, and cultural depth as arrows to pierce her heart? The liberal plutocrats have long since taught youth that such effeminate attributes or feelings are sure-fire proof that you're gay, and that your teachers and parents should put all their energies into bringing out your inner homosexual. In kindergarten? Ten years before you reach puberty and actually have sexual feelings? Who's committing the capital sin now?

Who in the modern day could survive the Annapolis Tea Party tradition for midshipmen in their first year at the US Naval Academy? They line up many young women (now young men, too, since they have female middies) on one side of a curtain, and the midshipmen on the other side, and match them one-for-one for the evening. You have to show her a good time even if she's a "brick." (I don't know what the female middies call unsightly boys, although brick is a unisexual term.) It's called grace, dignity, decency. It's called a formal dance when you're on your best manners and using all of your resources to have a good and jolly time.

None of this is in the realm of modern psychology. Indeed, a Ph.D. psychologist friend (a school psychologist at a local community college) once told me that I showed too many facial expressions and that only schizophrenics wear their heart on their sleeve. Clearly, modern psychology has signed off on this whole moratorium on nonverbal communication. Given half a chance they'd have me put away on a psych ward and use their caustic psychoactive meds to obliterate my body language once and for all. And this isn't just offhand anecdotal evidence. What psychology authority has bemoaned the rapid decline in body language? The answer is none. After all, Big Business funds their research and pays for their tenures and conferences; even shrinks know better than the gnaw off the hand that feeds them.

ENTER THE DRAGON

So, by design or by desperation, we hereby relegate body language to the realm of the soul. Our position in this is that you can't have enough body language – face, arms, hands, posture, relative position to others; all things go, and the more movement, the better. Put your transmission into gear, link your unconscious with your body, and get yourself into motion. Dance, run, swim; play soccer, martial arts, stick-fighting, Judo, you name it – express your body and set your mind free.

Men, get in touch with your inner gentleman and; well, learn the power of being gentle, kind, courteous, generous – all the Boy Scout attributes. Get in touch with your feelings, learn how to express them not just in words but in actions, what they call “details” in the Latino culture. Go ahead, try it out – watch her melt in your arms, experience first hand the power of tenderness to reach the heart and bless the soul. Bring on your wife's Many Body Problem, if you want to get crude.

Women, ditch all the slavery-produced high fashions and get in touch with your inner farmgirl. Nix the extra pounds and discover that fashions are for fat girls. If 80% of all Americans

are overweight or obese, join the 20% and become a man magnet. Save fashions for that special occasion when you want to knock your man off his feet (and coerce him into that Bahamas vacation or a new car). Save your knock-out moves for when they will do the most collateral damage – to get a raise, to land that important contract. Men are shallow fools – take it to them, make them fall into your trap; make it hurt bad (emotionally, of course) so that maybe they’ll learn to respect your skills and connivance.

THE PHANTOM MENACE

Fashions are like totally boring. Personality and perk and exuberance are far more prized and intoxicating. Stand out as an individual, glorifying in all your given attributes, show off your spirit and soul. Be like that Victoria’s Secret supermodel who made a video of herself working out in front of a fast food joint (munching on fresh fruit as she oozed sweat from her exertions). Social media exploded in protest at this “fat shaming” even though the pretty lady didn’t say one word.

Are the fat-cat liberals desperate or what? Who cares. Let them have their cake and eat it too. Let them glorify in their obesity and strut their gross, fleshy bodies in their slavery-designer fashions. They’re so fat they can’t even communicate via nonverbal cues. Which is probably a good thing because their body language would verily scream for help; to escape this obese dungeon of a body, to live free – to move – to communicate with and be communicated with nonverbally.

Finally, to answer the question proposed at the opening of this chapter: is lust a sin? The short answer is: of course it’s a sin. If it’s not a sin then what, a virtue? If lust isn’t a sin then the half of all the whole internet devoted to pornography is healthy and productive and a pillar of modern society (maybe it is, of a liberal society). If lust isn’t a sin, then prostitution should be legal everywhere, for all ages, and for any kind of sexual connection.

The long answer is more complicated because it’s all wrapped

up in our universal value set. Big Business is almost totally dependent upon sexuality to sell stuff. Watch any advertisement on TV, and you'll see an element of sex there; often overt and obvious, but more often subliminal and only suggestive. Ask Big Business (and all the major corporate leaders in the world) if lust is a sin, and they say hell no.

DE-EVOLUTION OF THE HUMAN SPECIES

Like, they can't make products that sell just because they're a good value for the money, or well made; because they're comfortable, attractive, not made by slave labor; made using green energy or with biodegradable products; because they're healthy, taste good, or do good things for your mind, body, or spirit?

The wages of lust as sin are everywhere in evidence. The whole #metoo movement verily shouts at the shallowness of people's sexuality. And no, sex education in kindergarten isn't the solution, but more nonverbal communication classes (like physical education, schoolyard sports). Sex education is the solution put forth by a society that's itself guilty as sin for causing this whole, horrible situation in the first place.

Liberals disparage conservatism, denigrate religion, belittle spirituality – then distort the facts and blame the Church pedophile scandals on – religion? All this out of control sexual violence is the fault of a too-strict moral environment. Are you kidding me? How could western culture be more “progressive” – by promoting New York City values everywhere, so that women can display their breasts everywhere – at work, in school, in the Halls of Congress, at the New York Symphonic, at religious services?

Clearly, liberals have declared war on moral depth and convictions; declared war on the human soul. And they're winning, but they don't have your soul – yet. Soon they'll have the full power of artificial intelligence, blasting their subliminal message at you via 5G connections (100 times faster than 4G); soon they'll have your soul.

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The Frequency Domain

Religion puts you in a frequency-domain state of mind. In the time domain, you live for the moment. In the frequency domain, there's accountability. The little accountant in your brain wearing the hat with the green-shaded bill (to borrow an apt description from L. Ron Hubbard, of all people, the founder of Scientology), he's keeping the book on you. No big deal if your heart lusts now and again, but if the tally gets up there in the high double digits, you're asking for trouble, according to el Ron: who's there as a warning, to set limits, to get at you before you crash and burn.

Lust-as-sin keeps the accountant on the payroll, marking in his little red book with every violation. (If you didn't consider lust as sin; well, there would be no record kept thereof. Hurray!) El Ron's there to nag you, to warn you off, to remind you of the tally now and then. But, alas, you don't hear his stern warnings because you're in the time domain. Lust isn't a sin at all. Where's the harm in it, huh? Tell me that, you righteous, sanctimonious bigot?

Then your marriage starts falling apart because your wife isn't attracted to you anymore. You can't get it up to please her; and, eventually, you no longer even want to please her. You risk losing everything you've ever worked for with her, the kids, grandkids, home, memories, a nest egg for retirement, all the dreams you'd built up together over the years on what to do after the house was empty of adolescents and college hang-ons. Poof, it's all gone in a blazing bonfire of vanity, and you look at a bleak declining years, alone, living in a hobble, without a hope in the world or a legacy.

Why didn't anybody ever warn me that habitual lust and a porno hobby would lead to this? Why can't I airbrush the wrinkles off my wife's buttocks or pump up her breasts to be young and nubile again? (And she says much the same, adding who's going to eviscerate the ugly beer belly off my husband, plant a new crop of hair in his shiny-bald head, and get his wretched face out the of porno mags?)

That, my friends, is why lust is the silent killer – of relationships, of happiness, or romance and love and family and togetherness. You don't notice it in the time domain. But you can't escape the frequency domain.

THE WAGES OF SIN

Psychologists have therapy to help couples recover their old pizzazz, but it takes a whole lot of work and discipline; money. You can't take a little red pill from the Rabbit and she her little blue pill to make everything right so you remain in Alice's Wonderland forever. Back in the day, psychologists would prescribe orgasmic reconditioning (you get off to your porno then at the moment of orgasm you transfer your attention to a more appropriate object of desire), but gays have discredited that practice, so it's been blacklisted.

Which is a page from the frequency domain ledger on homosexuality. It all looks harmless in the time domain. But when you realize that gays not only use orgasmic reconditioning to keep themselves turned on to the same sex; but that this simple and effective technique could save countless marriages from dissolution (she can still climax for her fat, bald husband and/or he can still get it up for his sagging, wrinkly wife with orange peel thunder thighs); could help pedophiles to get turned on by adult hotties; could have helped priests and Boy Scout headmasters and rapists suffering sexual dysfunction – tally up all the damage sustained by society at large by the gay war on orgasmic reconditioning because it implies they're living a lifestyle choice not a genetic

predilection. And you wonder why gays hate religion so much – it's not the spirituality they abhor but the accountability. Bugger.

The frequency domain keeps track of your petty thefts from your place of work, even if your boss doesn't. This soon becomes a habit in the time domain, and you justify it (they don't pay me enough, I shoulda gotten a raise decades ago) until it's not even petty theft in your mindset. Then your firm gets bought out in a hostile takeover. The new management installs hidden video cameras to see what the hell's happening to their inventory – and, bang, you're fired and maybe even facing jail time.

Shoulda gotten in touch with your inner el Ron and seen how things were stacking up in the Book of Life. Or gone to church maybe, or just taken the Ten Commandments to heart. Just because you hate God or don't believe, that doesn't mean the Ten Commandments didn't exist long before any God absconded with them and tried (unsuccessfully) to haul them up from Sheol into the time domain so that people at least tried to follow them even a tiny part of the time. Good luck with that, old boy.

COUNSELORS WITH NO BACKBONE

It's called a conscience, and it's not part of the subconscious; if you're asking. You won't find any psychiatrist telling you to not sin. That's not their business. Making blanket demands like that only turns people away from their offices (increasingly, religious leaders find themselves in the same boat: rain fire, guilt, and brimstone down on the congregation and pretty soon you won't have a congregation).

Psychologists (and, more and more, ministers) are there to wag a finger at you once your transgressions have caused mental issues, and to charge you a fortune to get you all fixed up again. After which time you get into serious financial debt issues, and your marriage fails anyway; so, for shrinks, it's a win-win situation, this whole sin game.

On another, higher fractal level, we see the dangers of political

correctness. Religion needs its institutional soul too, the Big Accountant in the Sky. Who's keeping track of the trillions of sins forgiven to Hispanic, mostly Catholic, illegal immigrants? Did the Church even assign penance for breaking laws, lying, subversion, greed, theft of services? Apparently not because they've championed the cause of open borders and illegal immigrant rights ever since.

What's the cost of the Church's role in the immigration fracas? Could their penance have been for all the immigrants in each parish to pool their spiritual penalty and to use the money to build schools back where they came from, to educate children out of poverty, to break the cycle, to make their own nation a great place to live? To give money to their host nation to reimburse them for the cost of school and healthcare that they got free? To file a massive civil suit, even, against employers who got rich off of cheap immigrant labor? To help the illegal immigrants return home, with all their new skills, to rebuild their homeland?

A GUILTY CONSCIENCE?

Everybody hates that little IRS agent inside each of us, calling past accounts due. There are many departments – for sex and lust offenders, for petty thievery, for lying (the average person tells 20? 100? lies a day – is that you), cheating, bullying, disrespect of professionals (like teachers, engineers, architects – in Hispanic nations they're called by their title, with respect and gratitude; not in America; the only people we respect are billionaires, who steal us blind), disregard for our elected leaders, and countless offenses people do regularly to complete strangers on all the social media platforms.

We hate the frequency domain. We live in the time domain so we can spend every red cent we make and take on credit card debt without limit. Then the bill literally comes due one day, and suddenly we realize that with so many debts we'll never be able to afford college or nice vacations, a own home, or even marriage. (If you have over \$11,000 in credit card debt you're considered

undatable in the internet dating world; so you won't even be able to have a relationship, much less gratuitous sex.)

Nobody takes the time to warn you about all these calamitous life events that build up in the frequency domain until they suddenly explode into reality. They see it happening; they might even give off-hand warnings (aren't you drinking too much? Can you really afford a new child – car, suit, tool, toy, dress, or pair of cowboy boots); but secretly they lust to see you crash and burn because that moves them up one notch in the pecking order, because it feeds their ego, their seething, burning, latent narcissism.

Again, psychology isn't in the business of teaching us how to avoid these things. Nor are schools or even most parents and friends. Everybody lives in the time domain, and nobody notices their own frequency domain, much less that of anybody else.

FRACTAL LEVELS OF SIN

As you can see, there are many fractal levels to this sin trap. Nations fall victim to massive debt (they either go flat broke, or their grandchildren do), whole religions, corporations (the FAANG collective that has gotten filthy rich off of selling data in all their loyal, dedicated users – to advertisers, political campaigns, foreign governments; you got the money, we'll give you the billions of detailed files J. Edgar Hoover would have envied they're so exhaustive), cultures, communities, schools, all the way down to you and I.

Do you believe in the frequency domain now? Are you a little bit interested in avoiding all the terrible pitfalls that religious leaders have been trying for millennia to vaccinate us against? Forget about how they say it all came in a vision from God, or on tablets writ on Mt. Sinai in ancient times. It came from hard experience. They warn you, to help you live a better life and to starve all the crooks, shysters, and con artists in the world into bankruptcy. We deserve better. They don't. We won't use God here. We'll just use math. Maybe you'll listen then.

26

Vibration Modes

We know what the frequency domain is as a concept. It takes our actions in the time domain and tallies them up in one nice chart, like 100 years of global temperatures showing the escalating danger of global warming. Like heart disease or diabetes, it's the silent killer – of hopes, dreams, families, even entire nations. It's your whole life flashing before your eyes; all the things that could have been.

We're going to try and add this frequency domain to our psyche model. The idea is to build the little account with the green shades into your psyche. It's not your conscience, just your trip wire to warn you of things to come; to send messages into your brain, with a red-flag warning as things get to the critical level, so you can consciously put on the brakes before things get out of hand. Think of it as your Mom-for-life (or Dad with a switch if you really screw up bad), so that you can achieve all the dreams your folks had (have, as the case may be) for you.

We return to our old friend gravity, to build up our soul model from scratch just like we did with the psyche model. We know that our model is eventually going to be the tripartite Trinity, kind of like a rotating 3BP id/ego/superego; a vague notion that we hope to reach, just like there was an iceberg theory in the future as we did the egg-sperm-zygote-ellipse thing, en route to the iceberg and the conics.

We want it all to jive with the gravity examples, or at least as an inverse-squared force so that even though this is a separate theory of the soul, it will also integrate into our psyche model. So

let's say the soul is there to recognize the gravity of situations – the gravity of the Ten Commandments say. Every violation thereof begins with an impulse, which we might overcome for a while, but eventually, it breaks through into physical action; we do it – and boom, it's like a spike on an EKG.

ACCUMULATION AS VIBRATION

This violation of standard protocols, this sin, this crime; it's not just a shock to the psyche, it's a message for el Ron Luzifer, the evil accountant in charge of our frequency domain. He spots the infraction, and opens a new column in his giant ledger, patiently recording the time, place, date, and the circumstances. If you don't repeat the violation, then over time it fades away, just like

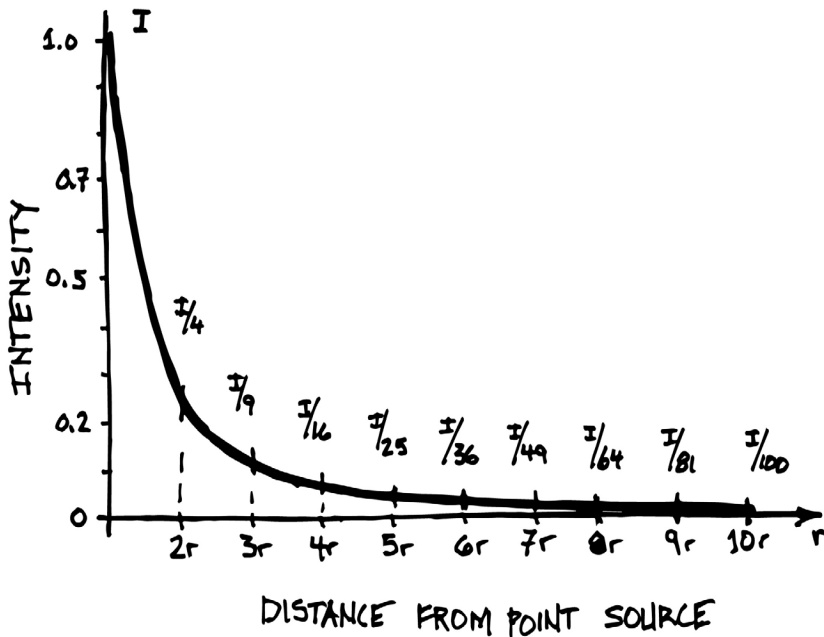


Figure 26.1 Plot of an Inverse-Squared Force

gravity diminishes from the source. Hopefully, the horizontal scale in Figure 26.1 is in days; if you're a repeat offender in other offenses to the soul, it might be weeks or even months. If you get away with your little sin, you might be inclined to try it again. You got a great buzz off the joint; all the other kids are doing pot, and your little social bubble isolates you from outside regulations (or perhaps imposes its own). So you try it again, and it might even become a habit (tobacco, alcohol, bullying, disrespect).

DAMPED MECHANICAL VIBRATIONS

Since we've been talking about many and repeated actions in our exploration of the frequency domain, it's reasonable that we turn to the field of mechanical vibrations for our inspirational little diagrams and comparisons. Our gravity studies of the 3BP and other problems are vibrations as well, if more complicated; so our use of vibration theory here fits right in, not just in our model conceptualizations but mathematically. I suppose you might also say that sex is fundamentally vibration and the started off our psyche model from the same place so, why not here too? Hopefully, we can move into some of the more profound facets of the soul later on like remorse, grief, happiness, gratitude, and faith.

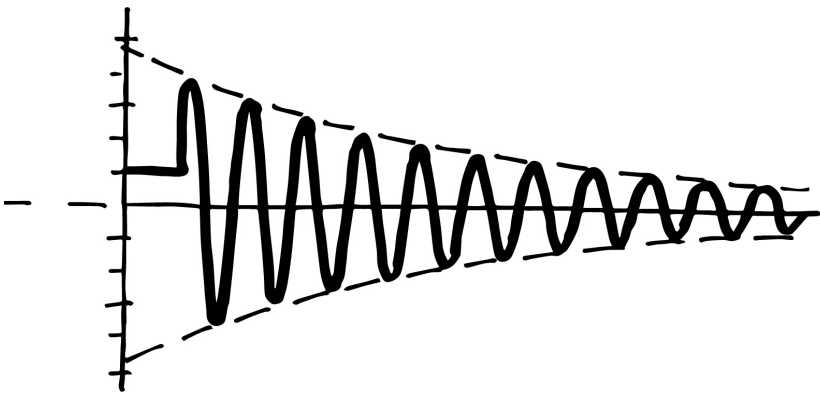


Figure 26.2 A Damped Sinusoid

Figure 26.2 is the plot of a damped vibration. The sine curve inside are spiked for each violation, and you're fighting the impulse afterward. The gentle curves on the top and bottom are an envelope curve. If your actions are addictive or dangerous or highly

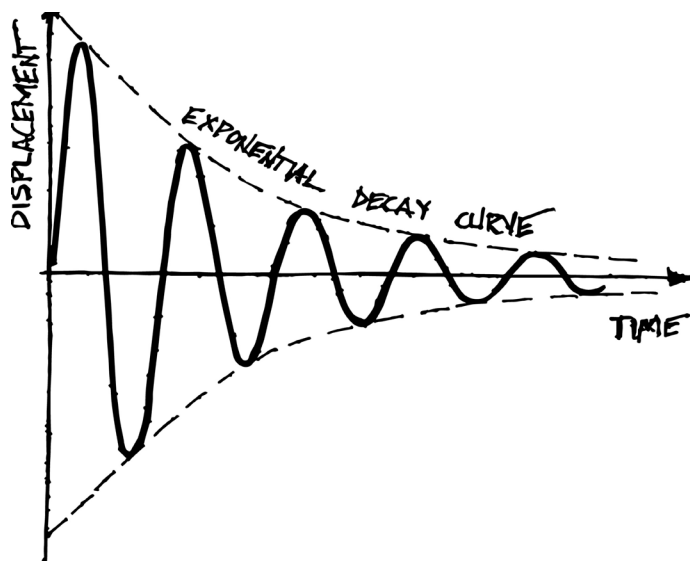


Figure 26.3 A Highly Damped Sinusoid

forbidden, you might try to fight the habit. That's your envelope curve, your soul. If you have strong scruples or a stable upbringing; you might partake of the forbidden less often, as in Figure 26.3. The envelope curve is steeper as your willpower grabs hold and gets control of the situation.

THE TUNING FORK

Conversely, a highly addictive narcotic might get you hooked real fast, or you might fall head over heels in love with a deadhead senior and bolt from your whole social support network, to be in his strange, new world. Then the curves in Figures 26.2 and 26.3 would be reversed; instead of a decreasing amplitude (the vertical distance) it might increase and quickly get out of control.

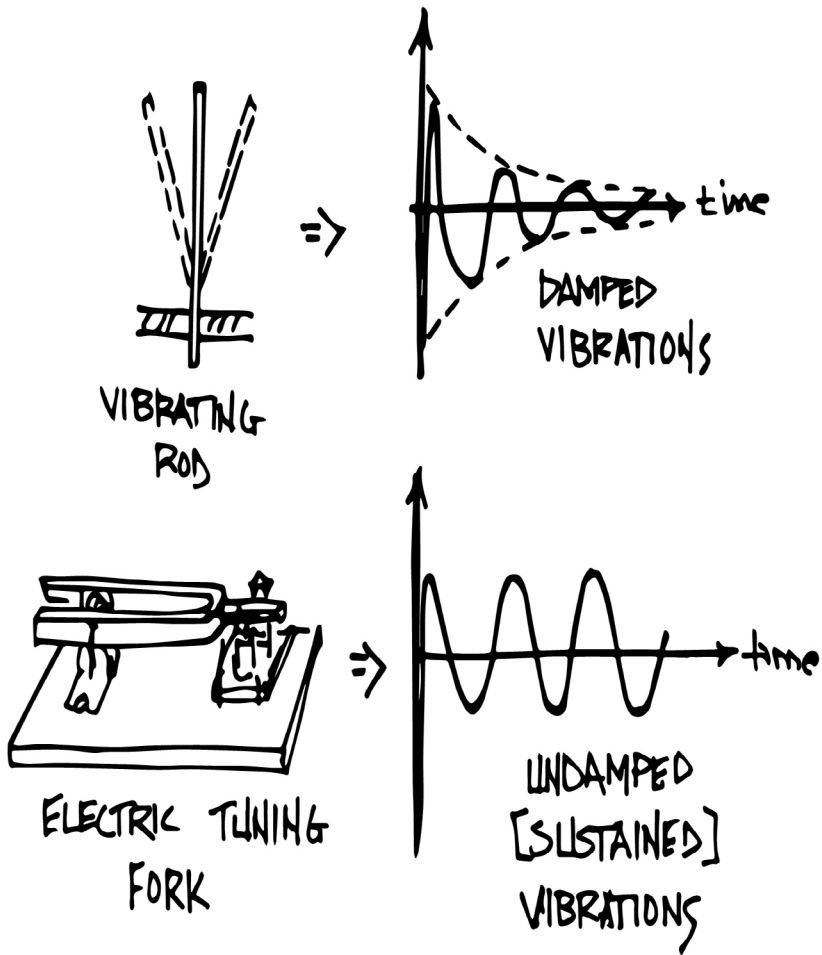


Figure 26.4 **Damped and Undamped Vibrations**

Vibrations like this are easy to show by example. A tuning fork vibrates at a fixed frequency; an electronic tuning fork will have an undamped vibration (the bottom half of Figure 26.4) whereas a simple vibrating rod will damp out over time because of resistance from the air. If there are no social inhibitions against your actions, or if you get constant reinforcement from your peers or new social network; there's no external force to dampen your temptations,

as with the electronic tuning fork. Another way to think of these impulses are as point sources, illustrated in Figure 26.5. It's like throwing a stone into a calm lake. Rings of waves move outward in waves from the source. We call each ring a wavefront. You'll notice that these waves die out as well so that if you took a cross section of any given wave, it would look like Figure 26.2 or 26.3. The damping force in the lake is the friction between the water

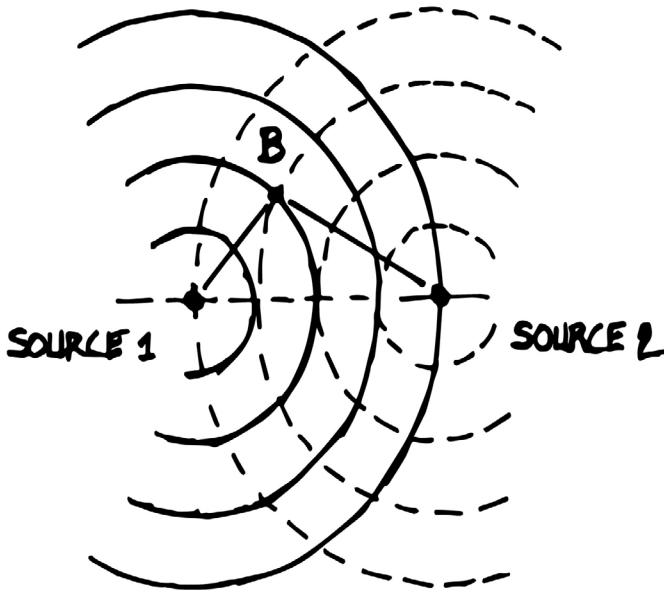


Figure 26.5 **Interference Between Wavefront 1 and 2**

molecules which sap energy from the wave and cause it to slowly die out.

INTERFERENCE OF WAVES

The second wavefront in Figure 26.5 sets up a new set of conditions. The two waves will collide, and at some points, they will add

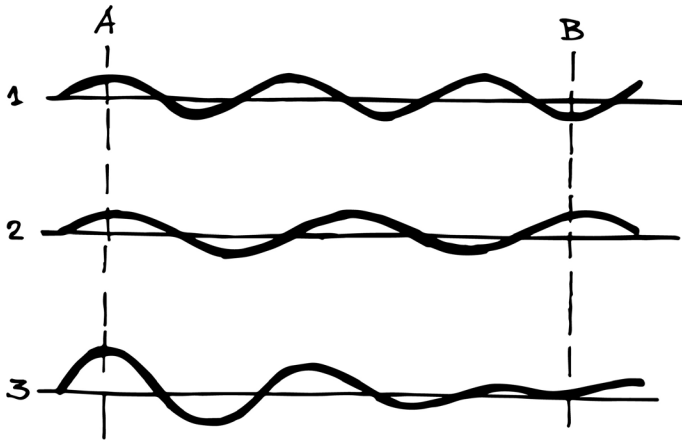


Figure 26.6 Constructive and Destructive Interference

together and form a higher peak, and at other points, they will collide and end up flatlining or even combine destructively for a lower trough. These phenomena are called constructive interference (they add up) and destructive interference (they nullify each other).

Figure 26.6 shows how these waves add up along the two lines A and B in Figure 26.5. The idea here is that some external influences might encourage your behavior and others might discourage it. And, being a good teenager, an authority that discourages the behavior or tries to stop it might actually increase your violations just out of plain rebellious belligerence.

THE SYSTEM WAVE AS INTERFERENCE

We can use this new vibration perspective for a new take on the 10BP results. Consider that the symmetric plane can be created by fixing a straight line to two circles, one located near the sun (giving insight into Relativity's space-time distortion at the sun and also the precession of Mercury's perihelion), and the other wheel is between the orbits of Earth and Mars. As you move these two wheels around the sun, each wheel turning at the same rate as

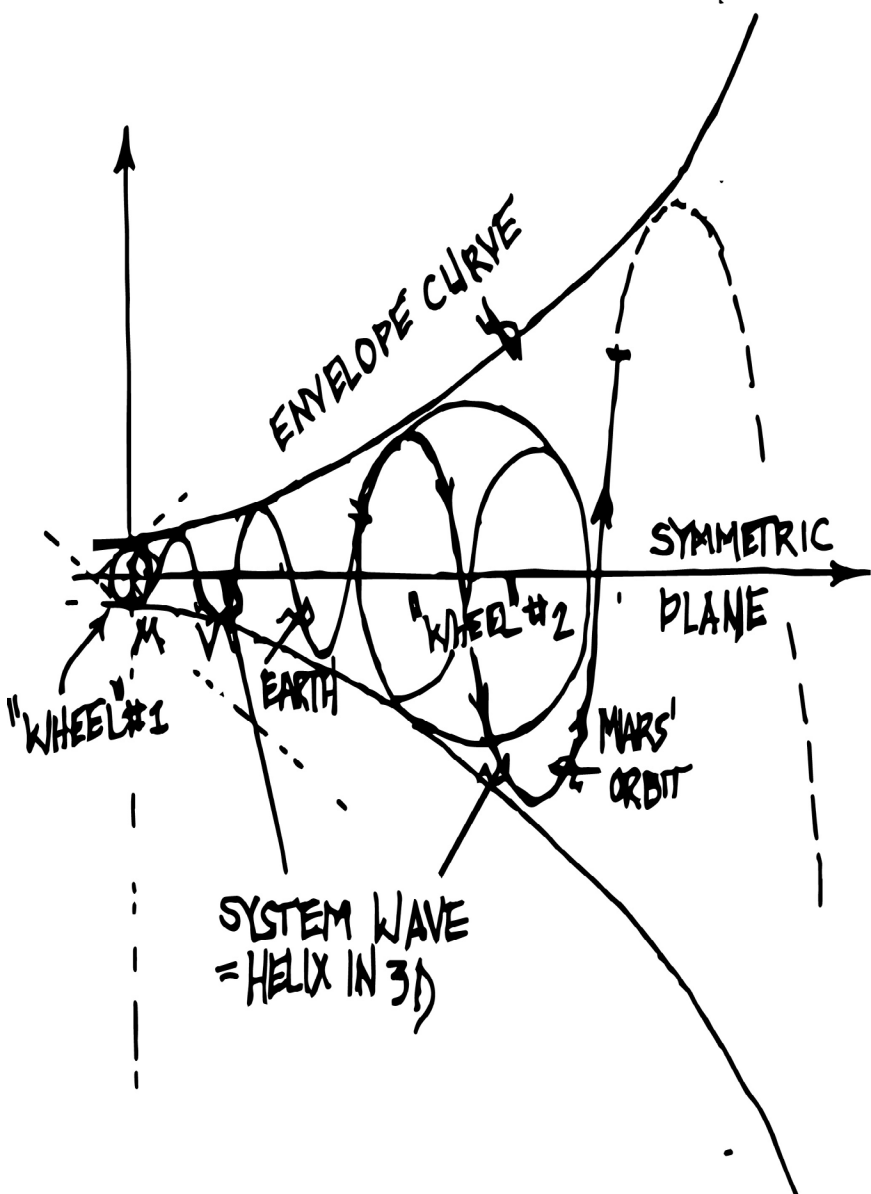


Figure 26.7 Generating The Symmetric Plane

our angular motion, they trace out an exact fit for our symmetric plane. Where the small, inner circle is the sinusoidal variation in the y-axis intercept that we calculated and the outer circle is the sinusoidal variation in the slope of our least-squares fit lines.

If we consider both circles as local aspects of a larger vibration, you get Figure 26.7. The symmetric plane is, at this point in the motion, aligned with the x-axis in the figure, with an envelope curve sketched at the maximum extent of the motion in the y-direction. Since the motion of a point on a wheel projected horizontally is a sine/cosine wave we can imagine the wave pattern inside the envelope curve as a way to combine the actions of the two wheels into a single model.

PLANETS IN VIBRATION BEATS

Again, we have the idea of a waveform originating at the sun and with the planets as fisherman's bobbers on this (gravitational?) wave, affixed by virtue of their mass and/or electromagnetic Van Allen belt type field. The four outer gas planets have powerful magnetic fields; Earth a moderately strong magnetic field called the Van Allen belts; Mercury has a fragile field; Venus, Mars, and Earth's moon have almost no magnetic field. Which doesn't quite jive with our magnetic field theory, holding each planet on the system wave.

However, if we assume the wave is gravitational, the much stronger gravity acting on the inner planets could compensate for a weaker magnetic field; and the much stronger magnetic fields for the outer planets could compensate for the weaker gravitational force; so that, combined, the net force on the planet relative to this wave (which we conjectured was a stability wave, similar to the Lagrange stability points but a wave) would be more or less consistent.

The location of the inner wheel near the sun (perhaps at the barycenter of the solar system) is reasonable. Figure 26.8 looks at the region around the second wheel and is reminiscent of our

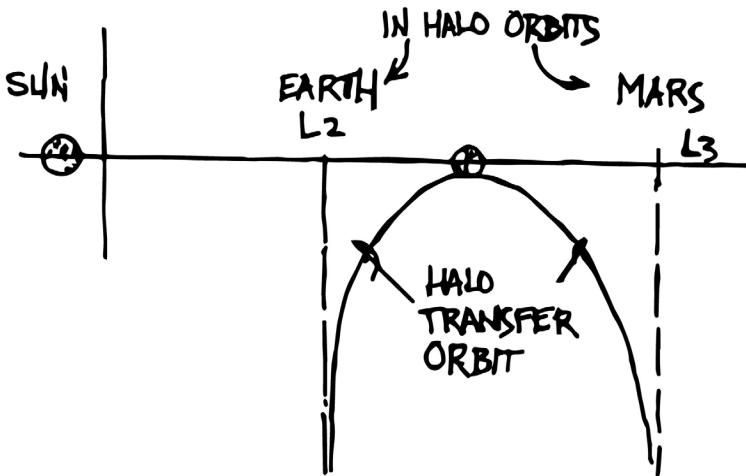
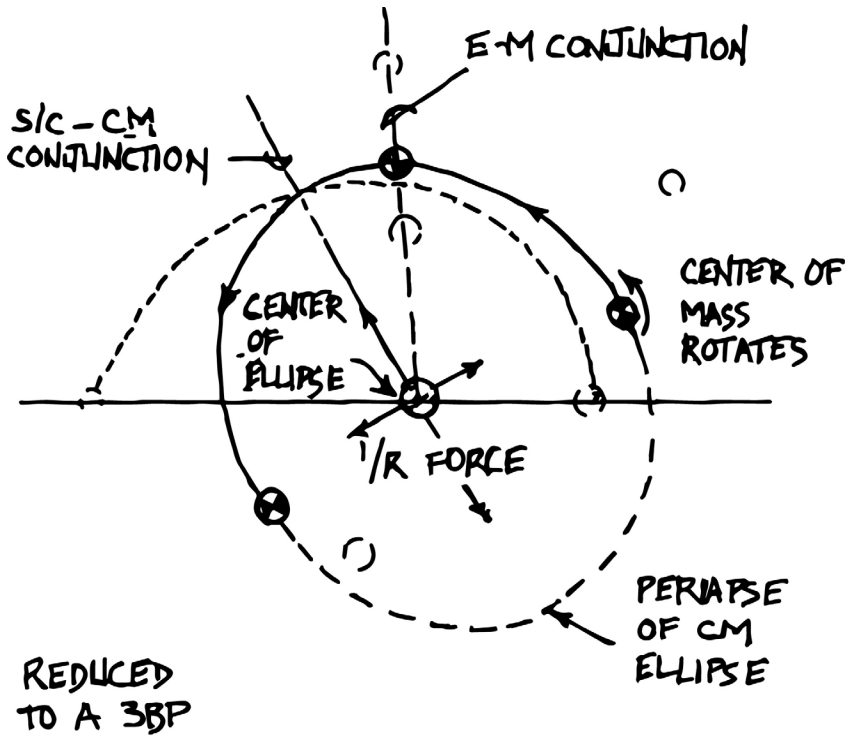


Figure 26.8 The Earth-Mars Transfer Orbit

investigation into the Earth-Mars interplanetary transfer. The inner dashed line in the figure shows the path of a s/c originating at Earth at perihelion (closest point to the sun on the ellipse) and arriving at Mars at aphelion (the farthest point from the sun on the ellipse).

The ellipse itself is the center of mass for Earth and Mars during the trajectory of the s/c. Conjunction is that point in the orbit where Earth and Mars are at the same heliocentric longitude, and the s/c is just off that line.

The bottom half of Figure 26.8 models Earth and Mars being in halo orbits around L₂ and L₃ in an imaginary 3BP, with the Sun as one primary mass and the center of our outer symmetric plane wheel as the second “imaginary” mass. Remember we’re in the complex plane now, which has one real axis (one foot in the real world) and one imaginary axis (the other foot in the imaginary world). Also remember that we’re reasonably close where both Cassini’s (imaginary) $1/r$ force and gravity’s $1/r^2$ force; recognized by the (imaginary) f- and g-forces and the two-body force, respectively.

A Three-Phase Domain

Okay, so we're comfortable in the "imaginary" frequency domain of the soul. Now we just need to get there along a mathematical pathway.

In engineering disciplines, complex analysis is used universally to study complicated systems and to optimize performance through controls. Typically, the system is modeled using electrical components. For example, friction in a mechanical system (a shock absorber, causing damping) is modeled with a resistor; mass in a mechanical system is equivalent to inductor in an electrical network; a spring in a mechanical system is a capacitor in an electrical system.

Similar analogies exist for fluid, pneumatic, and structural systems. Individual elements in each system are replaced with their electrical equivalents and then studied as a complete network in system and control theory.

THE ELECTRICAL DOMAIN

We've already made a good beginning in electrical ideas starting with Coulomb's Law for electrostatics at the atomic level. The Bohr atom is a 2BP, and the transistor junction is equivalent to a 4BP. Arguably, the current flow of an electron stream is a Many Body Problem.

Our situation is this: (1) We know the simple electrostatic basics in the time domain, and we want to (2) extend our orbital theory

into the frequency domain where we can (3) do our analyses in the complex plane.

The 2BP, 4BP, and NBP are all in the time domain; i.e., our coordinate axes are both real. The 3BP is in rotating coordinates which is half-way to the complex domain (where one axis is real, and the other is imaginary) except that neither axis is fixed: both rotate.

Since our soul analogy is hoping to build upon the 3BP, we need to examine the 3BP more closely and figure out some way to make one axis real and the other imaginary. The math we've been using isn't going to help much (we maxed out with the 10BP), so let's pose the 3BP problem using new mathematical ideas – the same concepts as used in complex analysis.

ROTATING PHASORS...

You're familiar with the notion, illustrated in Figure 27.1, of a rotating vector. Here we show it's in the frequency domain (on the complex plane with real and imaginary axes). The motion of the rotating vector (called a phasor) in the time domain is our simple sine wave, where the angle θ of the rotating vector is the displacement along the x-axis in the time domain. The bottom graphic in the figure shows L2 and L3 identified by vectors from the origin or center of mass.

...IN THE COMPLEX PLANE?

These are actually phasors because we recognize L2 and L3 as Lagrange points in the rotating 3BP. Consequently, if the idea of being in the complex domain confuses you; well, we've been there all along with the 3BP.

Except, of course, both axes in the 3BP are in the real, time-domain. So, theoretically, we're not in THE complex domain, but halfway there; which, of course, we already knew – but now we can see why this is mathematical.

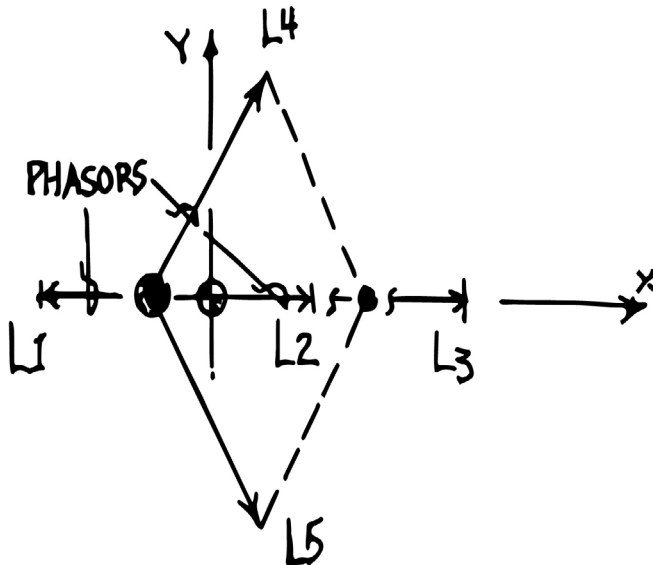
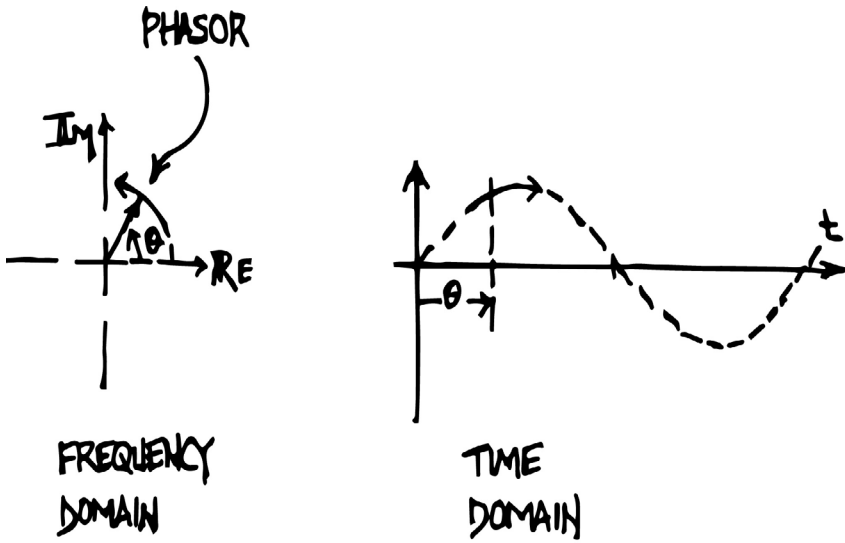


Figure 27.1 A 3BP in the Frequency Domain

Figure 27.2 makes this distinction a little clearer, showing the 3BP stability points in a rotating and non-rotating system. The bottom half shows the Lagrange points in the complex plane, where the eigenvalues show L_4 and L_5 are stable (no real part) and the colinear points are unstable (at least one real, positive part).

The match isn't exact, but it's close; so, the 3BP is part-way into the frequency domain. Which, again, we knew already, but the Lagrange stability analysis reinforces this position even more.

THE 3BP IN THE COMPLEX PLANE

Let's try this new math in a different kind of 4BP. Figure 27.3 is a highly structured 4BP with three masses at the points of an equilateral triangle and with the center of mass on the lines that bisect each inner angle (and also bisect each outer side). We're at the subatomic level right now, and so to correspond with the gravity 3BP, we need to think of the three masses as the primary masses and an electron as the 4th much, much smaller body.

This puts the electron on a zero-velocity curve, and since we know there are many zero-velocity curves, we can have many electrons zipping around this 3-proton nucleus, moving through the environs in patterns represented by the Schrodinger Cloud plots. Previously, we proposed free-return orbitals as a possible p-type electronic orbital, as a bonding orbital between atoms in a crystal matrix, and as covalent bonds forming a complex chemical compound: alias three fractal levels.

NESTED 3BPS

Now consider that the nucleus is more or less fixed in space, at least relative to the electrons that are moving so fast that we can't pinpoint position and velocity but have to depend on a probability distribution to estimate where they might, possibly, probably be.

Arguably, they move so fast that they only see two of the primary masses (think of this as a step toward the Many Body Problem

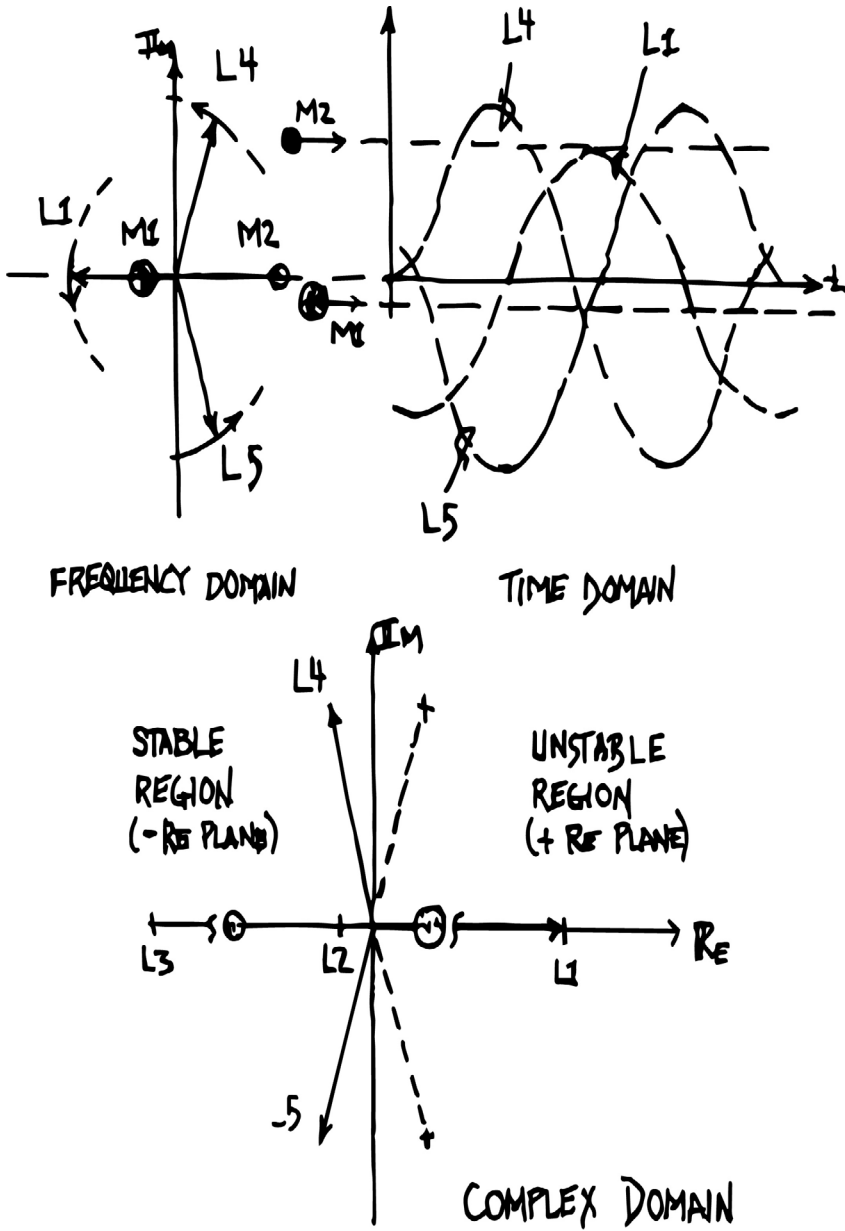


Figure 27.2 The Complex Plane and the 3BP

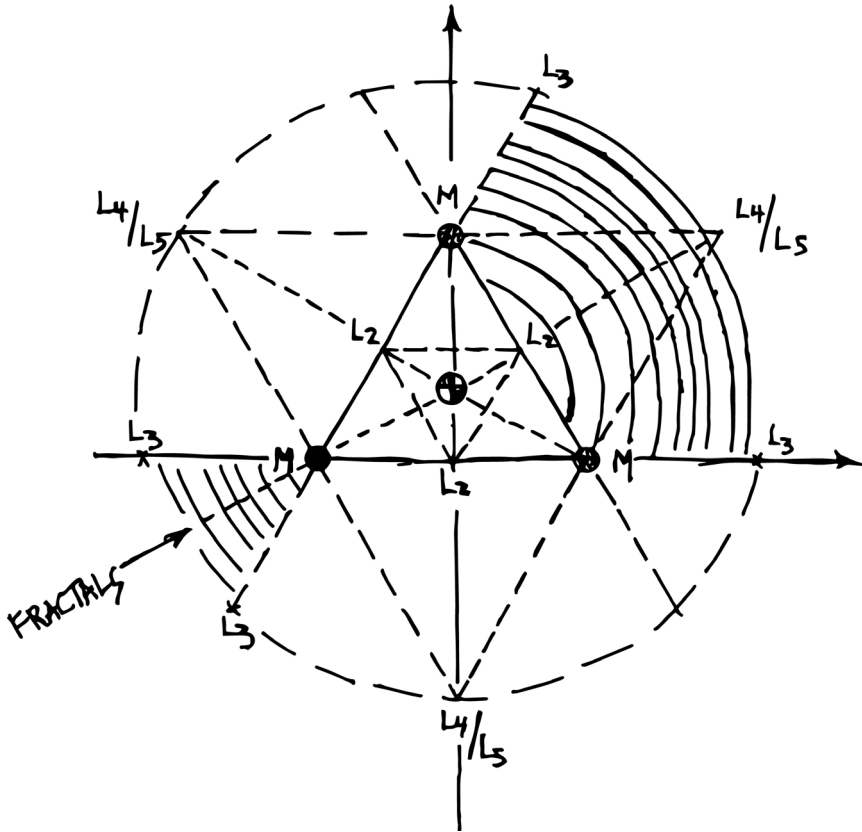


Figure 27.3 **Nested 3BP in the Complex Plane**

where electrons don't see any of the many primary masses but move in a fluid stream, literally and mathematically), and we can represent Figure 27.3 by two nested 3BPs.

Remember the Earth-to-Mars trajectory was a 4BP which we modeled with two 3BPs, one at Mars and one at Earth, patched together on either end of the heliocentric ellipse. Crunch together the Mars problem to minimize the sun-centered transfer part of the trajectory; except that the sun is so much larger than Earth and Mars the heliocentric transfer ellipse becomes a 3rd 3BP with the Sun and Earth as the larger primaries and Mars as the smaller 3rd body, and you get Figure 27.3 (conceptually, at least).

Now we can look at the figure as nested 3BPs, each with L₄ and L₅ equilateral points, one of which is coincident with another primary mass. The whole thing rotates around the barycenter of the three masses which, because the mass distribution is symmetric, behaves as a single mass when seen from a great distance.

THE SUBATOMIC 3BP

Our problem with modeling an atomic nucleus as a 3BP, or several; is that the primary masses are actually positively-charged protons. The force between them isn't attractive but repulsive. Consequently, there must be a steady stream of electrons flowing through the space between the protons, neutralizing the repulsion between the protons and replacing it with the attraction between positive protons and negative electrons.

Meanwhile, the electron clouds outside of the nucleus (negatively-charged electron clouds) are kept locked to the atom by the positive nucleus. This dynamic consistency between protons and electrons lets us model it as an electrostatic 3BP, using our old inverse-square 3BP methodology.

Why bother with this 4BP at all? If we're trying to model the soul as a Trinity of entities, isn't the 3BP already what we need? Yes, except that our soul is under assault by a battery of temptations. Yes, except that we're not just modeling the Trinity, but the Trinity interlocked with the psyche (another 3B), so the figure has added relevance here.

Now, we look more closely at the protons. The influence of the steady (Many Body) stream of electrons through the proton interstices (think of many figure-8 orbitals rotating in all directions, centered on the center of mass of the three protons) holds the protons together in a dense nucleus.

Think of the protons as being held together by springs (a $1/r$ force; which we know exists at close range inside a 3BP), and vibrating in small orbits around stable points in the overall crystal matrix.

Let's look at this problem from the side; or, if you prefer, project motions to one side. Figure 27.4 shows a regular motion of the three primary masses. Basically, we just show three masses (protons) vibrating around a common center. In the time domain, this vibration is sinusoidal; in the frequency domain, it's much simpler: three rotating phasors.

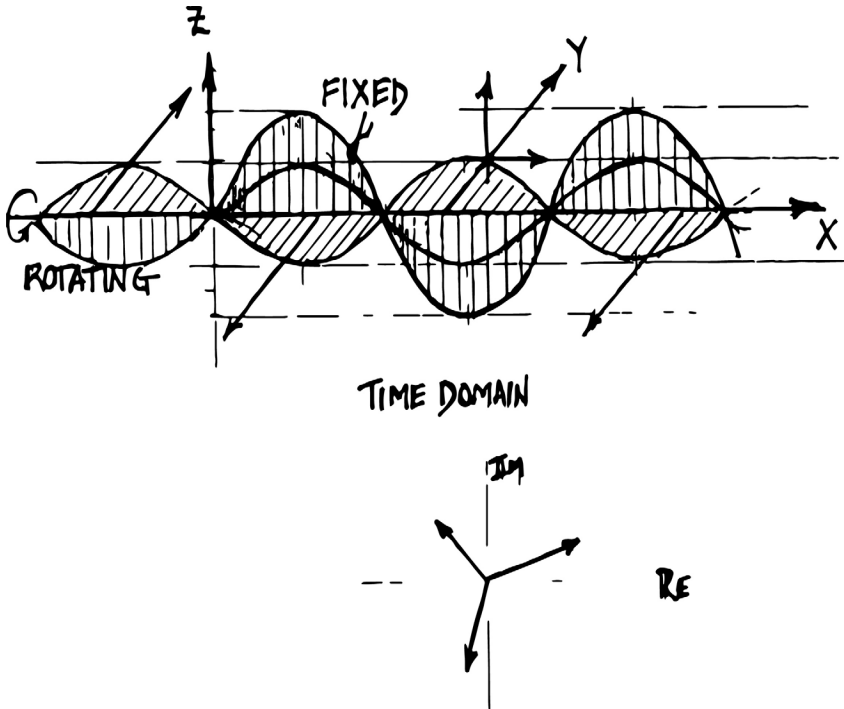


Figure 27.4 The 3BP as Phasors

THE 3BP AS TRINITY

In our Trinity model, this represents the stable system absent external influences. That is, the 3 masses in the Trinity are all primary masses, and the 4th body on our 4BP presentation is an external force from outside the atom and it's overall matrix (think

comets orbiting the sun as center of mass of the solar system; or a Jovian comet interacting with say just the Father construct).

Figure 27.4 is how we model electrical current in the design of circuits. The universal standard is three-phase Alternating Current (AC), with two “hot” phase (one positive and a red wire, one negative and a white wire) and the third phase is ground, a green wire. (Think Father, Son, and the ground phase is the illusory Holy Spirit.)

THE SUBATOMIC NBP

Electrical engineers study AC in the complex plane by representing the current as phasors, using the exponential notion presented earlier. Think of this as our classic 3BP with two large masses (the hot phases) and a very small 3rd body, the very small amount of current that goes to ground (when the other two phases are out of balance, i.e., unequal). Since we’re in the usual rotating coordinates, a projection of these motions looks just like the top of Figure 27.4.

We’re talking current now; an N Body Problem. So each of the three phases is a current flow, an NBP; but the three separate phases act overall like a 3BP, and we’re back into a situation that we can model.

Reference our Trinity, as suggested earlier, we can consider the system as a top rotating very fast, a very stable dynamic configuration that by virtue of its stability grounds the psyche to a strong foundation.

Figure 27.5 shows a Direct Current (DC) circuit, where the variable resistance R_4 is adjusted so that the two voltages are equal, balancing the circuit. Think how similar this is to a thrust (voltage) applied to escape Earth and a second thrust (voltage) to land on Mars, moving our s/c (electron) from one terminal to another but applying an optimizing voltage at conjunction; then a continuous DC current flow, and you have the transistor junction.

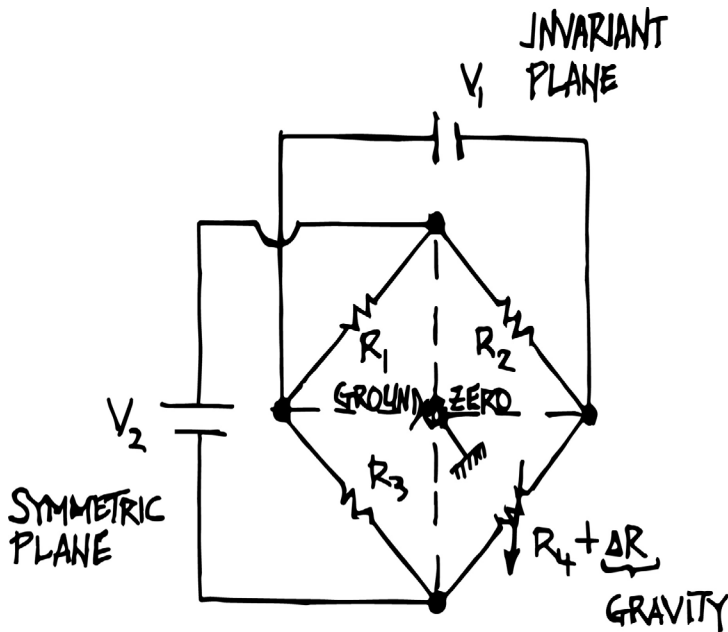


Figure 27.5 A Whetstone Bridge

Now imagine the voltages as Alternating Current (AC), the two main phases charging a 3rd phase, a ground in the center. The resistors in the circuit vibrate, simulating a small halo orbit at the center ground. Think of the R-loop and the center halo orbit as the inner and outer wheel of our system wave, modeled in an electrical circuit.

THREE BALANCED PHASES

That's the power of electrical modeling of a system, plus our fractal model. What happens in every level gives insights into the other levels, as well as tangible models that help us to understand abstract concepts. Also, notice that applying AC to a DC circuit puts it all into what we consider a rotating system if the phases are balanced. (If the phases are unbalanced you have an electrical

system in the full complex domain.) Which implies that our next step toward the complex plane should be to investigate what makes our system balanced; to unbalance it; and see if that moves our model toward the complex plane.

So, back to alternating electric current as a real-time 3BP.

Let's test this new Electrical Engineering (EE) approach with some 3BP plots of new zero-velocity curves. That is, stable, closed curves that we haven't seen before. Some were discovered using mathematics, others using computer models of the 3BP, both in the plane of the primaries and in the 3D Three Body Problem. Figure 27.6 suggests three different phases that are completely balanced.

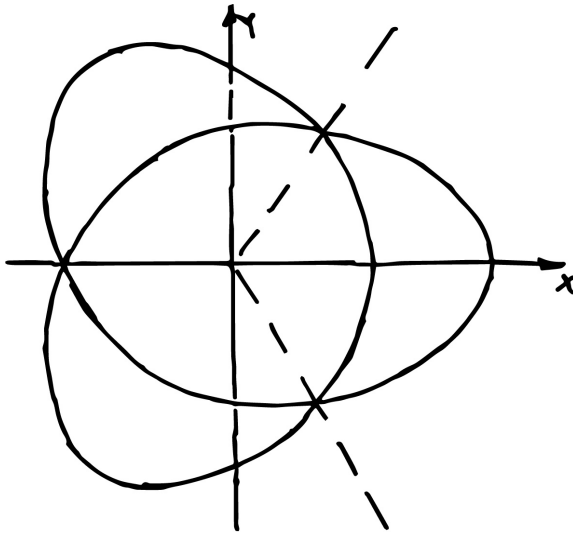


Figure 27.6 **Closed Orbits in a 3BP**

All three phase loops are balanced nicely, each 120 degrees apart. Except of course only two phases are used in alternating current. We have a 3BP curve for that, too. This is an idealized Trinity: equal, balanced, at one with the Universe.

Ommmmmm.

UNBALANCED AC CURRENT

The little outer loop in Figure 27.7 suggests current lost to the neutral leg (it goes to ground), which is lost power but the three phases are still working okay because it's a closed loop. Distractions from your Trinity soul, sapping your attention and energy. (Tripping an internal circuit to wake up your inner accountant to start a new ledger column.)

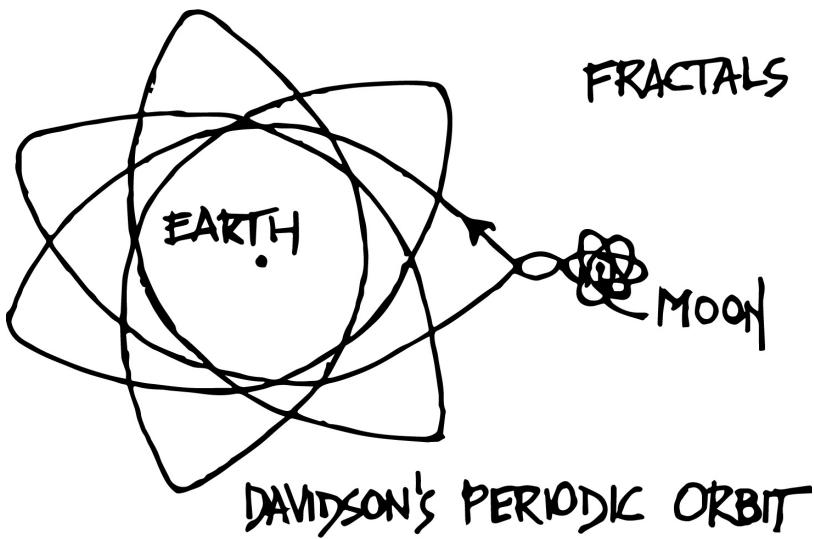


Figure 27.7 **Davidson's Orbit**

Another way to evaluate a system is to study its performance over time. (Issues are too important to ignore, the ledger column gets more and more entries: the time domain weighs on the conscience.)

In Figure 27.8 we see in the ground loop a spurious energy lost at stability points. (Your internal accountant, ideally, should hit the big red button to send a signal to your conscious mind: warning, warning, Dr. Smith.)

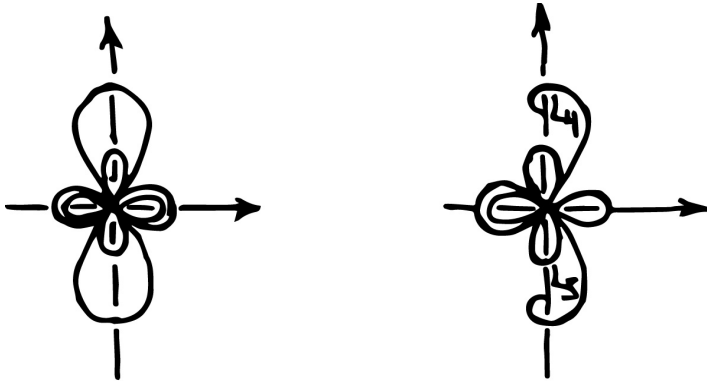


Figure 27.8 **A System Becoming Unbalanced**

Figure 27.9 shows two another way to have three balanced phases, with the neutral going to the ground at the center. (The psyche is very good at denial. It loves to sap energy from the soul, too – and to cover its tracks with an apparently balanced phase-circuit. Still a smooth, dynamic engine; so smooth that your inner accountant might not even notice: think artificial algorithms sneaking past all of your inner defenses, lulling el Ron asleep.)

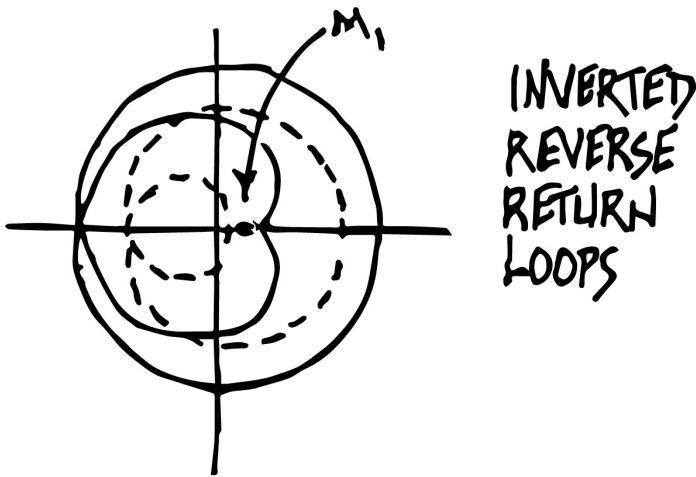


Figure 27.9 **Another Closed 3BP Orbit**

THREE-PHASE ANALYSIS

You might think of these figures as ways to study alternating current systems and to use the 3BP domain to balance the phases better, or even to use all the power normally lost to the ground phase as useful power, thus dramatically increasing the efficiency of the overall system.

(That is, finding an AC fractal level has the potential to apply 3BP dynamical methods to modify existing systems to use less electricity, more efficiently.)

Referencing Figure 27.10, a building or a machine might originally be designed so that all the phases balance nicely; the rightmost figure shows zero ground current, which is maximum efficiency (not power lost to the neutral phase).

Then over time as the building systems are modified or as the machine load changes or as moving parts wear out, the system may appear to be balanced (still closed loops) you get more and more power lost to the third phase (moving to the left), until fully a third of the power input to the system is wasted, discharged directly to ground.

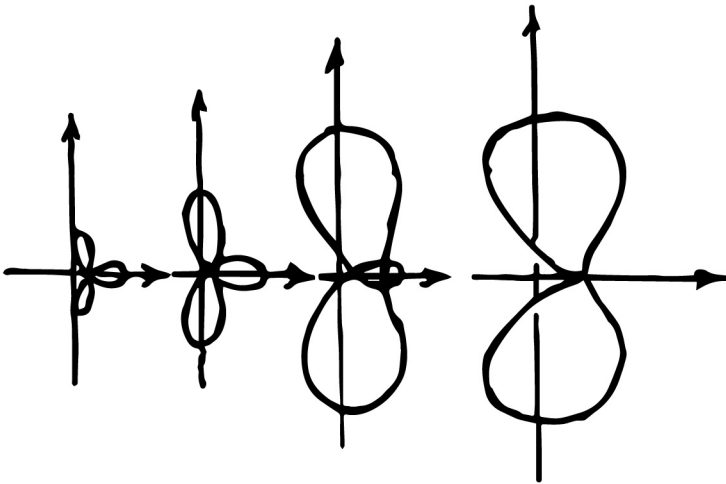


Figure 27.10 **Evolution of an Electrical System**

Here we see a healthy Trinity that, like a spinning top, can take a lot of abuse but still remain balanced, and healthy enough so that some careful external help can get back into proper alignment. (Modern AI algorithms can learn now, and they know so much about your that they can take this flexibility out of your soul and grind the whole spinning wheel to a catastrophic halt – suddenly you're a card-carrying liberal bigot.)

Electrical analogies are used to model all kinds of systems: mechanical, structural, pneumatic, and even fluid systems. If you can apply 3BP examples to make electrical systems more efficient, then you can also make any mechanical or other system that can be modeled using electrical components more efficient, too.

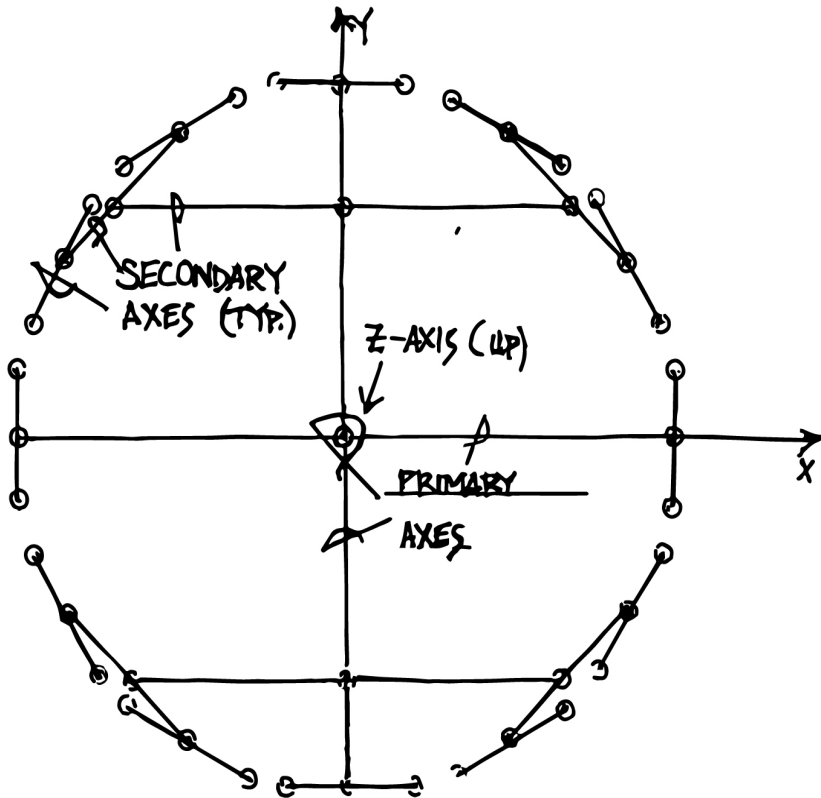


Figure 27.11 Earth's Equatorial Bulge as the Ground Phase

28

Rotating Motor Models

Okay, so we have a Trinity model, but so does Big Data's AI algorithms. We need to build a firewall around our Trinity so that external force or forces cannot influence you against your will. How is that going to work?

Let's take an example from physiology and the shoulder rotator cuff, a common location for a frozen joint, where the connective tissues literally collapse onto the ball-joint bone and make affix bone-to-bone at the joint. The remedy is to build up the muscles in all the surrounding connective tissues to help take the load off the joint (after you unfreeze the joint through physical therapy motion exercises). We've suggested an electrostatics analogy to this: a Bohr atom cloud of electrons collapses on the nucleus and freezes up the system.

This recovery therapy works with almost any joint. Collapsed cartilage in the knee joint "runner's knee" can cause a lot of pain in walking; regular straight-leg weight lifting exercises build up the muscles to take a load off the soft kneecap and ancillary tissues, for a smooth and painless operation.

The ideal Trinity way to recover is a three-phase operation; lifting weights to exercise opposing muscle groups (the two primary masses) plus stretching and balancing operation of the whole muscle-joint system. (Apply heat after to increase blood circulation for faster recovery of the tissues.)

What happens with our Trinity soul model?

Figure 28.1 shows a simple motor type of circuit, with alternating current, applied to magnetize the poles, causing the single coil to

rotate (in a motor there are many magnetized coils in a full circle and also many loops in the 3BP part of the model). The figure-8 free-return loop is symbolic of a balanced three-phase circuit.

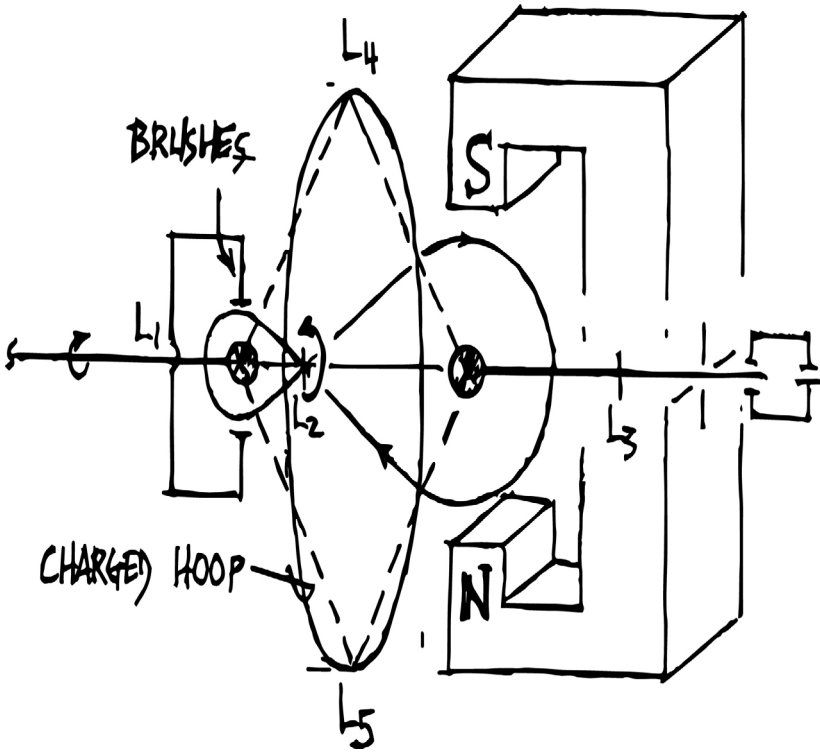


Figure 28.1 An Electromagnetic 3BP Trinity

The field coils are the cartilage bundles supporting the joint so that stronger muscles build up the L4-L5 loop to rebalance the joint for a full rotation at the ball of the joint itself, at L2.

Figure 28.2 gives more insight at the subatomic level. Here we see the end view of a motor, with a full 360 ring of charged coils on the outside and the rotating coils of the motor (generator) on the inside. A free return loop is used to simulate the electromagnetic charge from the AC coils that causes motion of the rotor, which is converted to useful work.

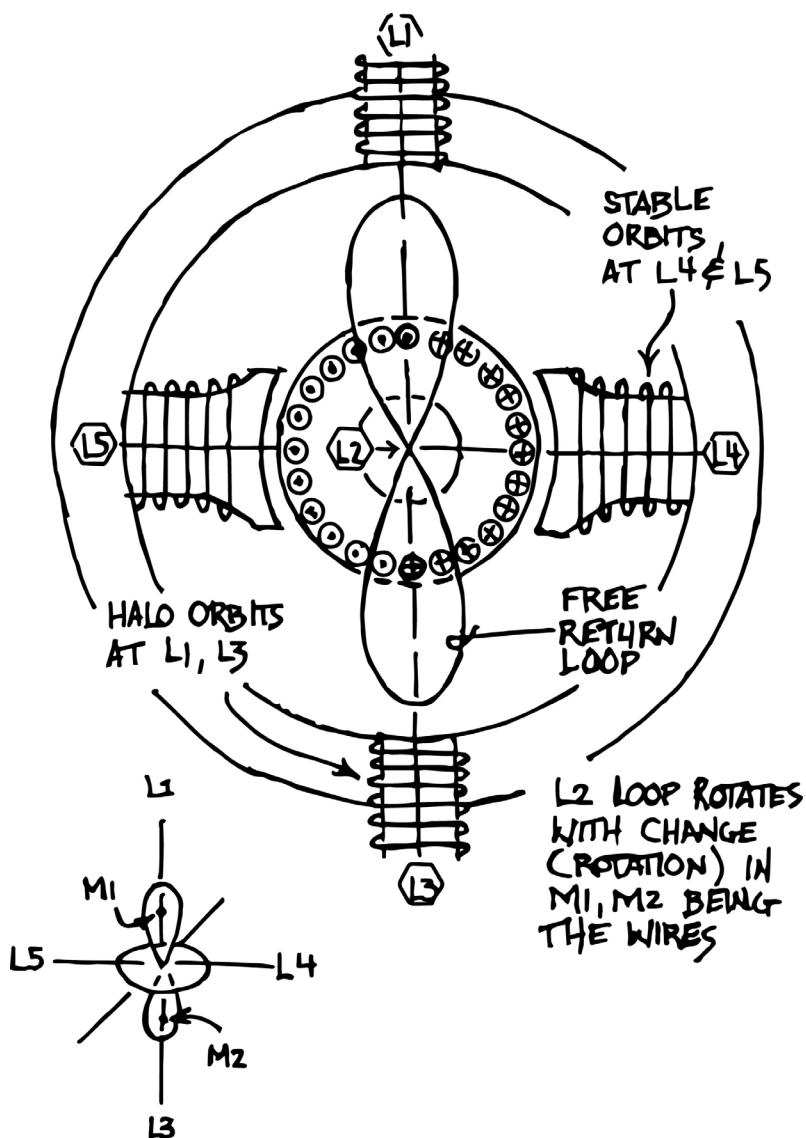


Figure 28.2 3BP Motor Operation

THE ROTATING THREE BODY PROBLEM

Think of each sin as one field line that is neutralized in Figure 28.2. The more sins, the less balanced the motor is and the less power it can output. The orbital graphic (lower left) shows the relationship between the psyche and the soul.

Eventually, the whole thing stops rotating (Figure 28.3), and the soul becomes vulnerable to malicious attacks.

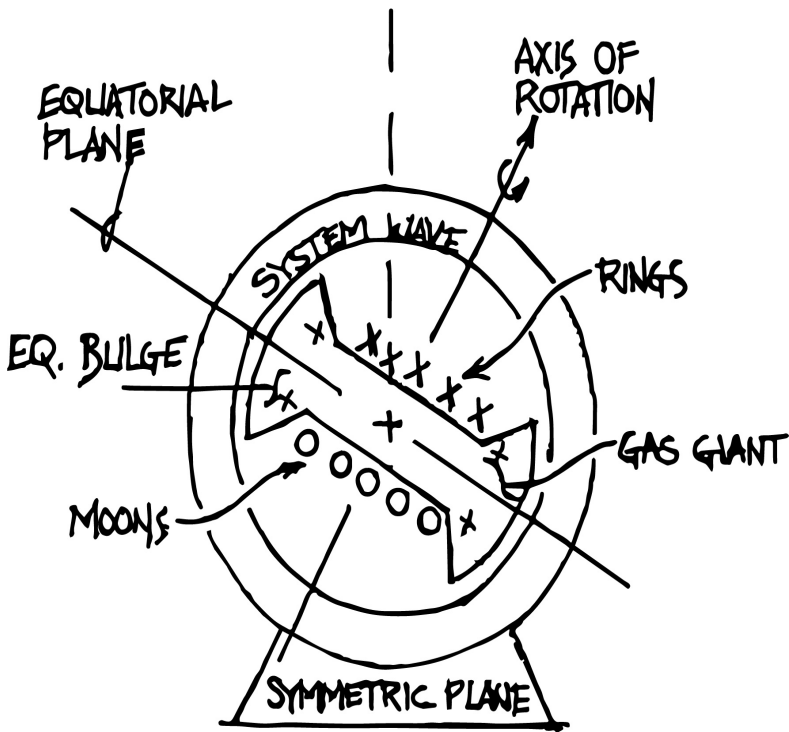


Figure 28.3 The Soul in Stasis

Superimposed on the Trinity model in Figure 28.3 are markers from the system wave string theory model. It too is a rotating system in the complex plane.

POINCARÉ' SECTIONS

Think of this as a cross-section of a turbine, where each planet is on one set of blades on the compressor side: As you get closer to the exhaust, you get closer to the sun and the inner planets. All of these blade sections stack together as in Figure 28.4, with the system wave as a kind of 3D envelope curve among the blade sets, labeled as a phase path in the diagram.

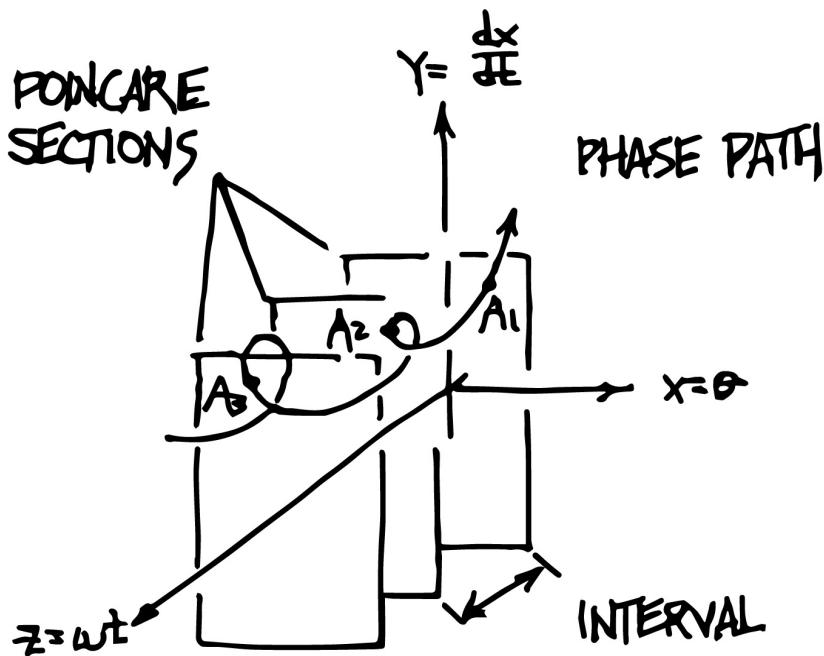


Figure 28.4 Poincare Sections

The system wave is an end view, where all the planet blade-sets are superimposed on a single prolate cycloid – each asserting power for a uniform thrust (conversely, maximum efficiency in transforming the sun's gravity wavefront into body language of

the planets – i.e., the full set of orbital parameters as designated by our string theory loop).

TURBOPROP ENGINE MODEL

Figure 28.5 shows a side view of a jet turbine-powered turboprop. You might think of the centerline shaft transferring power to the propeller (power from the sun in the string theory model), with the two sets of blades as the inner and outer planets.

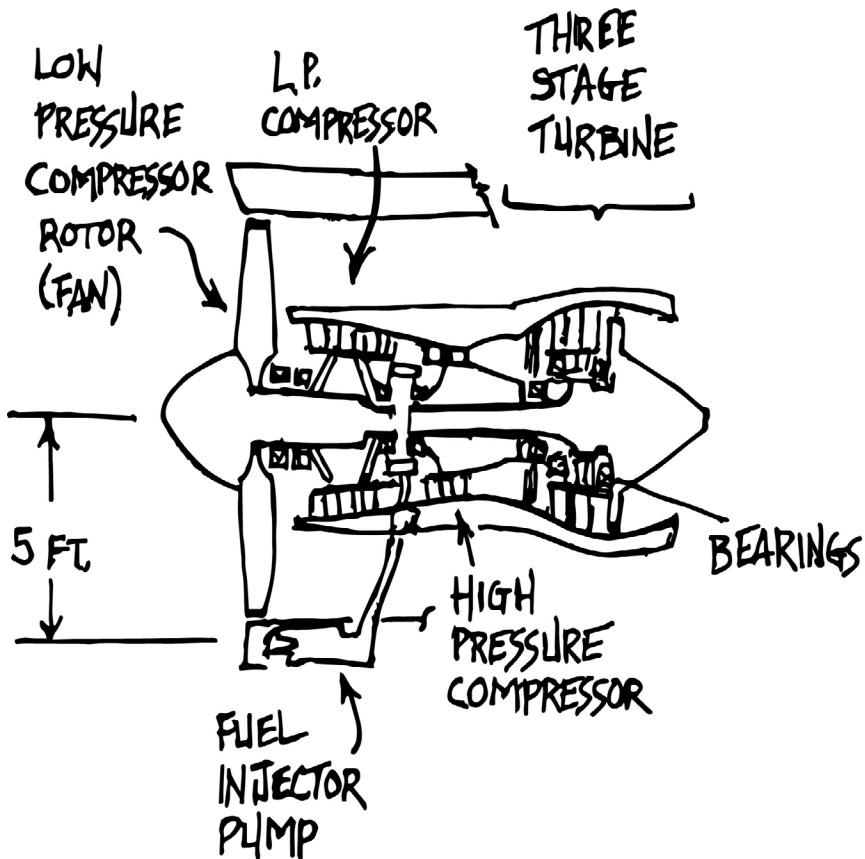


Figure 28.5 A Turboprop Engine

GAS GIANT RING SYSTEMS

Figure 28.6 shows a possible lower, fractal level of the system wave on a planetary level, suggesting fields that cause the ring systems around the outer planets. The gas giants all have powerful Van Allen belts, sufficient for an electromagnetic field creating the rings (just as the sun's electromagnetic field wavefront interacts with the "fisherman's bobber" planets on the system wave).

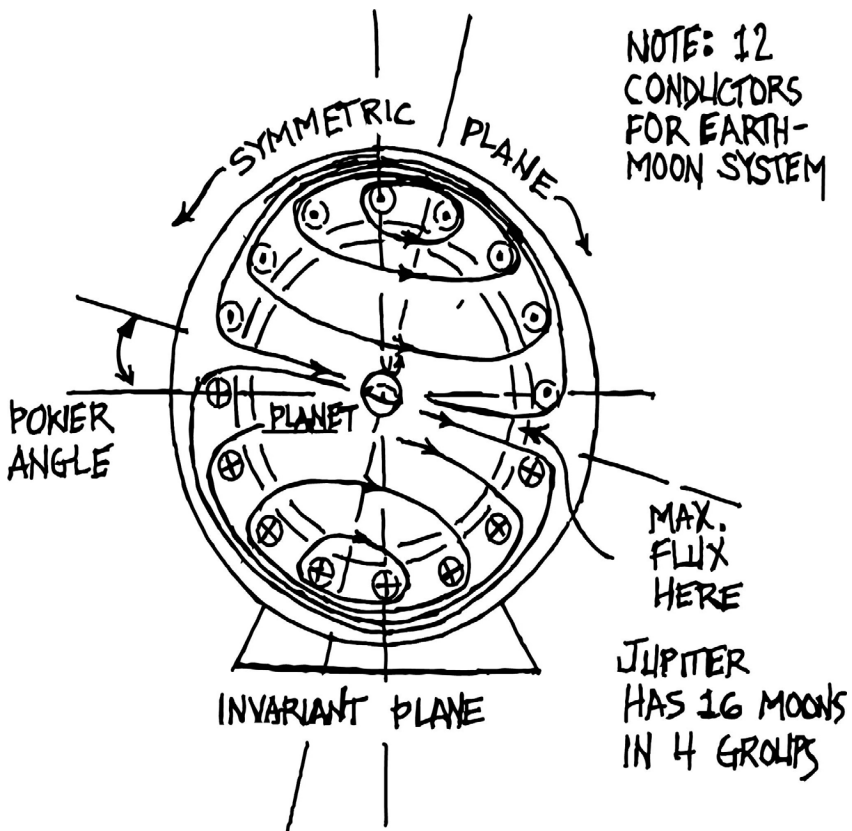


Figure 28.6 Gas Giant Ring Systems

ORBITAL RESONANCE

Figure 28.7 suggests a pattern of resonance among the planets, where orbital periods are related by a ratio of small integers; a natural frequency in eigenvalue terms for the whole solar system as a dynamical system.

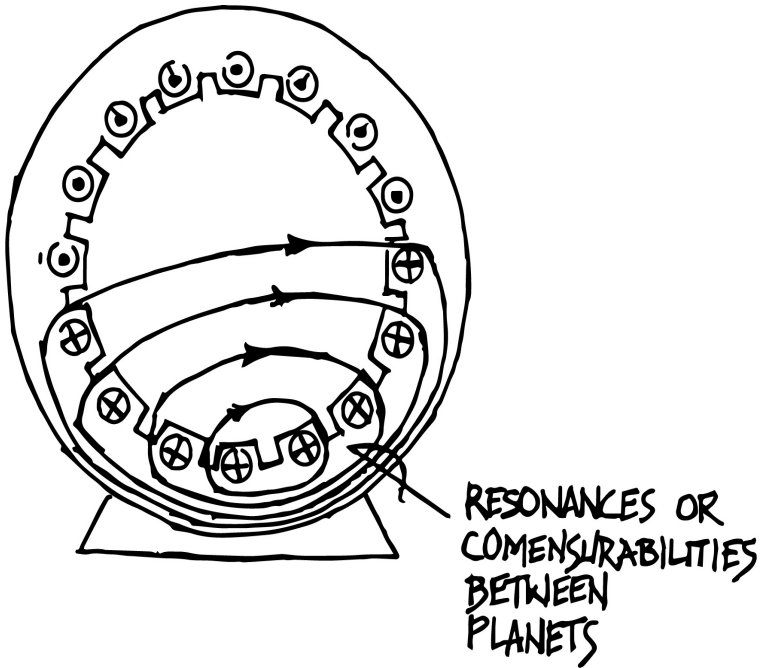


Figure 28.7 **Resonance Among Planets**

Figure 28.8 proposes a similar resonance, of the solar system to the deep, dark space beyond, as highlighted by the orbits of comets around each of the outer planets.

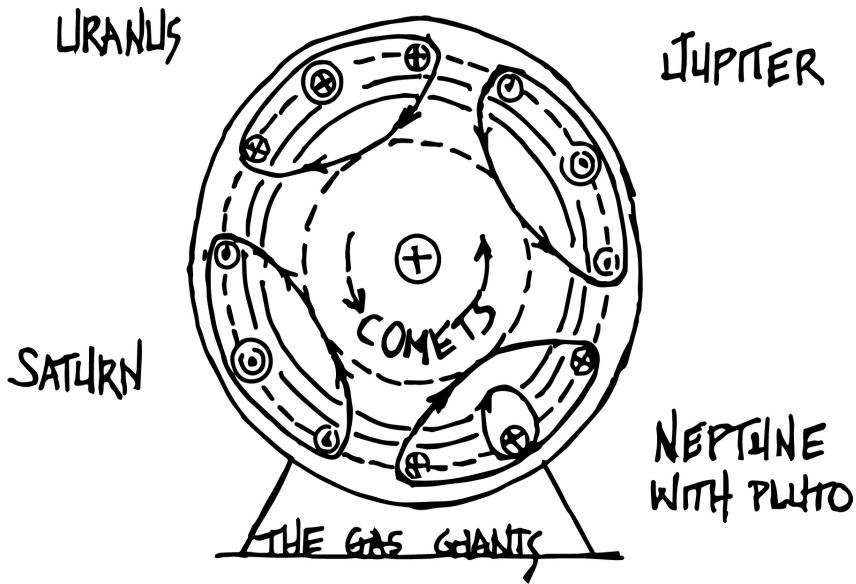


Figure 28.8 Comets around Natural Frequency Stability Points

Finally, superimposed on Figure 28.9 are arcs suggestive of the innermost loop of the string theory system wave, indicating another natural frequency.

RESONANCES AS PHASORS

To relate these diagrams to our Trinity, consider that any given parameter can be represented by a rotating phasor, as in Figure 28.10. This is a single entity.

The previous diagrams suggest a deep resonance or soul-connection to racial groups, cultures, musical communities, film genres and any number of other communities that you share many important interests and beliefs with; including religion, politics, and environmental awareness. Belonging is protective to the soul

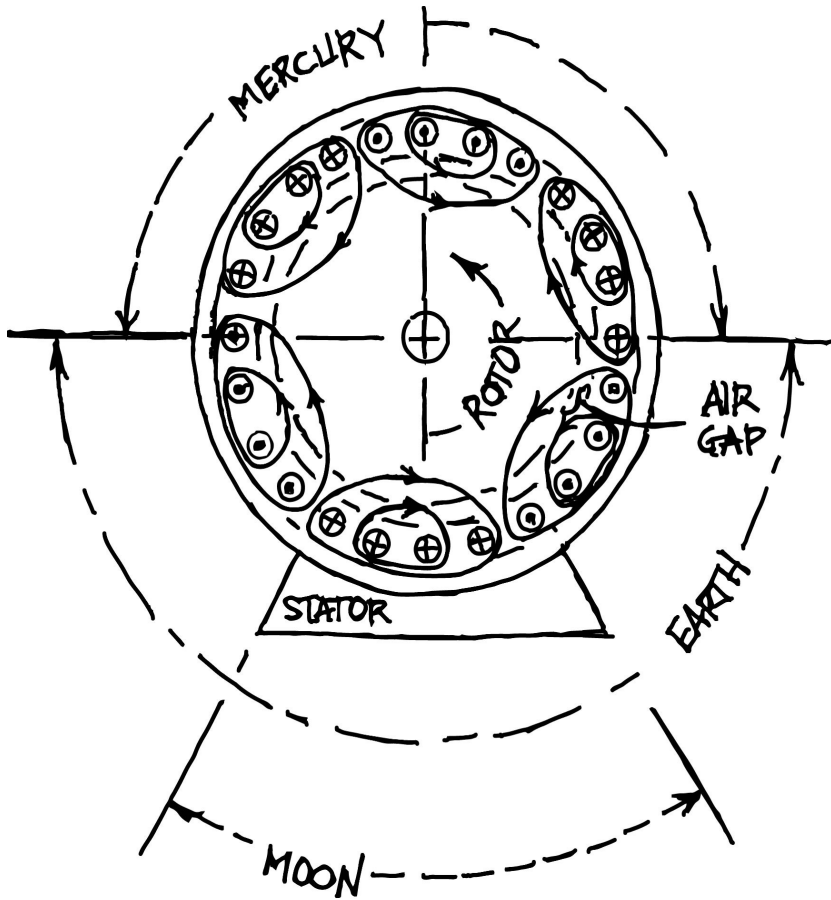


Figure 28.9 **Resonance Among the Inner Planets**

as well as the psyche (where it's called social networking, vital to the mental health; similarly for spiritual health).

Figure 28.10 brings us all the way back to the 4BP atomic model, situating the three masses inside of an encompassing electron shell of interlocked orbitals (most reminiscent of Figure 28.2). It shows the Trinity of spiritual forces, nicely balanced inside of a

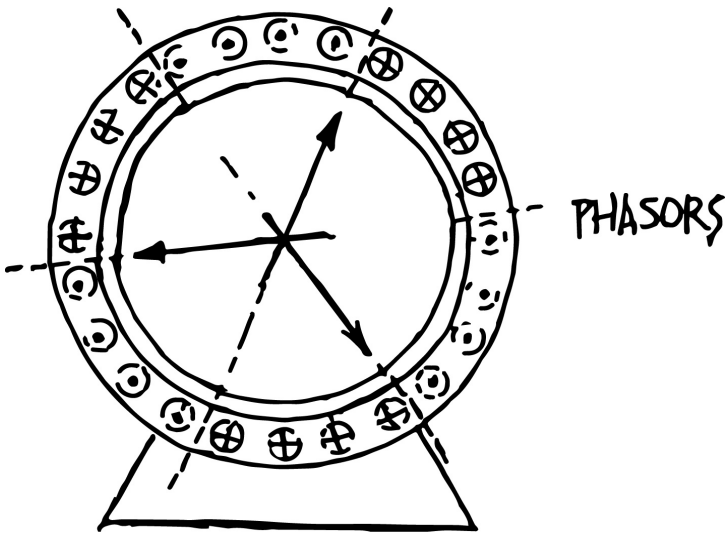


Figure 28.10 **A Rotating Soul Dynamic**

protective cocoon; which is the outer shell of the lower 2nd cone – which extends upward to the upper psyche cone, for a protective charge there, too.

SOUL MODEL DYNAMIC

That is, the dynamical, rotating aspect of the soul conic is its dynamical stability and protection; and the (figuratively speaking) electromagnetic field it creates in the psyche cone acts as a protective firewall to deflect all the lightning bolts of energy that the world throws at the psyche.

Consequently, if advertising wants to get at your psyche and to hard wire a lifelong loyalty to their product (McDonald's, Apple, Nissan, Nike), they need to weaken your soul (spirituality, at its

most basic, lets you gain maximum satisfaction from the simplest things in life; which is like totally anti-materialistic), which drops the psyche firewall. That's why liberals hate religion and seek to form a bubble of political correctness around their people, as their fundamental resonance; where they replace religion with their own set of ideals that keep your soul permanently shut down and give them ready access to your psyche.

Rank materialism and conspicuous consumption are liberal hallmarks: permanent links to the psyche of the faithful, forcing them like slaves to keep up to date on all the latest fashions, celebrity gossip, news fads, and all the other dimensions of their fake world.

POLITIC DYNAMIC

With all due respect to all you liberals out there, I think you're probably just the victims of circumstances (conservatives, too). All my born days I've kept current on all the news, and there seems to be a good balance of great ideas from both liberals and conservatives, and the system is flexible enough to almost always end up doing the right thing.

Nobody can argue that both sides have dug in on their positions, and we're in the middle of a horrible World War I style of trench warfare; with both sides suffering terrible casualties and neither making an inch of progress. Anybody who tries to get in the middle to mediate a solution is attacked by both sides and utterly destroyed (the GOP Tea Party and the Blue Dog Democrats both tried to be middle-of-the-road, and they were both wiped out by a coalition of Republicans and Democrats).

I take the side of conservatives here (although I'm sure they'll be outraged at the way I attack their wealthy elites, their fat-cat business collective, their ruthless materialism, and their total disdain for blue collar folks) because; hey, I'm an engineer. I don't take risks. Everything I do in life is on the conservative side. And frankly, I deeply resent how Republicans have taken my honest,

old-fashioned, Christian values and transformed the GOP into a party of the wealthy elites – and still call themselves conservative.

THE AGE OF NARCISSISM

Anyway, the whole idea here of people organizing groups to align their soul-felt interests – by race, religion, sexuality, social status, age – well, people have always done that, and it’s never been a problem before. What makes it a problem now is that we’re in an age of narcissism (thanks to selfies, lavish Facebook pages, reality tv, “influencers” in the social media, bigoted media, tasteless politicians; all our leaders exemplifying and promoting a universal obsession with aggressive self-promotion); so much so that in the next edition of the diagnostic manual of mental illnesses, narcissism will likely be excluded – because you can’t hardly classify everybody with a personality disorder and hope to keep their respect, much less have the authority to banish the demons from their psyche and/or soul.

This new ubiquity of narcissism changes the friendly, neighborly self-interest groups into ravaging, dictatorial powers of conformity. If you’re black/yellow/white/brown/gray – you must conform to your group standards, or you’ll be excluded entirely. Hey, this is America. Who’s going to drop their primitive tribalism and just stand up and say, like they do in the Army: We’re all green!

Who’s going to willingly give up that daily ego boost of belonging to your own exclusive club – with your own language, music, values, movies, leaders, tech – to put on their green and take a significant hit to your ego every day, to live in humility and grace?

Who’s going to live in the frequency domain and stop destroying your own soul with every vulgar, insensitive, crass act against your fellow humans – and especially against nature?

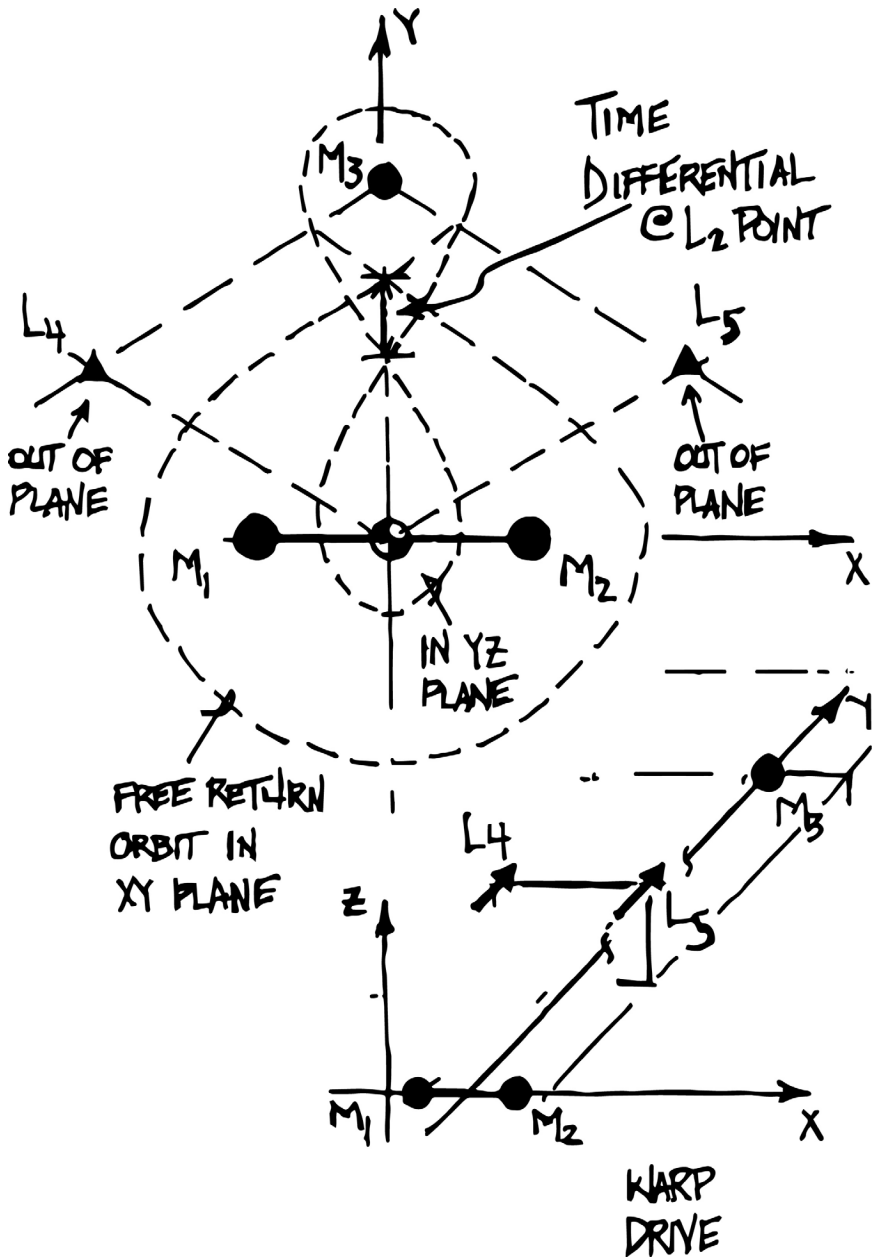


Figure 29.4 The Conceptual Design of a Constellation Class Starship

29

The Source Code

Here is the Fortran code for the original NASA letter “system plane” analysis. It used approximate positions of the planets used for observational astronomy. I just took the output, plugged it into Excel and generated the plots featured in the body of the book.

```
C
C      The Inverse Problem of Celestial Mechanics
C      by William H. Clark II, P.E.
C
PROGRAM SEROS
implicit REAL*8 (a-h,o-z)
REAL*8 Elemnts(5,9),Hx(40),Celestex(10,40),Celestey(10,40),
+      LSfit(40,2),Bary(10,40)
OPEN (6,FILE='a.out') 1
FORMAT (1X,2E8.4)
pi = DACOS(-1.DO)
C
C      Read orbital elements into an array for the nine planets; source:
C      Celestial Basic: Astronomy On Your Computer
C      by Eric Burgess, Fellow Royal Astronomical Society
C      (1960 Epoch) published by Sybex
C
DATA Elemnts / 0.387100,0.079740,2.735140,0.122173,0.836103,
+ 0.723300,0.005060,3.850170,0.593410,1.331680,
```

THE ZEN OF GRAVITY

```

+ 1.000000,1.017000,3.339290,0.000000,0.000000,

+      1.523700,0.141704,1.046560,0.031420,0.858702,
+      5.202800,0.249374,1.761880,0.019720,1.745330,
+      9.538500,0.534156,3.125700,0.043633,1.977458,
+      19.182000,0.901554,4.490840,0.013960,1.288050,
+      30.060000,0.270540,2.334980,0.031416,2.291620,
+      39.440000,9.860000,5.231140,3.001970,1.918120 / C
C      Read data into heliocetric longitude array in 10 degree increments
C      where Hx(1) = 0 degrees; Hx(35) = 350 degrees
C      (calculation units are in radians) C
Hstep = 0.Do DO 10 n=1,36
Hx(n) = Hstep
Hstep = Hstep + pi/18.Do 10 END DO
C
C      Calculate in heliocentric coordinate system at each Hx value::
C      x-coordinate, Celestex(planet,Hx) = distance from sun
C      y-coordinate, Celestey(planet,Hx) = distance from ecliptic C
DO 30 m = 1,9
C      write (6,*) m
DO 20 n=1,36
Celestex(m,n) = Elemts(1,m) + Elemts(2,m)*DSIN(Hx(n) - Elemts(3,m))
Celestey(m,n) = Elemts(4,m)*DSIN(Hx(n) - Elemts(5,m))
C      write (6,*) Celestex(m,n), Celestey(m,n)
20      END DO 30 END DO

```

Here is the Fortran code for “Mars Pathfinder 2.0”, my optimization algorithm that found the super-fast Earth to Mars trajectory. I’ve also included a couple of flow charts to help you follow the routine.

```

C Last change: 15 Nov 2003 12:43 pm
c "Grabat" Orbits from Earth to Mars
c ~ Gravity Assisted Bi-Elliptic Transfer Orbits
c copyright 2003 sahmain space systems
c
implicit real*8 (a-h,o-z)
common/RKCOM/CH(13),AL(13),B(13,12)
CALL INRK78
CALL Earth (deltaV1)
thrust = 0.0do
CALL Mars (thrust,deltaV2)
PRINT *, deltaV1 + deltaV2 ! = 0.24 km/sec < simple Hohmann
c Apply this thrust @ f=90 and arrive 30 days < simple Hohmann
STOP
END
c
SUBROUTINE Mars (thrust,dVmin)
implicit real*8 (a-h,o-z)
REAL*8 x(6),xe(6),xf(6),xm(6),xg(6),xtable(40,14)
common/conste2/xe,gmsun,gmearth,radE,re,soiE,ome,phE,rpE
common/constm2/xm, gmmars, radM,rm,soiM,omm,phM,rpM
pi = DACOS(-1.0do)
CALL initial (t,x)
theta = -DATAN(x(5)/x(4))
c x(4) = x(4) - thrust*DCOS(theta)
c x(5) = x(5) + thrust*DSIN(theta)
tol = 1.0d-13
dt = 1000do
do 1 n = 1,1500
CALL RK78T (t,x,dt,tol,6)

```

```

rangeM = DSQRT((xm(1)-x(1))**2+(xm(2)-x(2))**2)
IF (rangeM .LT. soiM**2) dt =1000.odo
IF (rangeM .LT. soiM) GOTO 2
IF (dsqrt(x(1)**2+x(2)**2) .GT. rm) GOTO 2
1 continue
c transfer to geocentric coordinates
2 xg(1) = x(1) - xm(1)
xg(2) = x(2) - xm(2)
xg(3) = 0.odo
xg(4) = x(4) + DSQRT(gmsun/rm)*DSIN(t*omm + phM)
xg(5) = x(5) - DSQRT(gmsun/rm)*DCOS(t*omm + phM)
xg(6) = 0.do
soi= soiM
soiM = dsqrt(xg(1)**2 + xg(2)**2)
Vrel = DSQRT(xg(4)**2+xg(5)**2)
Rf = radM + 80.odo ! rpM
gamma = -pi/8.do + .0003do
do 4 j = 1,40
gamma = gamma + pi/220.do
xtable (j,1) = -soiM*dsin(gamma)
xtable (j,2) = -soiM*dcos(gamma)
xtable (j,3) = 0.do
xtable (j,4) = 0.do
xtable (j,5) = Vrel
xtable (j,6) = 0.do
xtable (j,7) = 0.do
xtable (j,8) = 0.do
xtable (j,9) = 0.do
xtable (j,10)= 0.do
xtable (j,11)= 0.do
xtable (j,12)= 0.do
xtable (j,13)= 0.do
xtable (j,14)= 0.do
4 continue
gmsun = gmmars
gmearth = 0.do

```



```

gmmars = 0.do
tmax = 10.do*soiM/Vrel
c
c do 78 m = 1,40
m = 27 ! tried all 40 cases; best results with this one
do 8 k = 1,6
8 xg(k) = xtable (m,k)
t = 0.do
dt = +1000.do
dVmin = 100.do
Vrel = xtable(m,5)
do 75 n=1,1500
CALL RK78T(t,xg,dt,tol,6)
rangeM = Dsqrt(xg(1)**2 + xg(2)**2 + xg(3)**2)
IF (rangeM .LT. radM) THEN
deltaV = 100.odo
GOTO 78
ENDIF
CALL velocityM (xg,gmsun,rangeM,Rf,Vrel,deltaV,V1,V2,V3)
IF (deltaV .LT. dVmin) THEN
do 10 k = 1,6
10 xtable (m,k) = xg(k)
xtable (m,10) = deltaV
xtable (m,9) = gamma
xtable (m,8) = rangeM
dVmin = deltaV
xtable(m,11) = V1
xtable(m,12) = V2
xtable(m,13) = V3
xtable(m,14) = t/86400do
ENDIF
IF (rangeM .GT. soiM*1.1do) GOTO 78
IF (t .GT. tmax) GOTO 78
75 continue
78 continue
RETURN

```

END

C

SUBROUTINE Earth (deltaV)

implicit real*8 (a-h,o-z)

REAL*8 x(6), xf(10)

step = 0.0001do

ttol = 1.0d-7

ax = -.005do

adelta = 100.0do

CALL initial (t,x)

CALL TargetE (t,x,ax,adelta,xf)

bdelta = adelta

delta = adelta

2 DO 3 k = 1,3

IF (step.LT. ttol) GOTO 5

bx = ax + step

CALL initial (t,x)

CALL TargetE (t,x,bx,bdelta,xf)

IF (bdelta .LT. delta) delta = bdelta

IF (bdelta .GT. adelta) GOTO 4

ax = bx

adelta = bdelta

3 continue

4 bx = bx - step

step = step/2.do

GOTO 2

5 deltaV = delta + bx

RETURN

END

C

SUBROUTINE TargetE (t,x,deltaV,deltaVf,xf)

implicit real*8 (a-h,o-z)

REAL*8 x(6),xe(6),xf(6),xm(6),xg(6)

common/conste2/xe,gmsun,gmearth,radE,re,soiE,ome,phE,rpE

common/constm2/xm, gmmars, radM,rm,soiM,omm,phM,rpM

theta = DATAN(x(5)/x(4))

```

x(4) = x(4) + deltaV*DCOS(theta)
x(5) = x(5) + deltaV*DSIN(theta)
tol = 1.0d-13
dt = -1000do
do 75 n = 1,1500
CALL RK78T (t,x,dt,tol,6)
rangeE = DSQRT((xe(1)-x(1))**2+(xe(2)-x(2))**2)
IF (rangeE .LT. soiE) GOTO 78
75 continue
c change to geocentric coordinates (xe + xf = x)
78 xg(1) = x(1) - xe(1)
xg(2) = x(2) - xe(2)
xg(3) = 0.0do
xg(4) = x(4) + DSQRT(gmsun/re)*DSIN(t*ome)
xg(5) = x(5) - DSQRT(gmsun/re)*DCOS(t*ome)
xg(6) = 0.0do
gm = gmsun
gmm = gmmars
gmsun = gmearth
gmearth = gm
re = -re
gmmars = 0.0do
Rf = radE + 200.0do
dt = -100.0do
deltaVf = 100.0do
do 85 n = 1,85
CALL RK78T (t,xg,dt,tol,6)
rangeE = DSQRT(xg(1)**2+xg(2)**2)
IF (rangeE .LT. radE) GOTO 88
IF (rangeE .GT. soiE*1.2) GOTO 88
Vrel = DSQRT(xg(4)**2+xg(5)**2)
IF (xg(2) .LT. 0.0do) THEN
CALL VelocityE (xg,gmsun,rangeE,Rf,Vrel,DeltaVx,V1,V2,V3)
IF (deltaVx .LT. deltaVf) deltaVf = deltaVx
END IF
85 continue

```

```

88 gmeearth = gmsun
gmsun = gm
gmmars = gmm
re = -re
RETURN
END

c
SUBROUTINE velocityM (xg,gmsun,range,Rf,Vrel,deltaV,V1,V2,V3)
implicit real*8 (a-h,o-z)
REAL*8 xg(6)
Rp = range
phi1 = datan(xg(4)/xg(5))
phi2 = datan(xg(2)/xg(1))
gamma = ABS(phi1 - phi2)
Vcirc = dsqrt(gmsun/range)
V3 = dsqrt( Vrel**2+Vcirc**2-2.do*Vrel*Vcirc*dcos(gamma))
V2 = dsqrt(gmsun/Rp)*(1.do-dsqrt(2.do/(1.do+Rp/Rf)))
V1 = dsqrt(gmsun/Rf)*(dsqrt((2.do*Rp/Rf)/(1+Rp/Rf))-1.do)
deltaV = ABS(V1) + ABS(V2) + ABS(V3)
RETURN
END

c
SUBROUTINE velocityE (xg,gmsun,range,Rf,Vrel,deltaV,V1,V2,V3)
implicit real*8 (a-h,o-z)
REAL*8 xg(6)
Rp = range
Vcirc = dsqrt(gmsun/range)
V3 = dabs(Vcirc - Vrel)
V2 = dsqrt(gmsun/Rp)*(1.do-dsqrt(2.do/(1.do+Rp/Rf)))
V1 = dsqrt(gmsun/Rf)*(dsqrt((2.do*Rp/Rf)/(1+Rp/Rf))-1.do)
deltaV = ABS(V1) + ABS(V2) + ABS(V3)
RETURN
END

c
SUBROUTINE thirdbc(t,n,x3)
implicit real*8 (a-h,o-z)

```

```

common/conste2/xe,gmsun,gmearth,radE,re,soiE,ome,phE,rpE
common/constm2/xm, gmmars, radM,rm,soiM,omm,phM,rpM
real*8 x3(6),xe(6),xm(6)
pi = DACOS(-1.odo)
IF (n .EQ. 3) THEN ! position of Earth
x3(1) = re*DCOS(t*ome)
x3(2) = re*DSIN(t*ome)
x3(3) = 0.odo
xe(1) = x3(1)
xe(2) = x3(2)
xe(3) = x3(3)
ENDIF
IF (n .EQ. 4) THEN ! position of Mars
x3(1) = rm*DCOS(t*omm + phM)
x3(2) = rm*DSIN(t*omm + phM)
x3(3) = 0.odo
xm(1) = x3(1)
xm(2) = x3(2)
xm(3) = x3(3)
ENDIF
RETURN
END
c
SUBROUTINE initial (t,x)
implicit real*8 (a-h,o-z)
real*8 x(6),xe(6),xm(6),M,i
common/conste2/xe,gmsun,gmearth,radE,re,soiE,ome,phE,rpE
common/constm2/xm, gmmars, radM,rm,soiM,omm,phM,rpM
c input the planetary constants
gmsun = 1.32712428d11
gmearth = 3.986004415d5
re = 149598023do ! = a
ome = dsqrt((gmsun+gmearth)/re)/re
soiE = 924647do
radE = 6378.1363do
rpE = 200.odo

```

```

gmmars = .305d4
rm = 227939186do ! = a
omm = dsqrt((gmsun+gmmars)/rm)/rm
soiM = 577213do
radM = 3397.2do
rpM = 80.odo
c determine the Hohmann Transfer orbit parameters
pi = DACOS(-1.odo)
a = (re + rm)/2.do
e = (rm - re)/(re + rm)
p = a*(1.do - e**2)
period = pi*(dsqrt(a)**3)/dsqrt(gmsun)
omsc = dsqrt((gmsun)/a)/a
tconj = (pi - period*omm)/(ome-omm)
phM = pi - period*omm
c start when f=90 for the spacecraft
EA = 2.odo*DATAN(DTAN(pi/4)*DSQRT((1.odo-e)/(1.odo+e)))
M = EA -e*DSIN(EA)
t = M/omsc
x(1) = 0.odo
x(2) = p
x(3) = 0.odo
x(4) = -1.odo*DSQRT(gmsun/p)
x(5) = DSQRT(gmsun/p)*e
x(6) = 0.odo
RETURN
END
c
SUBROUTINE DERIV(t,x,f)
implicit real*8 (a-h,o-z)
real*8 x(6),f(6),xe(6),xm(6)
common/conste2/xe,gmsun,gmearth,radE,re,soiE,ome,phE,rpE
common/constm2/xm, gmmars, radM,rm,soiM,omm,phM,rpM
f(1) = x(4)
f(2) = x(5)
f(3) = x(6)

```

```
r2 = x(1)**2 + x(2)**2 + x(3)**2
```

```
r = dsqrt(r2)
```

```
f(4) = -gmsun*(x(1)/r)/r2
```

```
f(5) = -gmsun*(x(2)/r)/r2
```

```
f(6) = -gmsun*(x(3)/r)/r2
```

```
CALL thirdbc(t,3,xe)
```

```
CALL pert3b(gmearth,xe,x,f)
```

```
CALL thirdbc(t,4,xm)
```

```
CALL pert3b(gmmars,xm,x,f)
```

```
RETURN
```

```
END
```

```
SUBROUTINE energye(x,t,E)
```

```
implicit real*8 (a-h,o-z)
```

```
real*8 x(6),xb(6),xe(6)
```

```
common/const2/xe,gmsun,gmearth,radE,re,soiE,ome,phE,rpE
```

```
r = dsqrt(x(1)**2 + x(2)**2 + x(3)**2)
```

```
E2body = 0.5do*(x(4)**2 + x(5)**2 + x(6)**2) - gmsun/r
```

```
C
```

```
CALL thirdbc(t,re,ome,phE,xb)
```

```
r23 = dsqrt((xb(1)-x(1))**2 + (xb(2)-x(2))**2 + (xb(3)-x(3))**2)
```

```
Um1 = gmearth/r23
```

```
Um2 = ome*(x(1)*x(5)-x(2)*x(4))
```

```
Um3 = (gmearth/re**3)*(X(1)*xb(1) + X(2)*xb(2))
```

```
E = E2body - Um1 - Um2 + Um3
```

```
RETURN
```

```
END
```

```
C
```

```
SUBROUTINE pert3b(GMP,x3,x,f)
```

```
implicit real*8 (a-h,o-z)
```

```
real*8 f(6),x(6),x3(6),gmp,r12,r23
```

```
r12 = dsqrt(x3(1)**2 + x3(2)**2 + x3(3)**2)
```

```
r23 = dsqrt((x3(1)-x(1))**2+(x3(2)-x(2))**2+(x3(3)-x(3))**2)
```

```
f(4) = f(4) - gmp*((x(1)-x3(1))/r23**3 + x3(1)/r12**3)
```

```
f(5) = f(5) - gmp*((x(2)-x3(2))/r23**3 + x3(2)/r12**3)
```

```
f(6) = f(6) - gmp*((x(3)-x3(3))/r23**3 + x3(3)/r12**3)
```

RETURN

END

SUBROUTINE RK78T(T,X,DT,TOL,N)

IMPLICIT REAL*8 (A-H,O-Z)

common/RKCOM/CH(13),AL(13),B(13,12)

REAL*8 XD(21),F(21,13),X(N),F1(21),F2(21),F3(21),F4(21),F5(21)

c CALL INRK78 TO INITIALIZE

c IF(DABS(DT).LT.1.D-20)RETURN

TM=T

DT1=DT

C

DO 40 I=1,N

40 XD(I)=X(I)

GO TO 1020

C

1010 T=TM

DT1=DT

DO 41 I=1,N

41 X(I)=XD(I)

C

1020 CONTINUE

CALL DERIV(T,X,F1)

C K=2

DO 602 I=1,N

TP=B(2,1)*F1(I)

602 X(I)=XD(I)+DT*TP

T=TM+AL(2)*DT

CALL DERIV(T,X,F2)

C K=3

DO 603 I=1,N

TP=B(3,1)*F1(I)+B(3,2)*F2(I)

603 X(I)=XD(I)+DT*TP

T=TM+AL(3)*DT

CALL DERIV(T,X,F3)

C K=4


```

DO 604 I=1,N
TP=B(4,1)*F1(I)+B(4,3)*F3(I)
604 X(I)=XD(I)+DT*TP
T=TM+AL(4)*DT
CALL DERIV(T,X,F4)
C K=5
DO 605 I=1,N
TP=B(5,1)*F1(I)+B(5,3)*F3(I)+B(5,4)*F4(I)
605 X(I)=XD(I)+DT*TP
T=TM+AL(5)*DT
CALL DERIV(T,X,F5)
C
DO 50 K=6,13
KK=K-1
DO 71 I=1,N
TP=B(K,1)*F1(I)+B(K,4)*F4(I)+B(K,5)*F5(I)
IF(KK.LT.6) GOTO 71
DO 70 J=6,KK
70 TP=TP+B(K,J)*F(I,J)
71 X(I)=XD(I)+DT*TP
T=TM+AL(K)*DT
50 CALL DERIV(T,X,F(1,K))
C
DO 101 I=1,N
TP=0.Do
C TP=CH(1)*F1(I)+CH(2)*F2(I)+CH(3)*F3(I)+CH(4)*F4(I)+CH(5)*F5(I)
DO 100 L=6,13
100 TP=TP+CH(L)*F(I,L)
101 X(I)=XD(I)+DT*TP
C
IF(TOL.EQ.0.Do) GOTO 900
ER=0.Do
DO 112 I=1,N
A=DABS(X(I))
IF(A.LT.1.D-6) A=1.D-6
TEI=DABS(F1(I)+F(I,11)-F(I,12)-F(I,13))*CH(12) / A

```

```

IF(TEI.GT.ER) ER=TEI
112 CONTINUE
ER=ER*DABS(DT)+1.D-16
DT=DT*(TOL/ER)**.125Do
IF(ER.GT.TOL) GOTO 1010
C
900 CONTINUE
T=TM+DT1
RETURN
END

```

```

SUBROUTINE INRK78
implicit REAL*8 (a-h,o-z)
common/RKCOM/CH(13),AL(13),B(13,12)
DO 1 I=1,13
CH(I)=0.Do
AL(I)=0.Do
DO 1 J=1,12
1 B(I,J)=0.Do
CH(6)=34.Do/105.Do
CH(7)=9.Do/35.Do
CH(8)=CH(7)
CH(9)=9.Do/280.Do
CH(10)=CH(9)
CH(12)=41.Do/840.Do
CH(13)=CH(12)
AL(2)=2.Do/27.Do
AL(3)=1.Do/9.Do
AL(4)=5.Do/30.Do
AL(5)=5.Do/12.Do
AL(6)=1.Do/2.Do
AL(7)=5.Do/6.Do
AL(8)=5.Do/30.Do
AL(9)=2.Do/3.Do
AL(10)=1.Do/3.Do
AL(11)=1.Do

```

```

AL(13)=1.Do
B(2,1)=2.Do/27.Do
B(3,1)=1.Do/36.Do
B(4,1)=5.Do/120.Do
B(5,1)=5.Do/12.Do
B(6,1)=1.Do/20.Do
B(7,1)=-25.Do/108.Do
B(8,1)=31.Do/300.Do
B(9,1)=2.Do
B(10,1)=-91.Do/108.Do
B(11,1)=2383.Do/4100.Do
B(12,1)=3.Do/205.Do
B(13,1)=-1777.Do/4100.Do
B(3,2)=1.Do/12.Do
B(4,3)=1.Do/8.Do
B(5,3)=-25.Do/16.Do
B(5,4)=25.Do/16.Do
B(6,4)=1.Do/4.Do
B(7,4)=125.Do/108.Do
B(9,4)=-53.Do/6.Do
B(10,4)=23.Do/108.Do
B(11,4)=-341.Do/164.Do
B(13,4)=-341.Do/164.Do
B(6,5)=1.Do/5.Do
B(7,5)=-65.Do/27.Do
B(8,5)=61.Do/225.Do
B(9,5)=704.Do/45.Do
B(10,5)=-976.Do/135.Do
B(11,5)=4496.Do/1025.Do
B(13,5)=4496.Do/1025.Do
B(7,6)=125.Do/54.Do
B(8,6)=-2.Do/9.Do
B(9,6)=-107.Do/9.Do
B(10,6)=311.Do/54.Do
B(11,6)=-301.Do/82.Do
B(12,6)=-6.Do/41.Do

```

$B(13,6) = -289 \cdot \text{Do}/82 \cdot \text{Do}$
 $B(8,7) = 13 \cdot \text{Do}/900 \cdot \text{Do}$
 $B(9,7) = 67 \cdot \text{Do}/90 \cdot \text{Do}$
 $B(10,7) = -19 \cdot \text{Do}/60 \cdot \text{Do}$
 $B(11,7) = 2133 \cdot \text{Do}/4100 \cdot \text{Do}$
 $B(12,7) = -3 \cdot \text{Do}/205 \cdot \text{Do}$
 $B(13,7) = 2193 \cdot \text{Do}/4100 \cdot \text{Do}$
 $B(9,8) = 3 \cdot \text{Do}$
 $B(10,8) = 17 \cdot \text{Do}/6 \cdot \text{Do}$
 $B(11,8) = 45 \cdot \text{Do}/82 \cdot \text{Do}$
 $B(12,8) = -3 \cdot \text{Do}/41 \cdot \text{Do}$
 $B(13,8) = 51 \cdot \text{Do}/82 \cdot \text{Do}$
 $B(10,9) = -5 \cdot \text{Do}/60 \cdot \text{Do}$
 $B(11,9) = 45 \cdot \text{Do}/164 \cdot \text{Do}$
 $B(12,9) = 3 \cdot \text{Do}/41 \cdot \text{Do}$
 $B(13,9) = 33 \cdot \text{Do}/164 \cdot \text{Do}$
 $B(11,10) = 18 \cdot \text{Do}/41 \cdot \text{Do}$
 $B(12,10) = 6 \cdot \text{Do}/41 \cdot \text{Do}$
 $B(13,10) = 12 \cdot \text{Do}/41 \cdot \text{Do}$
 $B(13,12) = 1 \cdot \text{Do}$
 RETURN
 END

Appendix A

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Appendix B

GLOSSARY OF ORBITS TERMS

3BP – Three Body Problem

APOAPSIS – the closest point in an orbit to the main body; i.e., apogee for an orbit around the moon or aphelion for an orbit around the sun

APOLLO ASTEROIDS – a group of asteroids that are in permanent rotation around the L₅ Lagrange Point of the Sun-Jupiter system in 3BP dynamical analysis

APOLLO 13 – a dramatic reenactment of the moon mission that lost power at the moon and was able to return home safely on a free-return orbit

AMPLITWIST – a term used to describe the action of complex numbers which have two parts: an amplification (multiplication by a constant) and a rotation

ANAL PHASE – the second psychosexual stage typically the “terrible twos” sometimes said to have retentive and expressive phases

BARYCENTER – the center of mass of two or more bodies that rotate each other; for the Sun-Jupiter system, it’s located just outside the sun’s corona on a line joining the two centers of mass

BEATS – critical points in the Three Act structure of a screenplay

BOHR ATOM - the original model of the atom fashioned by Niels Bohr which has one electron orbiting a central nucleus, a concept which was borrowed directly from celestial mechanics and the theory of orbits

CENTRAL FORCE – a force that acts along a line between two objects

CENTRAL FORCE MOTION – a key characteristic of a central force like gravity is that the equations of motion of an object acted upon only by gravity can be integrated backward or forward in time

CIRCLE OF CONCERN – the environmental focus of a newborn, i.e., the mother's breast

COLINEAR LAGRANGE POINTS – three unstable points, denoted L_1 , L_2 , and L_3 , along the axis between two primary bodies in the rotating 3BP which are stable for short periods of time

COMPLEX PLANE – a mathematical construct in which the Cartesian axes are the real and imaginary numbers, a notation that is useful in the study of dynamical and engineering systems

CONIC SECTIONS – planes intersecting a cone that form a circle, ellipse, parabola, or hyperbola depending on the angle of the plane and its orientation to the axis of the cone

COSMOLOGY – a study of the origins of the universe and, in particular, the origins of planets, moons, suns, and solar systems

COULOMB'S LAW – the governing law for electrostatics, it has the same form as Newton's Law of Gravity so that, for example, an electron orbiting a nucleus behaves exactly as a satellite orbiting Earth

DELTA-V – a shorthand notation in orbital mechanics to denote a thrust, which results in a change in velocity

EGO - that part of the mind that mediates between the instinctive demands of the primitive id and the outside world (e.g., between the conscious mind and the subconscious), developing after the id

DIRECTRIX – for a parabola it's a straight line such that the perpendicular distance from the line to the parabola is equal to the distance from the parabola to the focus

EMPTY FOCUS – the geometry of an ellipse has two foci such that in orbital motion the main body is at the main focus and there is nothing at the other focus

ENVELOPE CURVE – a new solution to a set of dynamical equations that is formed (found) by plotting all the known solutions, each of which shares one small segment of the envelope curve

EQUILATERAL LAGRANGE POINTS – two points that are stable long-term, L_4 and L_5 , in the rotating 3BP located at the apex of an equilateral triangle with sides equal to the distance between the two primary bodies

F AND G FUNCTIONS – two functions with the same form as the Two Body Equation that are used in orbital mechanics to propagate an orbit from an initial time to some future time

FOUR BODY PROBLEM – a formal study of a small object such as a spacecraft under the influence of three much larger bodies, such as a mission from Earth to Mars, where the sun is the third primary body

FOUR FUNDAMENTAL FORCES IN NATURE – the weak and strong interaction between subatomic particles, electromagnetism, and gravity

FRACTAL – a pattern that repeats at many different levels

FREE RETURN ORBIT – a figure-8 shaped orbit between the two primary bodies in a rotating coordinate system upon which an object (spacecraft) will remain indefinitely, absent any external forces

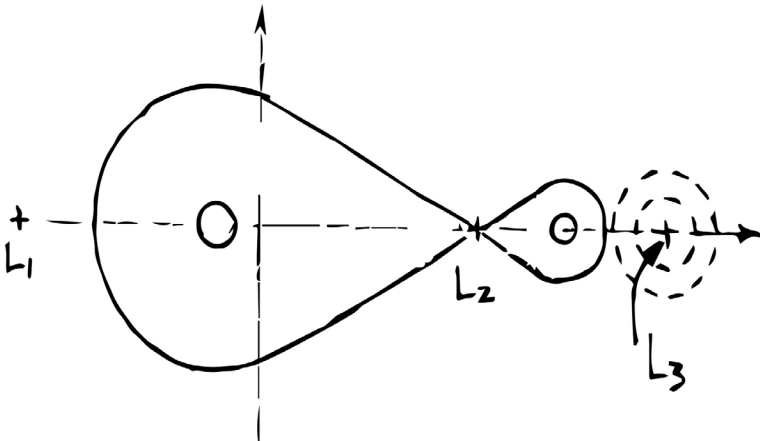


Figure 1 Free Return Orbit

FRACTAL THEORY – a law that shows similar patterns at many different scales in a natural system

HALO ORBIT – an object can orbit the colinear Lagrange points in a small orbit over a short period of time without needing station-keeping thrusts to stay in place

HARMONICS – spurious electrical currents in a system that represent power that cannot be converted into useful work and are consequently a net loss

HELIOCENTRIC TRANSFER ELLIPSE – in a mission from Earth to Mars, for example, once the spacecraft leaves the vicinity of Earth it's on an elliptical orbit with the sun at one focus

HOLLOW SPHERE – the force of gravity inside a hollow sphere of mass is zero, and the force outside the sphere is as if all the mass was concentrated at the center of the sphere

ICEBERG THEORY – Freud's model of the id-ego-superego and the human psyche where much of what goes on in the mind is below the surface in the subconscious

ID – that part of the psyche that is first to develop that consists of basic instincts and other primitive aspects and drives of the personality

INERTIAL REFERENCE PLANE – a plane in classical (non-relativistic) physics relative to which an object has no acceleration if it has no forces acting upon it

INVARIANT PLANE – a new coordinate plane for the solar system to replace the ecliptic (Earth's orbital plane) as an aid in a study of the motion of the planets around the sun

INVERSE PROBLEM – a mathematical analysis that begins with a huge set of raw data that the scientist tries to reduce down to a compact equation or model

INVERSE-SQUARE FORCE – gravity and electrostatics are both proportional to $1/r^2$ or the inverse of the distance between the two bodies under consideration

LAGRANGE POINT – points of full (equilateral) and provisional (colinear) stability in the rotating Three Body Problem that are defined relative to the line or axis between the two primaries

MATHEMATICAL PHYSICS – governed by the notion that mathematics provides direct insights into natural dynamic systems

N BODY PROBLEM – a dynamical study of a very small object acted upon by many much more massive ones where the equations of motion reduce down to the same as for static flow in fluid dynamics

PERIAPSIS – the farthest point from the major body in an orbit; i.e., perigee for an orbit near the moon and perihelion for an object orbiting the sun

POINCARÉ'S RELATIVITY – Henri Poincaré (using N Body theory) derived all the same equations for Relativity Theory at least a decade before Einstein (using electromagnetic theory)

PSYCHOSEXUAL STAGES – five stages of sexual development proposed by Sigmund Freud, consisting of oral, anal, phallic, latent, and genital

QUANTUM ENTANGLEMENT – if two subatomic particles created at the same time, despite vast separation, when one changes state, the other does too

REGULARIZATION – the process of making a mathematical substitution in the equations of motion for a system of bodies that results in a simplification of the problem and/or a reduction in the number of unknowns

RELATIVITY – a complicated scheme in astrophysics that attempts to explain various phenomena that cannot be replicated using Newtonian (classical) methods, i.e., using just Newton's Law of Gravitation

RESONANCE – in astronomy, when say two planets orbiting the sun exert a regular, periodic gravitational influence on each other and whose orbital periods are related by a ratio of small integers

RESTRICTED COPLANAR 3BP – a dynamical study where both primaries are in circular orbits, and the motion of the third, much smaller object is in the same plane as the two primaries

ROTATING COORDINATE SYSTEM – a helpful, insightful way to study dynamical systems such as the 3BP where the two primaries are fixed to the x-axis

SCHRODINGER ELECTRON CLOUD PLOTS – statistical averages that show where an electron moves in the various orbitals around a central atomic nucleus

SPHERE OF INFLUENCE (SOI) – an imaginary circle around a planet where the force of gravity from the sun is equal to the force of gravity from the planet itself

SUPEREGO – that part of the mind that behaves like a self-critical conscience, reflecting values learned from mentors, parents, and society at large, developing after the ego (which develops after the id)

SUSPENDED DISBELIEF – a phenomenon that happens inside a dark theater wherein the viewers willingly accept the new laws of physics for the drama unfolding

SYSTEM WAVE – the term used here to denote the solution of the inverse problem of the solar system, representing the motion of each of the planets as fixed segments of a helical/spiral waveform

TEN BODY PROBLEM – a dynamical study of the motion of a spacecraft in the solar system, where the major bodies are the sun and eight planets, and the 10th small body is the spacecraft

THEORY OF EVERYTHING – a hypothetical theory that links all the fundamental forces in the universe in a single set of mathematical notation

THREE BODY PROBLEM – a study of the gravitational influence of two massive bodies, e.g., planets, on a third much smaller body, i.e., a spacecraft

TROJAN ASTEROIDS – a group of asteroids that are in permanent rotation around the L₄ Lagrange Point of the Sun-Jupiter system in 3BP dynamical analysis

TWO BODY PROBLEM – a study of the orbital motion of a small object, like a spacecraft, in motion around or near a much larger celestial body such as a planet, moon, or star

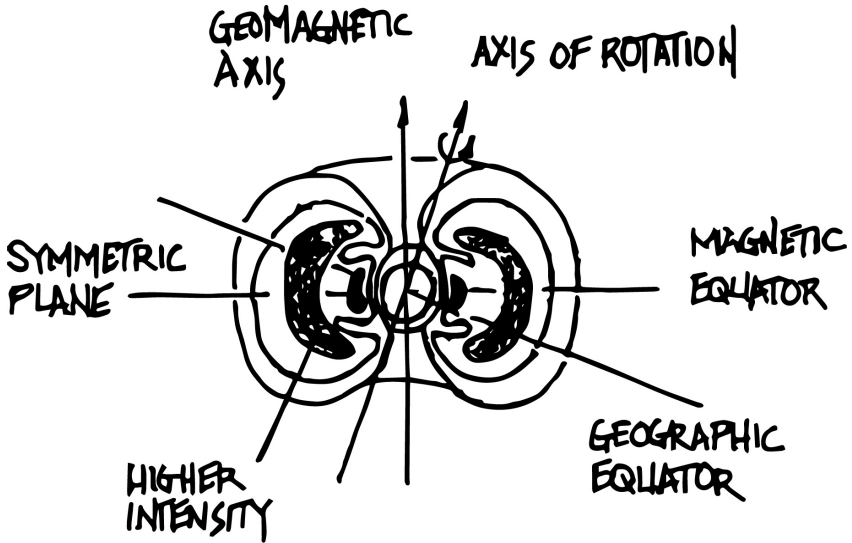


Figure 2 **Earth's Van Allen Belts**

VAN ALLEN BELTS – regions of intense electromagnetism enveloping the Earth, and caused by the rotation of the Earth's magnetic core, that protect the planet from dangerous solar radiation
Vector – a line segment in the engineering disciplines that has magnitude and direction

UNIFIED FIELD THEORY (UFT) – a mathematical theory that includes all four fundamental forces of nature in the same analytical context

ZERO VELOCITY CURVES – lines in a Three Body Problem that form closed orbits, upon which an object will remain indefinitely absent any external forces

GLOSSARY