

Plato's Noble Lie and the Imaginary Number *i*: An Introduction to the Zero Zone System of Measurement in the Context of Plato's Republic and the Laws*

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Introduction

The monetary system translates incommensurable commodities (such as apples and oranges) into economic exchange values based on numeric ratios of \$1. Similarly, the Zero Zone System of measurement (ZZS), invented by Mr. Yang, Dong-Bong, translates all 7 of the SI units of measurement—Le Système International d'Unités: meter (m), kilogram (kg), second (s), ampere (A), Kelvin (K), mol (mol) and candela (cd)—into pure numbers based on ratios of 1 photon, which he also equates with the *mental act* of each measurement. The photon is the basic unit of electromagnetic radiation, which is equivalent to matter according to Einstein's famous equation $E=mc^2$. Quantum physicists furthermore discovered that an act of measurement, the basic unit of the mind, is required to "collapse" the quantum "wave of probability" into a particular photon. Seeing that the basic unit of matter and the basic unit of mind are naturally united this way, Mr. Yang simply equated both with 1 (including 0, -1, and i and $-i$, the "imaginary unit" i and $-i$), then painstakingly recalibrated the SI units into numerical ratios of that universal psycho-luminous unit of measurement, for which he coined the term "zeron". The incredible thing is that this quasi-religious leap of faith, which so simply bridges the classic mind-matter description gap by equating the basic unit of each with 1, thereby provides the very practical and testable ability to add and subtract otherwise incommensurable SI units of measurement, an ability which could open our mind's eye to a whole world of previously undetectable correlations connecting the different dimensions of nature.

How do you subtract 3 oranges from 2 apples? You cannot; the question is meaningless. But you can easily translate both types of fruit into dollar values, then subtract the *price* of 3 oranges from the *price* of 2 apples. Similarly, by translating the 7 SI units into numerical ratios of 1, ZZS

* Thanks to Dr. James Dator and Seongwon Park from the Alternative Futures Program in the Department of Political Science at UH, Manoa, who introduced me to Mr. Yang, Dong Bong, and his Zero Zone System of measurement, and who encouraged me to write this essay.

provides the weird ability, for example, to add 3 candela to 18 meters, or subtract 9 seconds from 14 kilograms, and then retranslate the numbers into their SI unit word form. It is its potential for practical application (such as dramatically increasing database computer processing speed, and allowing social scientists to detect correlations between mathematical models using different units to measure different aspects of human life) that makes the leap of faith upon which ZZS is founded seem plausible. This Trinitarian equation (mind = universal light = 1), which may be the simple bridge we need to span the academic language gap between humanistic descriptions of mind and scientific descriptions of matter, is the same solution Socrates points to in the first academic curriculum conceived in Plato's *Republic*. Constructed as a normative futures studies exercise in alternative political design, the *Republic* culminates with a utopian city-state wherein the sciences and humanities cooperate to teach select citizens how the 3 dimensions of space and the 4th dimension of time radiate from and reunite in the idea of the good, the intelligible sun, the universal unit by which the value of all other physical and psychic units of measurement are determined, to see which with the mind's eye activates every virtue in the soul.

All quotes in this article from Plato's *Republic* will come from Allan Bloom's translation (1991), while quotes from all other Platonic Dialogues or Letters will come from *The Collected Dialogues of Plato: Including the Letters* (Hamilton & Cairns, 1994). The numbered lower case letters that appear after the title of each Dialogue or Letter represent the standard "Stephanus pagination" used by Plato scholars. Plato wrote dramatic Dialogues featuring his martyred master Socrates having lively philosophical question-and-answer sessions with the people of Athens and visitors from surrounding city-states. In *Letter VII* (341c), Plato wrote, in his own name, to explain why he never had nor ever will write down his own true philosophy, at least not in any straight forward way. In the *Phaedrus* (276c), he had Socrates formulate the same argument, comparing the man of knowledge to the farmer, who only sows his seeds in suitable soil, and does not waste them by distributing them indiscriminately, as happens with the written word. Although it is not explicitly spelled out, the idea that a mirror-symmetry exists between the mathematical system of number 1, the physical system of a unit of light, the psychological system of the mind (or soul), and the political system of the ideal city, is the tacit assumption, or logical connotation, of the *Republic*. In Book II of that Ten Book Dialogue, Socrates suggests he and the young men with whom he speaks simplify their search for justice in the individual by imagining the establishment of a just city. Their working assumption, amendable to revisions, is that the collective is an enlarged version of the individual, so that justice in the individual will be magnified, and therefore easier to see, on the scale of the city: "If you want, first we'll investigate what justice is like in the cities. Then, we'll go on to consider it in individuals, considering the likeness of the bigger in the idea of the littler?" (*Republic* 369a). They create an ideal city, focusing on the curriculum for its future leaders, which culminates with the conclusion that the temporary material forms radiating from the visible sun are a kind of shadowy dream reflection of eternal mathematical-geometrical forms radiating from the intelligible sun, the idea of the good seen with the mind's eye. This Two Worlds theory (also known as the theory of forms or ideas) resulted in the modern scientific revolution, beginning with

Copernicus and culminating with quantum theory. It is packed with implications, of which I will focus on three. First, the soul that perceives the intelligible sun becomes qualitatively one with it, it becomes good; or, rather, it wakes up from its temporary dream and realizes it is spawned directly from the idea of the good with the same eternal nature. Secondly, if the intelligible sun is the original standard, or unit, of psychical *and* physical value, then the individual soul is also a miniature replica of that original *number 1*. Thirdly, in 20th century terminology, the claim that the visible sun mirrors the intelligible sun indicates the quantum physics of photons should mirror the metaphysics of souls. Connecting all the points, the quantum physics of the photon should mirror the metaphysics (depth psychology) of the soul (mind), which should mirror the constitutional system of the ideal city, which should mirror the mathematical system of number 1. As with geometrical problems, if we find out one side of this parallelogram of concepts we can decipher them all: number 1 is the key; -1 literally rotates the key to unlock the secret commensurability between soul, city, and sun. If 1 includes the square root of its negative, then each of the remaining systems must contain something structurally similar to it. Following Socrates' advice, to discover what the imaginary unit represents in the mind and the photon, I will examine my theory that it is secretly reflected in the legislation of the imaginary city of the *Republic* in the pivotal "noble lie".

The claim that the infamous "noble lie" in Book III of the *Republic* is secretly a model of the imaginary unit will of course be met by the objection that the Greeks did not know about imaginary numbers back then. In fact, according to the 1930 classic by Dr. Tobias Dantzig, *Number: The Language of Science*, which Einstein admired, during Plato's day no one on Earth even knew about the number 0, or negative numbers (both of which were discovered by "Hindus" in India in the first centuries *after* Christ), let alone square roots of negative numbers (discovered by Renaissance Italians), or the complex number plane (a vertical "imaginary number line" intersecting the horizontal "real number line" discovered in the 19th century), upon which 20th century physics was formulated. Nevertheless, I will argue that in the *Republic*, Socrates' suggestion of the need for an outlandish "noble lie" on which to found the just city is a secret allusion to the imaginary unit, which is the noble lie modern mathematicians use to make our mathematical system functionally complete. The basic motif of the noble lie—that the citizens were spawned and formed underground while dreaming about childhoods they thought they were having, and were then brought up to the bright world above to a realization of their immediate kinship with their land and each other—is repeated at a higher octave in Book VII in the even more famous cave allegory, which I argue secretly depicts the complex number plane. In this article I will focus on the structural and functional parallels between the noble lie and the imaginary number i . However, before venturing into the mysterious realm of Plato's mathematical symbolism and imaginary numbers, I want to begin by reviewing the very practical problem the Zero Zone System of measurement purportedly solves, thereby granting the more esoteric aspects of this examination solid traction in the "real" world of weights and measurements.

Curriculum of Commensurability in the Laws

As a way of leading up to the culminating parallel between the noble lie and the -1, I want to demonstrate that Plato was well aware of the practical mathematical problem to which this mysterious number provides a solution: the problem of adding and subtracting seemingly incommensurable dimensional units of space-time. He demonstrated this most concisely through the mouthpiece of the "Athenian Stranger" in the *Laws*, a counterpart Dialogue to *The Republic*. In the process of developing yet another alternative political system in the *Laws* (a slightly less utopian version of the alternative city imagined in the *Republic*), Plato again had his leading literary character lay out a step by step mathematical study of the four dimensions of space-time to be taught to the citizens in the following order.

ATHENIAN: Then there are, of course, three subjects for the freeborn still to study. Ciphering and arithmetic make one subject [1st dimensional study of dimensionless numbers]; mensuration, linear, superficial [2nd dimensional geometrical study of length and width], and solid [3rd dimensional geometrical study of volume], taken as one single study, forms a second; the third is the true relations of the planetary orbits [4th dimensional study of time—solids in motion] to one another. (Laws 817e-818b)

Plato scholars debate much about how much Plato agreed with the opinions he had Socrates express in the Dialogues. Most scholars agree, however, that the Athenian Stranger in the *Laws*, Plato's final Dialogue (unique in that Socrates is not present), is the most thinly veiled mask for Plato's own opinions. Here, as in the *Republic*, the discussion is about the need to mathematically study the four dimensions of space-time in ascending order in order to awaken virtue in the soul. In the following passage, discussing the Egyptian education system (though not revealing its secrets), the Athenian spells out the major problem this course of study will encounter, the problem ZZS solves—the incommensurability of the dimensional units of measurement.

ATHENIAN: Then they go on to exercises in measurements of length, surface, and cubicle content, by which they dispel the native and general, but ludicrous and shameful, ignorance of mankind about the whole subject. ...

Such ignorance seemed to me more worthy of a stupid beast like the hog than of a human being....

And what of the relations of line and surface to volume, or of line and surface to one another? Is it not the fact that we Hellenes all imagine they are commensurable in some way or other?

CLINIAS: Why certainly that is the fact.

ATHENIAN: Then if this is another entire impossibility, though we Hellenes, as I said, all fancy it possible, are we not bound to blush for them all ... ?

The real relation of commensurability and incommensurability to one another. A man must be able to distinguish them on examination, or else must be a very poor creature. (Laws 819d-820d, my underline)

The units with which we measure one dimensional lines, two dimensional surfaces, and three dimensional volumes cannot be added or subtracted. Surprisingly, the Athenian said the general failure to realize this incommensurability is the single most condemnable deficiency in the mathematical knowledge of our species, more worthy of a hog than a human. Discussing this "apples and oranges" dilemma, in his 1976 book, *Understanding Correlation*, Dr. R. J. Rummel (2009) of the University of Hawaii, Manoa, summarized the problem of analyzing unlike units of measurement from a political science perspective as follows:

Although the cases across which two variables covary usually will be the same, the units in which the magnitudes are expressed for each variable may differ. One variable may be in dollars per capita, another number of infant deaths. One may be in percent, another in feet. One apples, the other oranges.

Clearly, we have a classic problem. How can we measure the correlation between different things in different units? We know we perceive covariation between things that are different. But determining common units for different things such that their correlations can be measured and compared to other correlations seems beyond our ability. Yet, we must make units comparable before we can jointly measure variation. But how? (Chapter 2, no page numbers on the Web Site version)

If it is what its advocates claim, the Zero Zone System of measurement will be remembered as the Rosetta Stone that solved the classic problem of measuring the correlation between different things in different units. What does it mean to subtract 4 seconds from 12 candela? How do you add 2 meters and 9 kilograms? The ability to add and subtract different units measuring different aspects of the four dimensions of nature could reveal relations between them no one ever imagined, with collateral realizations in every academic field, including the social sciences. Moreover, the more we realize by mathematical experience how the act of including our mental act in the measurement system unveils a unification of the dimensions of nature, the more easily will we be able to believe we truly are one with nature, a belief which should automatically expand our self-love outward to include all the cosmos, as Plato had Socrates suggest in the Republic with the idea of the good, the intelligible sun.

I return to the *Laws*, where the Athenian too discusses the belief that the invisible but intelligible soul of the sun, and light in general, somehow "infolds us in a fashion utterly imperceptible to all bodily senses, and is only to be discerned by the understanding." (*Laws*, 899c). First the Athenian laid out the primary importance of realizing the practical problem of the incommensurability of the dimensional units by which we measure the three dimensions of space (and, by extension, the fourth dimension of time), then he claimed everything is somehow invisibly infolded in the intelligible soul of the sun, which is the culminating realization of the *Republic* as well. If we could mathematically describe that fundamental feature of physics, the incommensu-

rable dimensional units would be rendered commensurable by the realization that they are merely measuring different ratios of 1 universal unit of measurement, of which all things are made. ZZS does indeed claim to solve the incommensurability problem by recalibrating the SI dimensional units of measurement into dimensionless numerical ratios of one universal psycho-luminous unit of measurement, the zeron, wherein the photon and the intelligible act of measurement are equated with the number 1, understood as a paradoxical kinship between 0, -1, and -1 , the imaginary unit i and $-i$, which I will argue is allegorically represented by the noble lie in Book III of the *Republic*.

Curriculum of Commensurability in the Republic

The *Republic* is overtly a legislative outline for the ideal city-state, with special attention paid to the educational system for its ruling elite. The mathematical-scientific curriculum for the future leaders of the ideal city is spelled out in Book VII of the *Republic* between 523b and 537c. It comes directly after the "cave allegory", according to which prisoners are chained head and foot in a subterranean cave from birth, forced to watch shadows on a wall in front of them, cast from puppets walked back and forth in front of a fire by guards in the rear of the cave. Living in a kind of dream world, the prisoners mistake the shadows for the totality of reality. Someone from the world above descends into the cave, breaks the chains, and turns a prisoner around to see the puppets and fire, then leads the prisoner up and out to see the natural objects of which the shadows in the cave were a facsimile, culminating with a vision of the sun, which was reflected by the fire. As the shadow cave is to the natural world, so too is the natural world to the intelligible world. The conclusion is that the temporary material forms radiating from the visible sun dimly reflect the eternal mathematical-geometrical forms radiating from the intelligible sun. The process of education is meant to liberate the student from the shadows of material perception to a vision of the intelligible plane of existence radiating from the archetypal unit, the idea of the good. The sequence of study in the *Republic* progresses from a *one* dimensional (dimensionless) study of the number one and the paradoxical way it unfolds arithmetically into many other numbers, to a *two* dimensional understanding of plane geometry, to a *three* dimensional understanding of solid geometry, to a *fourth* dimensional understanding of solid geometry in motion, which is astronomy (spherical planets orbiting) and music (vibration), both of which measure time, to a *fifth* dimensional, mental comprehension of the commensurability of the previous four dimensions of space-time. Continuing in *The Republic*, Socrates declared that only a few intellectually rigorous natures are capable of realizing the overarching law, the "fifth stage" of knowledge that "reveals the kinship of these studies with one another and with the nature of that which is." (*Republic* 537c). The Zero Zone System of measurement, founded on the imaginary unit, thereby reveals the kinship of the otherwise incommensurable SI units of measurement with the nature of that which is, the 1; similarly, the ideal city of the *Republic*, founded on the noble lie, thereby reveals the kinship of the otherwise incommensurable citizens with the political unit of their mother, the city.

The Imaginary Unit

My theory is that the literary riddles in the *Republic* serve as an interactive educational technology meant to teach the reader how to philosophically conceptualize the "complex number plane" formed by the perpendicular intersection of the real and imaginary number lines at point 0. The "real number line" extends horizontally from the line segment between -1 and 1, while the "imaginary number line" extends vertically from the line segment between the square roots of -1, the "imaginary unit" i and $-i$. Multiplication by i means rotating a point 90 degrees counterclockwise around the axis point of 0, the only number that is considered both real and imaginary; while multiplication by $-i$ means rotation 90 degrees clockwise. It was upon this peculiar number grid of real and imaginary numbers that 20th century physicists geometrically imagined their theories. I turn to Dr. Dantzig (1967), to his description of the history of -1 , originally rejected outright as imaginary.

Cardan in 1545 was the first to dare to denote the meaningless by a symbol. ...

But, as happened in the case of the negative numbers, so here too the mere writing down of the impossible gave it a symbolic existence. It is true that it was written with the reservation that it was meaningless, sophisticated, impossible, fictitious, mystic, imaginary. Yet, there is a great deal in a name, even if it be but a nickname or a term of abuse. (p.182)

The history of the imaginary unit epitomizes Dr. James Dator's "Second Law of Futures Studies": "Any useful idea about the future should appear to be ridiculous." Initially discarded as ridiculous, the imaginary i was eventually hailed as the pivotal pillar of 20th century physics. The imaginary unit, like the noble lie, is an incredibly useful fiction that was nearly impossible to convince people to believe. Moreover, as I will show, both have to do with a rooted unit rotating through four phases of increasing value. It is important to note how central the imaginary unit is to 20th century physics if we are to appreciate the importance it plays in ZZS, and my theory that Plato hid secret knowledge of this strange number in the *Republic*. I return to Dantzig (1967), who said the mathematics revealed by i provide "the foundation of the modern Relativity theory" (p.203), and "have lately found a remarkable interpretation in the quantum theory of the atom." (p.204). He continues as follows:

Such a rough outline is the story of the complex magnitude. For centuries it figured as a sort of mystic bond between reason and imagination. In the words of Leibnitz,

"the Divine Spirit found a sublime outlet in that wonder of analysis, that portent of the ideal world, that amphibian between being and not-being, which we call the imaginary root of negative unity." (p.204)

Notice how the famous 17th century philosopher-mathematician Leibnitz called the imaginary unit an "amphibian between being and not-being," using the explicitly Platonic language of the Two Worlds theory. If the imaginary unit rotates above and below the "real" number line, transcending the horizontal border between being and not-being, it serves as the bridge between the two, as a number that can lift our mind's

eye out of the sea of shadows into the bright sunshine of the intelligible sun, the "one". In fact, in the *Republic*, Socrates specifically said their ideal city required the rescue of an amphibian sea creature – a dolphin. Just as he and the boys began to stumble upon the incestuous necessities of the ideal city, intimately related to the noble lie of underground kinship on which the city is founded, Socrates said, "Then we, too, must swim and try to escape out of the sea of argument in the hope that either some dolphin will take us on its back or some other desperate rescue" (*Republic* 453d).

The city is a model of the soul, which is an earthly embassy of the original 1, endowed with all of its qualities in miniature form. The incestuous reproductive laws of the unit city require the "noble lie", which is a dolphin-like idea in that it concerns the multiplying human race rotating above and below the surface of the city. Similarly, the multiplicative laws of number 1 require the desperate rescue of some amphibian number which rotates above and below the real number line – the imaginary unit, the noble lie of mathematics. The dolphin Socrates hopes for is meant to save the argument concerning the incestuous procreation, or multiplication, of the men, women, and children in the family *unit*, each of whom, according to the allegorical model being used, must also represent aspects of number 1. I will argue that father = +1, mother = -1, and children, who are literally rooted to their mothers by the umbilical chord, equal the square roots of -1, +i and -i, which contain the DNA of both 1 and -1, as it were. On another level, the city itself is the mother, -1, while the intelligible sun is the father, +1, in which case men, women, and children are all imaginary units. The incestuous necessities of Book V are directly rooted to the noble lie of Book III, which informs the elite leaders of society to instruct their own offspring, if possible, but at least all the other citizens that they were originally rooted underground beneath their mother city, so that no one will know whose child is whose, thereby transferring the love of the family unit to the political unit of the mother country. Many scholars assume Socrates was being comical in Book V, though in some apparently frivolous way, while my theory that the noble lie is the imaginary unit reveals a mathematically potent punch-line behind the bizarre joke about the incestuous multiplication of the ideal race.

To reiterate the paramount importance of the imaginary unit i in quantum physics I turn to a book by quantum physicist Dr. Fred Alan Wolf (1994), *The Dreaming Universe*.

Without using complex numbers in quantum physics there was no way possible to reconcile the apparent split that existed between the particle and the wave theories. When Werner Heisenberg and Erwin Schrodinger introduced the imaginary unit i as a fundamental element into our description of matter, suddenly all of the contradictory appearances of quantum physics could be harmoniously integrated into the concept of the complex probability amplitude.

If that amplitude was expressed at a specific point in space and time by a complex number, $a+bi$, then there was also the complex-number wave amplitude, $a-bi$. The $a+bi$ represented at the point in space and time the wave traveling forward in time, and the $a-bi$ represented at the same point in space and time a wave traveling backward through time. When these two numbers were multiplied together, the

result was a^2+b^2 , a real and positive number representing the "reality" as expressed as a probability for finding the system at that specific point in space and time.

In a similar manner the point on the ring of imaginaries, the ring i , is also given by the complex number $a+bi$. When $a+bi$ is multiplied by $a-bi$, the result, a^2+b^2 , always equals 1, the radius of the circle. (p.374-375)

Quantum physics, the fundamental science of matter, is mathematically based on equations that multiply waves of real and imaginary numbers pointing forward through time toward alternative futures, by those pointing backward through time from alternative futures. This is obviously pertinent to futures studies methods of forecasting to and backcasting from imaginary yet realistic scenarios of alternative futures, if for no other reason than vindication by scientific analogy. The focus of this article, however, is the more basic issue of the imaginary unit and the complex number plane on which these waves of probability are constructed. The imaginary unit has the mathematically unique quality of rotating through four increasing powers manifest as right angle increments around the axis of the complex number plane centered at point 0: $i^1=i$, $i^2=-1$, $i^3=-i$, $i^4=1$ / $i^5=i$, $i^6=-1$, $i^7=-i$, $i^8=1$. A complex number is denoted as real number "a" times a positive or negative imaginary number "bi" ($a+bi$, $a-bi$).

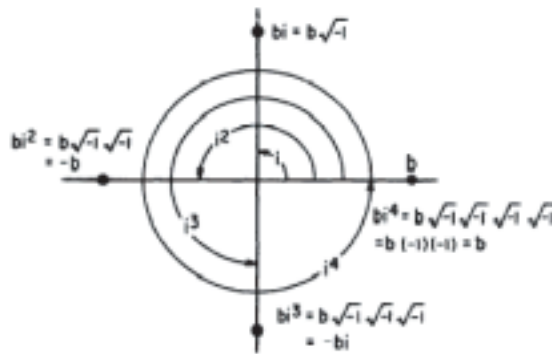


Figure 1. The "unit circle" of 4 increasing powers of i around the axis of the complex number plane

Note. From www.tpub.com/math1/16b.htm. Retrieved April 20, 2009.

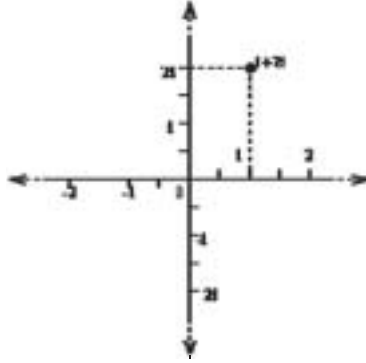


Figure 2. A complex number denoted in $a+bi$ form on the complex number plane
 Note. From www-xray.ast.cam.ac.uk/.../h13/calcguide.html. Retrieved April 20, 2009.

It is on this complex number plane that Einstein derived his equation $E=mc^2$, while the quantum physicists later derived their foundational equation, finalized by Born: $pq - qp = h/i$. Notice the number i at the end. At the foundation of the fundamental equation of the fundamental physics of matter we find the imaginary unit, the pillar upon which 20th century physics is built, and the pivot on which it turns. Similarly, interpreting the noble lie as an allegory of the imaginary unit makes mathematical sense of a pivotal component of Plato's *Republic* that has puzzled Plato scholars since he founded the first Academy. Before turning to the noble lie, I quote now from an advance copy of an article, "One Parameter", by the inventor of the Zero Zone System of measurement, Mr. Yang, Dong Bong (2009). His technical language should be slightly less inaccessible after the introduction to imaginary numbers given above.

There are bitter arguments with respect to duality of light or locality and non-locality in terms of relativity theory and quantum mechanics. A new framework of translation can be presented through the in-depth analysis on the relationship among number 1 and 7 basic [SI] units. In particular, the concept of $1s=1Hz=1=(-1i)(+1i)$ can provide broader physical translation of; one; when connected to physical implication of time and space and the pair of imaginary numbers.... There are 3 abstractions in photon such as numbers 1 and 0 with duality and the imbedded concept of imaginary number. All these exist in the relationship of 'one', as indicated through number 1 in the assumption of this paper. ...

In quantum dynamics of modern physics, the square of wave function is used to produce real number, yet there is lingering hatred of imaginary number. Avoiding something does not clearly resolve any problems. We need to find the clues of the outstanding problems from the concept of imaginary numbers that we have overlooked. Zero Zone theory emphasizes the straightforward approach of problem resolution, suggesting that paradox be resolved by paradox and imaginary number be addressed by imaginary number. ...

As light itself cannot be internally contaminated or damaged, number 1 secretly contains a pair of imaginary numbers in the opposite directions. Instead

of being the smallest unit, number 1 serves as the criteria of identifying the relationship between critical velocity and infinitesimal in terms of quantity and quality of translation and calculation. In other words, number 1 becomes the fundamental scale of every difference such as the smallest countable quantity, etc. and explains the ground-zero (mod 1) for comparison of large and small, many and little quantity. (pp.29-30, my underline)

ZZS solves the riddle of the incommensurability of the different SI units by equating the mind and the photon with 1, placing special emphasis on -1 . This technical accomplishment could additionally provide an extremely practical tool for educating people about the philosophical implications involved. Plato's *Republic* is the perfect template within which to digest the greatly simplified but still technically complex language of the Zero Zone System of measurement, for Socrates walks his friends through precisely the kinds of complicated questions ZZS forces us to ask, using everyday figures of speech in free-flowing parlance aimed entirely at the total novice. It is impossible to say what Plato believed for certain, though it seems the one point on which he most agreed with ZZS is that matter and mind should both be equated with the number 1; the -1 enables us to describe that mathematically. I return to Wolf (1994), who discussed the pioneer of quantum physics, Wolfgang Pauli's, fascination with the psycho-physical implications of the number i on the complex number plane: "The ring i reconciled the wave and the particle. Could it also reconcile the psyche and matter – the spirit and material?" (p.297). In this article I am leading up to the parallels between the noble lie of the *Republic* and the imaginary unit so central to ZZS, wherein matter and spirit (photon and mental act of measurement) are reconciled as 1 based on the proper application of the number i .

The Noble Lie, A Phoenician Thing

We will see that Socrates calls the noble lie a "Phoenician thing" (*Republic*, 414c), which scholars assume is a reference to Cadmus, the mythic Prince of Phoenicia who founded the city-state of Thebes, a neighbor of Athens – see, for example (Kateri, 2003). In the endnote to his translation of the passage in question, Alan Bloom (1991) wrote: "Probably referring to the Phoenician hero, Cadmus; he founded Thebes with giants who sprang from the earth of the teeth of a slain dragon which were sown by him (fv. *Laws*, 663e)". (p.455). I will return to the dragon teeth in a moment. First, the following excerpt is from the ancient Greek historian Herodotus (Selincourt, 1954): "The Phoenicians who came with Cadmus ... introduced into Greece, after their settlement in the country, a number of accomplishments, of which the most important was writing, an art till then, I think, unknown to the Greeks." The Phoenician alphabet was the foundation of the Greek and Hebrew languages. Moreover, since each Phoenician letter is associated with a number, it gave those later civilizations their mathematics as well. I return to Dantzig (1967): "The Phoenician origin of both the Hebrew and the Greek numeration is unquestionable: the Phoenician system was adopted bodily, together with the alphabet, and even the sounds of the letters were retained." (p.25). My outlandish theory that the noble lie is an allegory of the imaginary unit seems much more plausible in the context of its connection to the Phoenician prince,

Cadmus, founder of the Phoenician numerical-alphabet, which became the basis of the ancient Greek and Hebrew linguistic-numeral systems. Comparing the noble lie to the imaginary unit and the role it plays in the Zero Zone System of measurement makes further sense when we consider that the Phoenician's equated each letter in their alphabet with a number, while measurement systems similarly seek to meaningfully equate words and numbers. However, the more overt meaning of Socrates' reference to the noble lie in the *Republic* as a "Phoenician thing" is the story about Cadmus planting a dragon's teeth in the ground, from which Spartan warriors grew up to help him found Thebes. Similarly, the legislators of the ideal city are to tell the citizens the childhoods they thought they had were dreams, during which time they were actually growing underground, rooted like plants to the underside of the political unit of their mother, the city, being formed there by the god who fuses one of 4 metals in their souls (gold, silver, iron, bronze), thereby fulfilling three functions for the ideal city: instilling a literal love for *mother* country in each citizen; instilling the belief in each citizen that all the other citizens are literally brothers and sisters; and, finally, it enables the rulers to *rotate* blood lines through *four* hierarchical castes (guardian=gold, auxiliary=silver, craftsman and farmers are lumped together as iron and bronze), so that people are placed at the level for which they are most naturally qualified, rather than the level they inherit from their parents: children with iron or bronze qualities born to gold parents will be cast *down*, while children with gold qualities born to iron or bronze parents will be rotated *up*. If the city mirrors the "one" on which its leaders pattern their government, and a noble lie is required to make the political system functional, then the mathematical system of number 1 must require something similar, i.e. the imaginary unit. I turn now to the passage about the noble lie.

"Could we," I said, "somehow contrive one of those lies that come into being in case of need, of which we were just now speaking, some one noble lie to persuade, in the best case, even the rulers, but if not them, the rest of the city?"

"What sort of thing?" he said.

"Nothing new," I said, "but a Phoenician thing, which has already happened in many places before, as the poets assert and have caused others to believe, but one that has not happened in our time – and I don't know if it could – one that requires a great deal of persuasion."

"How like a man who's hesitant to speak you are, he said.

"You'll think my hesitation quite appropriate, too," I said, "when I do speak."

"Speak," he said, "and don't be afraid."

"I shall speak – and yet, I don't know what I'll use for daring or speeches in telling it – and I'll attempt to persuade first the rulers and the soldiers, then the rest of the city, that the rearing and education we gave them were like dreams; they only thought they were undergoing all that was happening to them, while, in truth, at that time they were under the earth within, being fashioned and reared themselves, and their arms and other tools being crafted. When the job had been completely finished, then the earth, which is their mother, sent them up. And now, as though the land they are in were a mother and nurse, they must plan for and

defend it, if anyone attacks, and they must think of the other citizens as brothers and born of the earth."

"It wasn't," he said, "for nothing that you were for so long ashamed to tell the lie."

"It was indeed appropriate," I said. "All the same, hear out the rest of the tale. (Republic 414b-415d, my underline)

Summarizing the rest of the tale, like the imaginary unit, which rotates through four phases of growth at the root of -1 , so too does the noble lie periodically rotate family bloodlines through the four castes of society by telling people they grew up like plants literally rooted to the underside of their common motherly unit, the city, formed therein by the god with one of precisely four metals in their soul, so that the manifest *value* of their inner metal, and not the accident of their birth, determines their vertical positioning on the hierarchical pyramid. It is crucial to keep in mind that the noble lie leads unavoidably to the incestuous implications of Book V, the first premonition of which appears in the following passage from Book IV.

"If by being well educated they become sensible men, they'll easily see to all this and everything else we are now leaving out – that the possession of women, marriage, and procreation of children must as far as possible be arranged according to the proverb that friends have all things in common."

"Yes," he said, "that would be the most correct way."

"And hence," I said, "the regime, once well started, will roll on like a circle in its growth." (Republic 424a)

The ideal regime is well started when it is based on the education system starting with the noble lie, which is the imaginary unit, which does grow in a circle. The passage above is, furthermore, the first mention of the communal sharing of women and children in the city. If fathers symbolize $+1$, mothers -1 , and children the square roots of -1 , then the city, composed of successive generations of imaginary units, will indeed roll on like a circle through precisely 4 phases of growth, although when we translate that mathematical system of number 1 back into the human terms of the city, we see how the noble lie leads to strangely incestuous laws of reproduction. The incestuous laws of Book V only make sense if we see the city as a model of the mathematical kinship between 1 , -1 , and -1 , i and $-i$, in which case the *noble lie* about everyone being originally rooted to the underside of mother city (-1) corresponds to -1 , the *imaginary unit*. With this in mind I skip to Book VI, where Socrates directly relates the idea of the good with number one, then said he wanted to discuss the "child" of that "father", furthermore tying the whole issue to a warning about intentional and unintentional lies.

"But, you blessed men, let's leave aside for the time what the good itself is... But I'm willing to tell what looks like a child of the good and most similar to it..."

"Do tell," he said, "Another time you'll pay us what's due on the father's narrative."

"I could wish," I said, "that I were able to pay and you were able to receive it itself, and not just the interest, as is the case now. Anyhow, receive this interest

and child of the good itself. But be careful that I don't in some way unwillingly deceive you in rendering the account of the interest fraudulent.

"And so we assert that there is a fair itself, a good itself, and so on for all things that we can set down as many. Now, again, we refer them to one idea of each as though the idea were one, and we address it as that which really is." (Republic 506d-507b, my underline)

Socrates compares the idea of the good to the number one, that which really is. Thinking himself unfit to discuss the one directly, he opts instead to speak of its child, leading Glaucon to call the number one, the idea of the good, the father. The *child of father 1* must initially be rooted in the womb of the father's opposite, *mother 1*. The child of + 1 is the square root of -1, the imaginary unit, which I believe Plato equated with the noble lie in Book III, which explains why in this passage in Book VI he had Socrates ironically bring up the further issue of *fraudulent* interest fractions and *unwilling deceit*, which naturally brings to mind the idea of the *willing deceit* of the noble lie. This same theme continues in Book VII, after the ideal curriculum for the mathematical study of the four dimensions of space-time has been laid out.

"And likewise with respect to truth," I said, "won't we class as maimed a soul that hates the willing lie, both finding it hard to endure in itself and becoming incensed when others lie, but is content to receive the unwilling lie and, when it is caught somewhere being ignorant, isn't vexed but easily accommodates itself, like a swinish beast, to wallowing in lack of learning?" (Republic 535d-e, my underline)

Earlier in the *Laws* we saw the Athenian say the native and ludicrous ignorance of the human species concerning the mathematical incommensurability of length, surface, and solids "seemed to me more worthy of a stupid beast like the hog than of a human being" (*Laws* 819d-820d). Here in the *Republic* we see that same exact metaphor of swinish ignorance directly related to the same exact curriculum studying the commensurability of the four dimensions of space-time, which is furthermore directly connected to the issue of a willing lie, to hate which is to reveal a maimed soul. Conversely, love of the willing lie saves us from the swinish ignorance concerning commensurability and incommensurability, thereby making the soul healthy with a proper understanding of "truth", which is the 1. ZYS shows how the solution to the incommensurability problem is found in the proper use of the imaginary unit, the offspring of father +1 and mother -1, which rotates our mind's eye from the swinish ignorance of the incommensurability of the 7 SI units with which we measure the 4 dimensions of nature, to a brilliant realization of how all things are commensurate with the psycho-physical one.

Returning to Book IV, Socrates makes another allusion to circular growth of the city with his remarkable exclamation that he may have discovered justice itself, rolling around at their feet.

*"My, my" I said, "that was a stupid state we were in."
"How's that?"*

"It appears, you blessed man, that it's been rolling around at our feet from the beginning and we couldn't see it after all, but were quite ridiculous. As men holding something in their hand sometimes seek what they're holding, we too didn't look at it but turned our gaze somewhere far off, which is also perhaps just the reason it escaped our notice." (Republic 432d, my underline)

Political justice is had by organizing society according to the noble lie that everyone was originally rooted beneath the mother city with 1 of 4 metals in their soul, thereby rotating bloodlines through the caste system according to quality of soul rather than accidental birth right. If justice translates into a mathematical understanding of how to properly use -1 , not only does it roll around at the feet, or root, of -1 (which represents the mother city), unnoticed, but it is also, as Socrates said, like something we search for far off while holding it in our hand.

Conclusion

As Socrates is the proof that the imaginary pattern of a perfect state does not need to exist in reality in order to be realized in an individual's life, so too is -1 the proof that the pattern of a perfect numeric system does not need to be real to be realized as an operational fact. In fact, we know -1 does *not* exist on the "real number line" at all, which is why mathematicians had to invent what came to be called the "imaginary unit" in the *Renaissance*, and the corresponding "imaginary number line" on the "complex number plane" in the 19th century to give it a proper place, thereby making our mathematical system complete. I return to Dr. Dantzig (1967).

And so it was that the complex number, which had its origin in a symbol for a fiction, ended by becoming an indispensable tool for the formulation of mathematical ideas, a powerful instrument for the solution of intricate problems, a means for tracing kinships between remote mathematical disciplines.

Moral: FICTION IS A FORM IN SEARCH OF AN INTERPRETATION. (p.205)

The imaginary unit reveals the *kinship* between disparate mathematical disciplines, rendering them commensurable in one complete mathematical system capable of comprehending Relativity theory and quantum physics, which opened insight into astrophysics and nuclear biology – DNA. Similarly, Mr. Yang, Dong Bong, figured out how the imaginary unit completes the measurement system by enabling us to translate the 7 SI units into commensurable numerical ratios of one universal unit of measurement that equates the mind and the photon with the number 1 rightly understood as a paradoxical kinship between 0, -1 , and $-1, i$ and $-i$. The technical language of ZZS finds profound support in the vernacular terminology of Plato's *Laws* and *Republic*, both of which are designed as normative exercises in alternative political design. This support would be considered much weightier were scholars to recognize how Plato secretly equated the noble lie with the imaginary number i .

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