

# FIRST STEPS

*This book has no barcodes: it is not a commercial enterprise. I wrote it as a teacher for the benefit of his pupils, knowing them to be curious about the way things are. I now offer this digital edition freely for all non-commercial purposes. It is my gift to you, who would find out what is wrong with our world, and hence what is magical in it. I ask for no recompense other than that you think for yourself, and that you heed the latent sense of greatness that stirs in the young. I dedicate this book to the One within you. So take courage! Live free! Seek the jewel beneath the mountain! And, above all, listen to your heart. It is there you will find the deepest truth.*

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# 1

## A FORK IN THE ROAD

That which exists is now, in this and every instant, one and continuous. It is indivisible, because it is all alike. There is no more or less of it anywhere. Everything is full of it.

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*Parmenides*

Mostly, history keeps up a slow, steady pace. There are changes day to day, year to year, life to life, but, when viewed through the broadest lens, those changes don't make all that much difference. New cultures and civilisations come and go; the road, however, winds on and on. But then, every once in a while, around some corner, sitting fatly in some people's present, there emerges a real *decision* to be made; history's long trudge of incidents and accidents brings up a genuine fork in the road. We are at one now. In recent decades and centuries, humanity, once so confident of its priority in creation, has come to realise that LIFE is, in fact, a physical thing, a reality: *machinery*, at least in some sense. No fatherly authority offers guarantees. As to the human race, its progress and happiness, the rules of reality are, it seems, decidedly neutral. They do not seek our well-being, although we may surely do that ourselves, and neither do they prohibit our annihilation. As the scales of dogma have fallen away, we have realised: history has no master.

What to make of LIFE, then, in this Sparkly New World?

Life remains, now and always, an asked question, a gauntlet thrown down, a story unwritten. Dogma or none, belief or none, science or none, life remains a *challenge*. Despite what many pretend, it isn't easy being human. And, such is the way culture has gone, this challenge is one many fail. Not by dying (which offers much scope for success, in fact), but by *failing to live*, by failing to be, by squirming out of Reality's facts, by giving in to make-believe, succumbing, as so many people do, be they cosmologists, Creationists or marketing executives, to some comfortable and widely established fiction. God hates a coward, they used to say. Yes indeed.

Here's the deal.

Humanity, at the fork, deciding whether to kill itself with "development" and "progress", is wearing a blindfold. It isn't the one you think. That's the thing about robbers of your sight; you don't see them. This modern age, so proud of its modern minds, is, in fact, packed to the gunwales with make-believers, whose entire *modus operandi* is to maintain, at great cost to themselves and others, a particular dogma: an Establishment fiction which stands in direct opposition to the empirical Facts. Very few are those who see—open-eyed, open-hearted, aware—Reality as it actually is, living the chaos, the beauty, the sadness, owning the fullness of misery and bliss, not as shirkers, controllers and liars but as true witnesses, true philosophers, true lovers. Few can see the *road*, blindfolded as we are. Even fewer can see the FORK. The West, whose ways of thinking have now spread across the globe, carried by tech and mercantile greed, has thus far failed (refused) to open its eyes. Fools are idolised. People argue over words, seek pleasure in money, love halfheartedly or never, and then die badly. Everywhere, folk chirrup, squabbling over this or that, advertising this or that, straining every sinew for fame, status, power, money. Such quantities of soul energy are expended in bickering for life's dregs, such copious depths of Nature's resources.

Simply, we are decadent.

CULTURE, whose primary task is the health and happiness of its people, is M.I.A., mute, nowhere to be seen. God died, long, long ago, and culture, in the absence of religion's depth, has itself become *consumption*. Art is now an industry, music a machine. Shallowness has fed shallowness. And it is Mother Earth, once indefatigable, once stronger than the petty envies of men, who bears testament to this rampant sickness. Yes, it's a sickness. It is only the sick who care for status, only fools who care for fame. That's because, simply, it doesn't work, as anyone

with half a brain knows. Those who lust after dominance—the grand idiots of business and government, the stars and winners, the billionaires, the clowns who the media, in their imbecility, have had the temerity to name “Successes”—are tragic addicts and weak-souled children. Anyone who seeks lauded victory in the Rat Race has failed the first challenge of life; those who manage to *attain* such victory have failed even more dismally. The tired West, with the evangelising “wisdom” of arid middle age, worships cowards and tools. And the toll, in human misery, is appalling.

But *why*?

We don’t ask this question often enough.

Not “Why is the world shafted?” but rather “Why is it particularly *us* who are shafting the world?” Why is it *our* culture that is shallow enough to do so? Why are *we* (geographically and temporally) as a civilisation, obsessed, more so than ever before, with getting and gaining, with owning and having, with the superficial aspects of life, even though we all *know*, deep down, that lives lived well are lived beyond all that. Why, in *our* culture, is everything about material success? Why, in *our* culture, are clever heads valued above honest hearts? I don’t for a moment believe that there is some ineluctable process by which a species like ours is automatically bound, once it reaches a certain technological capacity, to annihilate itself in an orgy of gluttonous consumption. Anyone who believes that has failed the other test of life: the capacity for HOPE. By and large, people aren’t arseholes. Meet and talk to individual humans, and they tend to want what is best, for themselves and for others. Even the ones who fuck it up are trying not to. There are plenty of people with good hearts out there. So, why are we drinking the world dry? What has led us into this consumerist cul-de-sac?

The question is, how have we got it so *wrong*?

## The Western Error

The answer is easy to say, but very hard to see. It is this. Our way of life, our value system, our very civilisation, is built on a soul-crushing, life-crushing, joy-crushing *falsehood*. There is, and I write this in an empirical, mathematical, scientific sense, a massive and all-pervading logical error at the heart of the White Man’s worldview: our paradigm is incorrect. The importance of this fact, so easily read but so hardly understood, cannot be overstated. No fanfare of mine, no

barrage of exclamation marks could possibly do it justice. It transcends science and religion, faith and reason, politics and morality; it is deeper than all that. Our core system of belief regarding REALITY, that is to say, not what patchworks of particles the world *contains*, but literally what the world actually *is*, is untrue. We have adhered to this fallacious system of belief for millennia, and it has coloured every decision we have ever made.

I write the above with no hint of hyperbole. Sometimes, an idea isn't quite correct, but it remains a reasonable approximation for the truth, provided it is viewed with the appropriate perspective. Other times, an idea is simply *wrong*, totally wrong, factually incorrect, out of kilter with Reality, erroneous in a binary sense. I'm talking about something that wouldn't get a ✓, that wouldn't even get a "Good attempt here", but would receive a flat ✕. WRONG. Such ideas are *always* harmful. If a man holds the belief that, by killing a number of heathens in the name of his religion, he will achieve inner peace and attain heaven, he is mistaken. The fact is wrong. It isn't part-way wrong; it is incorrect, a thought-virus. That is not how the world is. Likewise, if a woman believes that, simply by harnessing the power of desire, that is to say, simply by *wanting* it enough, she is capable of having everything, she is mistaken. That is also not how the world is. Some facts are untrue.<sup>1</sup> The relativism of the last two hundred years, which has reached its nadir in the claim that "All perspectives are equally valid", is a piece of abominable stupidity. It is, like all moral philosophies, a comfort blanket, a faux-philosophy, a rationalist dummy for infants to suck. The mere fact that someone has an opinion doesn't mean that that opinion is worth anything. Most people are sheep: they repeat what they have been told. And *what* they have been told, that is to say, the Facts regarding the very foundation of their existence, regarding reality itself, are demonstrably false, not in shades of grey but in plain black and white. The West has the wrong idea about reality. Centuries of misery hide in that sentence, and all joy depends on our recognising it. Let me say it again:

#### THE WEST HAS THE WRONG IDEA ABOUT REALITY.

Our model of models, our *paradigm*, our understanding of what reality *is*, stands opposed to the empirical Facts. It is wrong. It is very stupid, indeed. How easy to deride the religious zealot or New Age mystic, whose nebulous and hare-brained

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<sup>1</sup>It speaks of the Western error that such a sentence warrants writing. In a healthy culture, guided by the Deep as opposed to whichever clever pen has authority, it is obvious that, for example, infants, drunks and rabid intellectuals don't know what is best for them. Their "facts" are worth nothing.

views have him promoting nonsense; how easy to mock proto-scientific or non-scientific views of Reality, safe in our citadels of mathematical modernity; how easy it is to feel *right*. But that is the error of every scholar in history. In centuries to come, history will look back on the scientific West of the second millennium as a peddler of intellectual lies, as the propagator of a most tragic, most pathetic, most insidious creed. Our error of thinking, now so deeply embedded in the culture of the White Man that few have the tools to address the *question* of its existence, has bred a race of consumptive halflings: ignoble, inwardly stunted beings whom history will rightfully mock. The hubris of the West, once you open your eyes to it, is nothing short of breathtaking.

The whole damn castle is built on sand.

## Off With The Blindfold!

As a teacher, philosopher, mathematician and physicist, the task has fallen to me—*ah woop!*—to write as the CONSCIENCE OF THE AGE. Being possessed of a soul, courage, patience, hope, mathematical skills, love for humanity, and, most importantly, a total disdain for all dogmatic authority, I see it as a sacred duty to speak the unspeakable. I am here to explain the Facts: the lofty facts, the *glorious* facts, the facts (of empirical science) that the grim-faced toads of Western scholarship, in their dank amphibian realms, don't want you to hear. This is a task I accept wholeheartedly. \*Grins.\* What greater bliss could there be than to be given such a gargantuan task, and to find oneself able to meet it?

As a philosopher must, I have lived as many different people, and thought as many different people think. After decades of deep and intense training, my mind is clear and my shoulders are strong. I write without fear or expectation, unconcerned (entertained, indeed!) that frogs and weaklings will think me brash. But nor do I seek gain for what I am. In stating my credentials, I state facts. Only someone with a very rare combination of mathematical ability, artistic creativity and philosophical courage could even have *considered* undertaking the work I have. It was work of the hardest kind. So, I don't apologise for my talents; I am grateful for them, and I affirm them. I mention them here not for self-aggrandisement, but because, to understand *that* this work could exist, you, dear reader, need to be in no doubt that I am a man aware of, capable of and fully committed to the great task allotted to me. I have no interest in praise for these facts.



Clearly, this book is not for the fainthearted. While I have written it with subtitles for the mathematical “layperson”, that word doesn’t signify a lack of respect for you. Quite the opposite! Out of deep respect, I expect a great deal. According to the philosophy in this book, and in line with (correction of) the catastrophic errors promulgated by the West, I am bound, by logic and feeling, to assume that you are a deeper, more thoughtful, more soulful, more *conscious* being than a paradigm-bound writer could dare. I do not address the surface of you—this notion, it turns out, has rigorous scientific meaning—but rather the fullest breadth and depth of you. I address the Witness who experiences your life, who seeks to affirm it, who senses grandeur beyond grubby rag-bags, who *knows*, in some timeless sense, more than has been explained by the White Man, with his protons and electrons. I write for you who are mighty of heart, you whose answer to the challenge of life is “A thousand times yes!”

But, while I have (indeed, *because* I have) the deepest respect for you, dear reader, I am going to attack some rational ideas that you may hold as inviolate. This cannot be avoided. The worldview of our culture is incorrect; we have been educated, inculcated, implicitly indoctrinated into a fallacious paradigm; we have each of us been given the wrong tools to use. So, it is inevitable that some sacred cows of rationalism, some of *your* sacred cows, indeed, are incorrect. This is, of course, no fault of yours. Indeed, the idea of “fault” is nonsensical here. The causes of our world-consuming delusion lie in complexity too vast to comprehend,<sup>2</sup> and the timescale of the errors involved stretches, at the most conservative estimate, over several millennia. Civilisation itself, most notably ancient Greece, is the major player. So relax, what’s past is past! Nevertheless, we are now the custodians of the future. And there is dead wood to burn away. My assumption, therefore, in writing this book, as a teacher speaking to his students, is that I am writing for the *true* reader, whose fondness for the dead wood of current thinking (which is, of course, perfectly natural), is, in the final reckoning, outweighed by the soulish need to bear witness to life in all its facets; to meet the challenge of seeing life *as it actually is*. Such a deep reader, filled, at whatever age, with the bravery of youth, welcomes any rattling of the intellectual cage, recognising that received wisdom, unless it can stand on its own two feet, unless it can withstand such philosophical earthquakes, can only be worthless dogma. I am going to shake the world to its very foundations. Much must crumble!

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<sup>2</sup>That doesn’t mean we shouldn’t try. Nevertheless, it is a crucial aspect of Unity theory that, while the *nature* of Reality can be understood; its *details* must forever lie beyond us. One can and should understand *that* there is a Mystery; this doesn’t, however, stop it being a Mystery.

# The Status Quo

To my pupils, a word about *scientific validation*. Unity theory has not yet been absorbed into the mainstream, and would be vigorously denied by many scientific thinkers. The universities at which you will study, are studying or have studied are full of such people. That's life! These are early days, and it couldn't be otherwise. Unity theory is too big a leap for small hearts or old minds to take. It is the work of years to change one's perspective, and, as only the young (at heart) are, you have to be *willing*. Max Planck said:

“A new scientific truth doesn't triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up familiar with it.”

Proverbially, you can't teach an old dog new tricks. Unity theory wasn't written to convince old materialists, because most are beyond convincing. The revolutions of the 20th century were nothing in their challenge to the incumbent paradigm compared with what I am proposing. Planck, the first quantum physicist, was speaking of the antipathy felt by *classical* physicists towards the *quantum* view. In this book, I will explain that the so-called “modern” *quantum* physicists, who are proud of their status as cutting-edge intellectuals, *themselves* failed to face up to the evidence, and that the “new scientific truth” of which Planck spoke was, in fact, suppressed. The veneer of physics looks shiny, but it's rotten underneath. The old Establishment “rationalists”, who are the implicit guardians of the Western paradigm, are not interested in truth-as-is; rather, they have a (paltry) version of the truth which is dear to them, and they spend their years in scholarly grind, finding ways to justify what they already “know” to be true. Nietzsche wrote the same of the moral philosophers of his age, lambasting them, in *Beyond Good and Evil*, for dogmatists and fools; he pointed out, most presciently in the 1880s, that, in striving to firm up the Western house of cards, SCIENCE, the newest and most respectable regimen, had taken up the baton:

“The self-promotion and arrogance of the learned man now blooms fully in its finest springtime; this does not, however, imply that such self-praise smells sweet. Happily, science has resisted theology, whose servant it had remained too long, but it now proposes, in its brazenness and greed, to lay down laws for *philosophy*.”

With very few exceptions, e.g. Einstein and Feynman, the scientific men of the last hundred years have done their utmost to *resist* the truth. “Without peer review,” the scholar says, with white-bearded gravitas, “a theory is speculation. Only after publication in a respected journal, only after editing by longstanding members of the community, only when accepted into the *mainstream* can a piece of work be classified as science.” Baaaaaaaah! So bleat the sheep of every age. By definition, “peer review” (to which Einstein, incidentally, was strongly opposed) *rules out* original thought from finding its way to the scientific masses, where it might destabilise the status quo. It’s a defence mechanism. The whole point of original thought is that its thinker, in that moment, is peerless; all true thinking is peerless; every philosopher is peerless; every *individual* is peerless. “Peers” are, in the end, what herd animals have. The wish to have one’s work ratified by a patriarchal community of elders is the classic desire of a feeble thinker.

So, it is not a lack of courage, nor a wish to hide behind nebulous half-truths, that keeps me, as an author, from wanting to publish in the standard journals. Simply, Establishment physicists are the people *least capable* of understanding Unity theory. They do not have the minds for it. The deeper a person’s submersion in the old paradigm, the less likely they are to be able to think in a new (but also very old, it turns out) way. These “guardians of truth”, these decorated veterans, these winners of Nobel prizes and suchlike, are, as it stands, the greatest *barrier* to scientific progress. The key to our redemption, in this nihilistic age, lies in a total reconstruction of our value system, and it is the “peers” of science, lauded and glorified, who have, as far as their meagre egos can calculate, the most to lose.

Let me give you an example. Unity theory, as a system built on axioms, produces the SCHRÖDINGER EQUATION, which is the central equation of quantum mechanics. In its simplest form, that equation is:

$$i\hbar \frac{\partial}{\partial t} \psi(x, t) = -\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} \psi(x, t).$$

If you aren’t a mathematician, don’t panic at the sight of algebra; you’ll get it soon! This law describes the rates of change of a MATTER WAVE  $\psi(x, t)$ , which models an electron, moving freely through the laboratory, changing in space  $x$  and time  $t$ . The equation, in the free form above, is the wave equivalent of Newton’s classical First Law: *when no force is applied, momentum is constant*. The Schrödinger equation has been well verified over the course of a hundred years, since its formulation in the winter of 1925; it undoubtedly corresponds to an aspect of the physical reality of the Universe. Yet this equation, despite its precise format and empirical

verification, has, according to current ways of thinking, *no physical meaning*. Take a moment to digest how bizarre this is. It is not known what the wavefunction  $\psi$  represents in a physical sense, nor is there any justification for the equation taking the form it does.<sup>3</sup> Richard Feynman, who was perhaps the 20th century physicist with the most profound understanding of his *non*-understanding, said:

“Where did we get that [the Schrödinger equation] from? It’s not possible to derive it from anything you know. It came out of the mind of Schrödinger.”

For a hundred years, the equation has remained a POSTULATE: it is assumed to hold (approximately) as scientific fact, but no justification is given, at any level of study, of its form. Currently, as Feynman said, it cannot be derived. Now, Unity theory offers a full and rigorous derivation of the Schrödinger equation, in the form given above. I will run through it, with mathematical subtitles, in this book; this will give you a better understanding of the Schrödinger equation, and hence the nature of Reality, than is possessed by all the Nobel laureates in the world. I’ve taught this derivation to pupils at Westminster. Yes, it is relatively complicated by the standards of a mathematical novice, but it is elementary by the standards of, say, a second-year undergraduate in any scientific discipline. It’s not *that* advanced. Set up the foundation, run through the mathematics, and the Schrödinger equation falls out the far side. And, since it is a piece of pure algebra, there can be no doubt: whatever the mathematics is subsequently taken to *mean*, the derivation itself is valid.

I would, of course, welcome criticism of the derivation (indeed, of the whole theory) in a mainstream journal.<sup>4</sup> Less confusion is a good thing. You might suppose, then, given that the mathematics fits onto one side of A4, given that it can be understood by an intelligent teenager, and given that it goes, at the very least, a way towards solving a long-standing mystery concerning one of the central equations of physics, that it would be exactly the sort of thing those interested in promulgating science are looking for. But not so. This is why I do not care for jumping, or even *trying* to jump through the hoops of the old Establishment. In aligning with the status quo, one implicitly sanctions it, thus sacrificing one’s

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<sup>3</sup>The conversation goes: What is  $\psi$ ? “ $\psi$  is a *wavefunction*.” And what is a *wavefunction*? “ $\psi$ .”

<sup>4</sup>I mean this. If you *understand it fully*, and can explain any aspect of Unity theory in a journal article, please feel free. If it feels right, I encourage you to do so. I claim no ownership of the ideas; they are truths of the Universe. But, don’t attempt such a thing looking for academic glory; none will come your way. Shallow folk simply will not hear of the depth of things. Only do it as a gift to God.

ability to *think*. The Bible has a fine phrase about pearls and swine. Establishment hoops, as they currently exist, serve one purpose and one purpose only: to ensure that work only of a certain type is presented to the world. Every gatekeeper, unless possessed of remarkable self-knowledge, ends up in the business of maintaining his position.

To be clear, this is not a conspiracy theory. There is no group of cackling white-coated scientists, buried underground in some clandestine collider lab, scheming in Machiavellian fashion about how to maintain their grip on the truth. The situation is more mundane, more *human* than that. It's not that an academic looks at a paper and thinks "Hell, that looks dangerous. In fact, it looks like an existential threat to my status, self-image and livelihood. I'd better reject it and report it to the Illuminati." No. The academic's attention simply slips away.<sup>5</sup> To a run-of-the-mill scholar of the second tier, highly intelligent in a narrow domain (as the majority of Western thinkers are), a piece of first-tier work and a piece of third-tier work look exactly the same. Ease of understanding is the primary concern, not quality of content. In both cases, badly written or truly original, the ideas proposed don't flow in well-established mental grooves; hence, to a scholar fond of theories and fonder still of his mastery of the same, the experience of reading jars. Duly, the rejection pile beckons.

To me in personal terms, this is a matter of happy indifference. Quite simply, I don't give a shit. When you've opened Pandora's Box, when you've tripped the real mysteries, when you've fought your dragons and come out smiling, you don't give a fig for Nobel prizes, academic status or the suchlike. All of that is just masturbation. A student's grin at having actually *understood* something is worth a thousand polite rounds of applause. But, in broader terms, as regards humanity, this situation, namely the quiet rejection, by Establishment figures, of anything that threatens to destabilise the paradigm, is far from irrelevant. A great many people have suffered and died as a result of it. Indeed, the continuation of the Western paradigm (the wrong choice taken at the current fork) may well end up causing more suffering and death than anything in history. Our ancient European mistake, the very same European mistake that led every conquered tribal people to view the White Man as deeply *sick*, is already a killer. And it will undoubtedly kill a great many more.

This is why the keepers cannot be allowed to keep the gate shut.

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<sup>5</sup>Upton Sinclair said: "It is difficult to get a man to understand something, when his salary depends on his not understanding it." Never underestimate the fear of redundancy; when the chips are down, an egotist's principles always give way to his biology. That's why one must have a sense of the divine.

# The Long View

All roads lead to Rome. Either materialism, as championed by the West, is recognised as erroneous *swiftly* (in decades rather than centuries), allowing us to understand and so break our long addiction to consumption, or not. If not, then the environment will continue to degrade. And this will happen, it is likely, at an accelerating rate; living conditions will worsen dramatically. As we are coming to realise, humanity, with its current cultural norms, isn't just unsustainable but is *wildly* unsustainable. We're nowhere near equilibrium. Our planet has already undergone major climatic change, and, all other things being equal, we should expect this trend to *increase* in magnitude, not decrease, to become overwhelming, in practical terms, in the not-very-distant future.

This is the FORK IN THE ROAD.

The promises of governments, be they democratic or otherwise, to limit the consumption of fossil fuels etc. are patently hollow. The catalogue of broken climate resolutions speaks clearly; barely a day goes by without a target missed. There is a simple reason for this. Government promises are all contingent on, that is to say, *secondary* to the ability to maintain and improve standards of living. Such "progress" is what, in our materially obsessed world, allows the people in power to stay so. As long as the people lower down the pecking order are satisfied by occasional weeks on sunny islands and the sleekness of their phone screens—the *trappings* of success, in other words—they will meekly accept the rest, allowing the rich and powerful to remain so. But power knows, deep down, that, when the economics falter, the mirage disappears. The Gatekeepers of the Castle of Riches only remain so by the tacit permission of everyone else. Keeping the hamster wheel spinning—*Material Progress At All Costs*—is the only way power holds onto power. Simply, this guarantees the failure of all top-down approaches to tackling the climate crisis. Do not for a moment believe that powerful Establishments, whether they be corporate, governmental or scientific, have the faintest interest in dismantling the apparatus of greed.

Nevertheless, whether or not we humans do, Mother Nature herself will bear witness. Addiction to consumption will not cure itself, and the natural world, as we know it, will collapse.<sup>6</sup> Ecosystems and food chains will fall apart, as they are

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<sup>6</sup>The idea, as held with shallow conviction by a great many, that *technology* will step forth to save us, is a classic piece of Western idiocy. It is precisely technology that is ruining us. If the world stays full of consumers, then everything good will end up consumed; if someone taps hydrogen fusion, thereby

already doing; more and more people will go hungry. In the long view, unless the paradigm shift I describe in this book actually takes place, eventually (thinking on the broadest scales) even the *richest* of the relatively *richest* countries will start to go hungry. And, in the end, irrespective of any attempt to maintain old ways, drastic times will call for drastic measures. As the materialistic error of Western culture becomes harder and harder to deny, as the erroneous equation of wealth and progress with health and happiness falls apart, as climatic chaos and failing ecosystems become things that causes immediate, daily *pain*, people will think less and less of making large-scale changes to their worldviews.

The Age of Materialism will end, and the truth will out.

The only question is how long it takes.

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“solving” the energy crisis, things will get *worse*, not better; if advances in medicine allow folk to live to 150, then the environmental burden of death-avoidance will *increase*, not decrease. The system cannot be gamed. As a person not short of ideas, I have never felt the slightest inclination to try, as an engineer, to “solve the energy crisis”, because, in the manner proposed, it cannot be solved. And this is not to say that someone won’t manage to crack hydrogen fusion. They may well do; it would likely be disastrous. The eponymous crisis is not one of *energy*, but rather one of *people*. The solution to the energy crisis is this: giving the young, and so, in time, everyone, the chance to realise that there is more joy to be had in sitting still, face to the winter sun, than there is in all the grand hotels in the world. Until folk find themselves capable of enjoyment of living where they are, how they are, with what they have, every technological advance can only serve to accelerate the destruction, because such advances will offer false dawns, thus convincing people that their problems *can* be solved externally. Nothing could be further from the truth. If you really want to help save the world—and I urge you to think this big every day of your life—don’t march on parliament, don’t block the roads, don’t work in a laboratory; rather, learn to sit quietly on a bench, smiling. If you can learn to do that, which is the task of Life, then you will have done all you can. And so much more will follow.

# 2

## THE OLD PARADIGM

The majority of a philosopher's so-called "conscious" thinking is secretly governed by his instincts, and is, as such, forced into set grooves. And behind all the logic, behind the immaculate flow of reason, there are closet valuations, or, put more bluntly, *bodily demands* for the continuation of a certain mode of life.

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*Friedrich Nietzsche*

What is a PARADIGM?

We need a clear understanding of this before we go anywhere near discussing One vs Another. A PARADIGM, as I use the word in Unity theory, is a worldview; it is a system of thought, a *Weltanschauung*, a universal theory in the scientific sense. A paradigm is an overarching way of looking at things, a particular take on reality, a view on lived experience, an opinion re *The Way Things Are*.<sup>1</sup> A paradigm has, then, the same sort of conceptual content as a scientific model does: it has axioms, assumptions, conventions, tools, procedures and so forth. What distinguishes a paradigm from a model, then, is firstly *scope* and secondly *self-awareness*.

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<sup>1</sup>This concept is not an easy one to grasp, because to grasp it requires stepping outside of it. A certain perspective on oneself is needed: in the language of GOD 3.0, *altitude* or Meta-2 cognition.



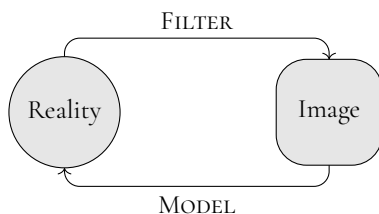
A paradigm is a model on the very broadest scale. It's an overarching model of models. Indeed, it's *the* overarching model of models. It's the *supramodel*, the model which contains all other models. Because of this, while a scientific model such as “classical mechanics” or “evolution” tends to refer to a set of ideas that is *recognised* as a tool for understanding reality, a PARADIGM, while also a tool for understanding the same, exists at such a deep level of experience that, by almost everyone, its existence goes unnoticed.

By way of analogy, consider a camera.

Apply a black-and-white filter to a photo, and everyone is aware, if they think about it at all, that the monochrome nature of the image does not reflect the same quality in the underlying reality. The b/w filter is a well-recognised processing tool, and its presence in a photographic image does not lead people to believe (although this is easily forgotten re the past) that the image's subjects were themselves monochrome. The MODEL, “There was a black-and-white filter used in the making of this photo”, is a recognition of a FILTER; the model allows, if it is a good one, for optimal reconstruction of reality.

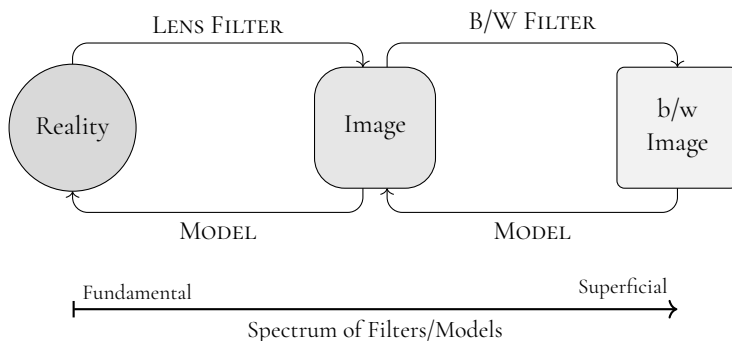
These concepts generalise:

- ① A FILTER is a *physical* process that generates an imperfect image of reality. That image exists as a set of data.
- ② A MODEL is a *mental* process that does the reverse, reconstructing a perceived reality from the data contained in the image.



A perfect MODEL would account for the FILTER perfectly, hence allowing for full reconstruction of reality. Most filters, however, do not permit this. With a b/w filter, the model can be optimal or sub-optimal—one can conclude, correctly, that the trenches at the Somme were dug in full colour, or, incorrectly, that they were dug in monochrome—but one can't get the colours back. Old photos simply don't contain colour information. Indeed, most filtering processes actively *destroy* information in this manner; such information cannot be retrieved.

Conversion from REALITY to an *image of reality* often involves many filters. Photographers will also recognise the same data-altering quality in the lens, say, and other elements of the image recording, storage and distribution processes. Those processes, which are themselves filters in the abstract sense, are broader, that is to say, more *fundamental* to image production than b/w. Some images are colour, some are monochrome, but *all* go through the lens.

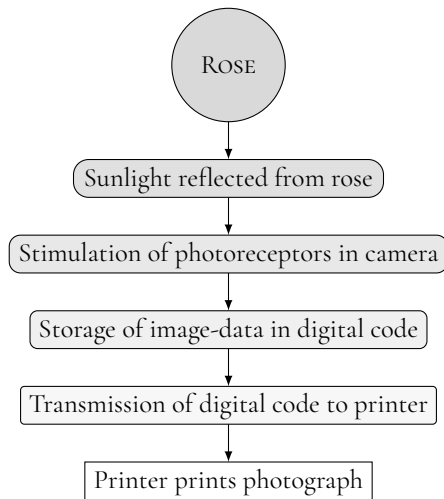


FILTERS and MODELS sit on a spectrum, from broad to narrow, fundamental to superficial. At the narrow end, things are easier to model: “The monochrome nature of this photo is down to a filter.” But the broader the process, and hence the *more* data passes through it, the *less* obvious it gets. We forget, when viewing e.g. photos taken on a phone, that *every* image, regardless of any other filters applied, is transformed, i.e. filtered in a characteristic way by the lens. The more fundamental the filter, the more knowledge is required to unpick the process.<sup>2</sup> Even a “simple” process like photography (“simple” compared to the perception of existence) involves a great many more stages than the two described above. Suppose you look at a photograph of a ROSE, and say “Ah, a rose!” In order for the original rose, as it existed physically in the garden, to be subsequently perceived as a conceptual “rose”, rather than as a mere dump of meaningless data, the data of the rose must pass through two broad stages:

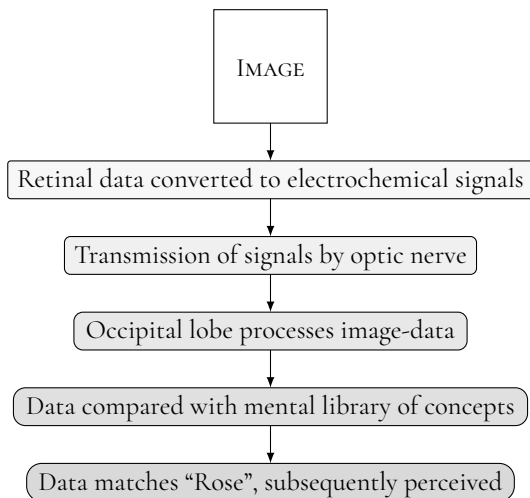
- ① The FILTERING process, which produces an image of the rose.
- ② The MODELLING process, which reproduces a concept in the mind.

<sup>2</sup>This is the content of “The bigger the lie, the more likely people are to swallow it.” When cognitive dissonance is marginal, folk feel strong enough to face it, but when the dissonance is cataclysmic and the entity selling it big enough, most people assume they are small, thus wrong, and so fall in line.

① FILTERING produces an *image*:



② MODELLING reproduces an *idea*:



The rose information has been FILTERED, and has duly required MODELLING, many times. It has existed as: light in the air, light in the camera lens, focused light in the interior of the camera, photoabsorption by electrons, digital bits in wires and microprocessors, ink fluid and dried, photoemission by electrons, light in the air, light in the ocular lens, light in the vitreous humour, photoabsorption by retinal electrons, bioelectrical signals in axons, chemical transmission across brain synapses, neural combination, and other forms too numerous to mention. You get the point. Looking at a photo and saying “Ah, a rose!” belies a vast number of FILTERING processes by which the rose ended up as data, and hence an equally vast number of MODELS by which the data, in the reverse process, ended up being seen as a rose.

A PARADIGM, as I use the term here, is the last model in the line. It is the broadest, most global set of assumptions, the overarching model that converts subjective perception, that is to say, the data you get as a conscious being, back into an apparently “objective” picture of reality. The conceptual recognition “Ah, a rose!” obviously contains many modelling assumptions, because a photo of a rose is not a rose; the two are categorically different entities. Photograph data is combined with *a set of assumptions*, based on experience, about how photograph data correlates with reality, and a conclusion is then drawn about reality proper. “Ah, a rose!” you think. Now, if you are fully aware of the FILTERING process, you can also, with enough study, be fully aware of the MODELLING process. This is *knowledge* of the paradigm, i.e. *knowledge* of the sum total of all models employed in reconstruction of a world-image. In the rose example, this is (theoretically) somewhere close to possible. Such modelling, fully understood, is as close to clear glass as you can get: within 3D space, there’s no reason why a photograph of a rose can’t conjure up a pretty accurate picture of what a rose looks like in real life.

However—and here’s the rub—no entity experiences the deepest filter, the one through which *experience itself* arrives. No entity sees the “optic nerve” along which the raw data of reality travel. Hence, irrespective of IQ, irrespective of modernity, irrespective of the quality of the lenses involved, every conscious being has a paradigm. Having a paradigm isn’t a sign of mental incapacity or a lack of rational progress; I don’t use the term pejoratively. One *must* make background assumptions about reality, otherwise the world is nothing but a torrent of abstract data. A paradigm is essential to make sense of anything! It all goes pear-shaped, however, when the paradigm is *wrong*, that is to say, when the perceiver makes the *wrong* assumptions about the filtering process, and hence uses the *wrong* models

to reconstruct reality. This pulls reality and one's image of it out of kilter, which is always a bad idea. One ends up, as so many do, making the *wrong* choices regarding the most elementary things, like, say, choice of job.<sup>3</sup> And this problem is at its very starkest, at its most disastrous, indeed, when an assumption is made, without awareness: "*There is no paradigm.*"

AAAGH!

Haha. I joke, but this assumption really is a no-holds-barred catastrophe. There is no greater error, as an entity bound, *a priori*, to use a paradigm, than to assume "There is no paradigm."<sup>4</sup> One who makes this error equates the *image perceived* with REALITY itself. This is the error of equating a photo of a rose with a Rose, which, linguistically, we do all the time. If a child looks at a photo of a rose, and asks "What's that?", we answer "It's a rose." With photos, this is fine, because it's clear, with some thought, that a piece of glossy paper isn't, in fact, a Rose. But a paradigm is deeper. It's obvious with a rose, yes, but not at all obvious with *the world*. The White Man, at great human cost, equated historically, and continues to equate, the *photograph of existence* with EXISTENCE itself.

## Data and Variation Data

It is easy to say "I am aware of all of the stages of the process by which I perceive existence. I am aware of my paradigm, so can reconstruct reality fully." But this statement, which goes right to the heart of the issue, is **WRONG**. It's wrong in a mathematical sense: wrong *a priori*. Let's be clear why.

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<sup>3</sup>For example, the choice to go into advertising or marketing. People do make the most terrible mistakes. I quote the great Bill Hicks: "By the way, if anyone here is in advertising or marketing, kill yourself. Kill yourselves, seriously. You are the the ruiner of all things good. Seriously, no, this is not a joke. "There's gonna be a joke coming..." There's no fucking joke coming, you are Satan's spawn, filling the world with bile and garbage, you are fucked and you are fucking us, kill yourselves, it's the only way to save your fucking soul. Kill yourself, kill yourself now. Now, back to the show."

<sup>4</sup>This error is no problem if, as for e.g. the pet dog of a wise man, one's owner is enlightened and has one's interests at heart. This is not the case with humanity. The world, as anyone who knows some people who aren't arseholes can tell, is run by arseholes. And the main way in which those arseholes shit on you is by stopping you from seeing that their entire system, their entire M.O., their entire consumerist-materialist way of life is built on falsehood. If all were hunky-dory, you wouldn't need the Bullshit Shield of Self-Knowledge. But it isn't all hunky-dory. I am a Messenger of Hope, yes, but you must save yourself: you can't go through life naive, hoping to be happy. Our ancestors ate from the Tree of Knowledge, and the gates of Eden are guarded by an angel with a flaming sword.

An entity or idea can only be *perceived* if it generates VARIATION. So, a horse, say, can only be picked out of a photo because there is a part of the photo that is *horse* and a part that is *not-horse*. The distinction between the two, broadly the outline of the horse, is familiar and recognisable. “Ah, a horse!” you think. When you look at a photo of a horse, it is not absolute horseness that is your perception-data, rather it is *gradient* of horseness. What is perceived is the difference between regions of the photo. One builds the idea “Horse” from the spatial *rate of change* of horseness. This can be seen by zooming in. Press the camera right up against the horse’s fur, and take a picture. Now, the pure horseness of the image has increased—the whole picture now contains horse-data, rather than just a section of it—but it is now unrecognisable as a horse. There is *no variation* in the data, so there is *no perception* of an entity. We don’t perceive entity X solely in data that emerges from X; to perceive entity X we need data that emerges from X and also data that emerges from not X. We perceive entities via their *variations*, and we then reconstruct those entities post hoc, using MODELS, from their outlines.

You may be familiar with having lost sunglasses you were wearing. You look around, wondering where you have put the damn things, before realising, with a sense of chagrin, that you were, in fact, looking through the very sunglasses you were looking for, all the time you were looking for them. But there is nothing foolish in this. While the sunglasses cover your vision, they are literally *invisible*. If you put them on, you see them as the world gets darker (variation); if they are small, you see them in a bright edge to your vision (variation); if scratched, you see them in imperfections (variation); if you put a hand to your face, you feel them in pressure (variation). But, as long as nothing changes, they are *nonexistent*.

The same phenomenon occurs commonly with the sense of smell. We have all experienced, on returning to a kitchen in which we previously smelt nothing, the discovery that, in fact, the room smells very strongly of, say, onions. While in the kitchen, the variations in onion-data were very small, as the particles of onion flavour slowly seeped out of the pot. There was an imperceptibly *shallow* gradient of onion-data. However, on re-entering the room at pace, a *steep* gradient of onion-data exists, and the smell leaps into perception. Again, it is *variation* in smell that is perceived, not smell itself.

There are countless examples of the same phenomenon. We don’t perceive speed in a train until the brakes go on; we don’t see our eyes until one gets injured; we don’t perceive altitude in a plane until there is turbulence; we don’t see the windows until they get dirty; we don’t hear clocks ticking until they chime; we

don't notice children growing until they've been away; we don't feel our shoes unless we're wearing them in or they're wearing out; we don't hear our earphones until we dislodge one.

Proverbially, you don't know what you've got til it's gone.

To understand reality, to see through the shallow error of the "rationalist", to understand the awful suffering of the Western and now broader world, it is crucial to recognise and appreciate deeply the following fact: merely because we *experience* reality to be a certain way does not mean that REALITY is, in fact, that way. Indeed, it means Reality is *not* that way.<sup>5</sup> It is guaranteed, in a mathematical sense, that perceived reality is not Reality. What we experience, as perceiving beings, is a set of *variations* of Reality, not (and mathematically never) the thing itself. We see an outline, and subsequently infer with a paradigm. This statement is easy to understand in reference to smells and sunglasses; it is much harder, and much more important, to understand it in reference to the raw data of existence, that is to say, in reference to the combined sum total of all of the information that arrives at consciousness. It is harder because this is the stuff that we cannot, in any scenario conceivable or otherwise, perceive directly. Anything that fills the image of experience *completely*, like the horse's fur, is beyond perception. It isn't readily recognised as a filter, because it can never be seen as a filter; there is no way to take the filter off. Hence, if one thinks naively, as our civilisation has done, one's paradigm fails to account for it. Systematic errors emerge.

The Western<sup>6</sup> paradigm, such as has dominated for centuries now, is naive. Be in no doubt: history will judge the Age of Materialism very harshly indeed. Why? Because we have, as a civilisation, made the most basic, indeed the most infantile of errors: we have equated *perceived reality* with REALITY. This idea, tragically, lies at the heart of the scientific worldview. The old paradigm does not make a distinction between the two ideas, the photo and the Rose. I call this error "infantile" not simply looking for a good insult; it is exactly the error that an infant makes when it delights in a game of *peek-a-boo*. The infant assumes that, when its mother hides behind her hands, she has disappeared. The infant is duly delighted to discover that she can magically reappear on cue. But even toddlers soon tire of this game, because they realise, as their models grow in sophistication, that the fact that they cannot *see* their mother doesn't mean she isn't there. In other words, they make a distinction between *perceived reality* and REALITY.

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<sup>5</sup>In this book, and Unity Theory generally, I use Capitalisation to refer to "the deeper Entity behind the scenes"; SMALL CAPS for primary emphasis of concepts; *italics* for secondary linguistic emphasis.

<sup>6</sup>The term "Western", which I use regularly, is, of course, very far from perfect.

# The “Triumph” of Reason

The White Man’s worldview is based on the childish idea that the material 3D world in which we end up *seeing* ourselves as living is the full extent of what is. Now, this may have been a useful tool when it came to clearing out the dogma of the Abrahamic age, which had posited supernatural beings beyond the sky, yes, but just because an idea has been useful in the past doesn’t mean it’s correct. This one is not. Atheists are keen to point out that materialism (peek-a-boo!) cured us of adherence to Bronze Age religion. What they do not realise, however, and are highly resistant to considering at all, is that it was post-Hellenic adherence to the materialistic creed—“The way I see it is the way it is”—that forced old Europe to buy into the Skybeard idea to begin with. The materialistic paradigm is the not the saviour it pretends to be. The purported cure is, in fact, the *disease*. Why did we have to buy into Abrahamic religion? Why did we then have to fight so hard to rid ourselves of it? Why did the pendulum swing out so far? Because we have, for centuries, for an Age, for “civilised” ever, been dead wrong about the nature of Reality, the structure of existence itself, *the way things actually are*.

There are philosophical, religious and psychological questions (addressed by wise folk such as Plato, Ekhardt and Jung) which are crucial to the living of life. They concern the disparity between *perceived reality*, also known as “the world”, and the deeper REALITY which underpins it. Now, the old religions of Europe and the Middle East placed this depth outside or beyond, imbued it with a moral, patriarchal aspect, and called it Heaven or Hell. Needless to say, this is factually incorrect; it was a naive response of the Bronze Age. But that doesn’t mean the *question* was naive. On the contrary: it is the most *grown-up* of questions.

It was addressed as such, maturely and with wisdom, in the more advanced civilisations of the East, most notably India. Unhobbled by the Hellenic addiction to concept, and with a greater capacity for maintaining contradiction, the Hindus developed a sophisticated system for addressing the coexistence of, and difference between, *perceived reality* and REALITY. The Bhagavad Gita remains a peerless analysis of things; in terms of factual content regarding Reality, its few pages are (as long as one has the capacity to cope with its symbolic gaudiness) wiser than all of Western science put together. The Eastern sages modelled both ideas—*perceived reality* and REALITY—simultaneously, without contradiction. The West failed this test of courage; we simply weren’t ready back then.<sup>7</sup>

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<sup>7</sup>Don’t imagine, as I act as the CONSCIENCE OF THE AGE, that I do so out of disdain for Westerners.



Following the dissemination of Greek reason at the tips of Roman spears, old Europeans were raised rapidly out of a state of barbarism. Hellenic logic, borne by the legions of a culture that did not itself understand its dangers, spread into the Celtic and Germanic worlds. A rapid elevation of conceptualisation occurred. With it came leaps and bounds in technology, and thus, in time, the ability to conquer. But there was, in the first millennium after Christ, no depth of European culture, no wisdom of elders with which to process and contain this explosion of thought. While the more advanced peoples of the East maintained, especially in the teachings of Buddha, a firm distinction between *perceived reality* and REALITY itself, the old West did not. There were too few thinkers of calibre. Hence, when the rational upsurge came, when Europeans began to conceptualise and hence control perceived reality, a schizophrenia set in. Far from maintaining models for *perceived reality* and REALITY side by side, as all wise folk do, the old Europeans found no room in their rational worldview, Stuff in a Box, for deeper things. And so the photograph became “reality”.

But, as the toddler discovers, failure to model what is imperceptible doesn't thereby render it nonexistent. The need to describe the hidden face of Reality, as met by philosophy, psychology and religion, remained, remains and will always remain pressing, because, irrespective of its imperceptibility, that face *exists*. This has nothing to do with religious faith; it is, in the end, simple mathematical logic. It makes no difference (other than to sanity) what you choose to believe: there simply *are* aspects of Reality beyond perception; that's just a scientific Fact, as true as any Fact could be. Hence, hard materialists whose domain is space—the Western world is full of these—end up depressed, boorish and shallow; they base practical life decisions (choice of job or partner, for instance) on *incomplete data*; they think, contrary to all logic and empiricism, that the only life-information which is “real”, hence *valuable*, is data which can be placed in the photograph of existence, data which pertains to the perceived image of reality, data which can be quoted in the lab or the boardroom.

This idea is bollocks.<sup>8</sup>

To live genuinely, one must attend *most* to the information that *doesn't* come in material form: hope, love, soulfulness, song, destiny and the sense of the divine. The particular language you use isn't relevant; choose whichever one makes sense. The point is, being a materialist doesn't *negate* deeper need—it is flat impossible

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On the contrary. I am one through and through. I *love* Westerners, and it is exactly that *love* that I am expressing when I point out the towers of hypocrisy and hubris that overlook the cities of the West.

<sup>8</sup>Only flatulent arse-weasels addicted to sounding clever think swearing is stupid.

for the photo of reality to hold the information of Reality—it just ensures that the only options, for addressing the Empirical Depth of Life, are either no tools at all (hard materialism) or tools that are crap (the old Churches). For anyone with the slightest bit of sense, the former is a no go, which is why our historical mistake *caused* addiction to the Skybeard idea. We have been very stupid. The recent (say two-century long) “triumph” of science over religion has not, in fact, been an enlightenment. It has been a Bloody Mary laced with poison: hair of the Roman dog that bit us. The OLD PARADIGM, that is to say, the naive equation of perception and Reality, was the problem; it created a monster in the Church. The cure for the Church was then the *old paradigm*, which, bold and unsuspected, stepped forth in rational glory to rid us, once and for all, of the imperceptible. What terrible hubris. This is the toddler, unable to cope with the paradox of its mother’s appearance and disappearance, shunning her entirely. Better to *know*, the toddler thinks, with rational pride. I’m talking about a systemic problem of the very deepest kind.

## The Paradigm Matters

One can conceive of a universe in which the world-image and its underlying Reality are pretty similar. The Newtonian model is exactly such a system, which is, of course, how it came to birth science. In a Newtonian universe, essentially a three-dimensional box with stuff moving around in it, the reality perceived by entities built of matter is barely different from Reality. If Reality was, in fact, as Newton stated, then so would the world-image be. This is why the physicists of the Age of Enlightenment Delusion, in stark contrast to every deep thinker ever, needed give no consideration to the concept of PERCEPTION: their model was internally consistent, and it agreed with (some of the) experimental facts. In such a universe, the ideas which lie at the heart of Unity theory would be largely irrelevant. If PERCEPTION, i.e. the set of processes by which variation-data is filtered, simply added a sepia tint, then it wouldn’t much matter. You might make some different aesthetic choices, but you wouldn’t make different decisions about whether to bomb a mosque or build a property empire. But that’s the problem. The old paradigm isn’t just a bit wrong. No. It is *utterly* wrong. There is, as any clear-thinking analysis of the facts shows, an overwhelmingly vast discrepancy between what the Universe is actually like, and how we end up perceiving it in its

variations. It isn't a question of colouring, of sepia shades, but rather a question of stark absolutes. Perceived reality is shallower, speaking in dimensions, than Reality per se. *Much* shallower, in fact. The apparently "paradoxical" phenomena of quantum mechanics, and the rationally "incomprehensible"  $\psi$  wavefunctions of Dirac and Schrödinger, only make sense (and they do make perfect sense!) if Reality has not three dimensions, as the immaculate "reason" of the White Man holds, but eight. Yes, EIGHT. Take a deep breath! Those are dimensional depths beyond reckoning. Indeed, you may well, on reading such a number, find any sort of visualisation impossible. But don't feel that that is any failure on your part, either of ability or training; there is simply no reason, contrary to the idiot claims of the materialist, why you *should*, as a material being in the three dimensional world-image, be capable of visualising the true form of Reality.<sup>9</sup>

Which is *precisely* my point regarding life. Take that total "impossibility of visualising" and apply it not to physics but to the nitty gritty of *everyday life*. Imagine the vast wealth of life-data that exists in an eight-dimensional Universe. Imagine how deeply that data extends above and below the world-image as we see it. Recognise how logically contradictory it is to summarise all of that in the 3D photograph we end up seeing. The thing is beyond rational comprehension, right? Yes, that is the correct thought. In a photo of a rose and a Rose, perception has two dimensions and Reality three, a difference of one dimension. That's the difference between the surface of the ocean and the ocean itself. It's a world of difference. And *our* Universe, it turns out, has at least eight dimensions, which boil down, through various filters, to the three of space. Perceived reality and Reality belong to entirely different categories of existence. Logic that applies in one doesn't even *begin* to apply in the other. Which means that we have, for a long aeon, been basing our every decision about what to do, what to strive for, what to reject, what to believe, on a fallacious intellectual system. This is the tragedy of the modern world.

Again and again I say: a culture's PARADIGM, a culture's worldview isn't a mere matter of "academic interest"; it isn't philosophical esoterica; it is *everything*. People, families, tribes, nations, cultures, civilisations, nay, species live and die by the decisions they make (at forks in the road), and every decision is coloured by the paradigm. One's models underpin the lot. If the picture is false, as in "There is an anthropomorphic God who will reward me for killing these apostates" or

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<sup>9</sup>If you are going into physics, *nota bene*. The only point of physics is to *stop* doing physics. I say this as someone who loves doing physics, and has done much of it. In the end, the only useful thing that physics can tell you is that physics cannot tell you how to live. This is an incredibly useful fact.

“Only what is observable in the lab is real”, then one’s actions go sour. Our actions have gone sour. What has become clear to me, in my long researches, is that the mainstream of the entire Western hemisphere, and now, by cultural proxy, the mainstream of the entire world, believes an implicit dogma, “Perceived reality is the extent of Reality”, just as warped as that of the religious fundamentalist, and a hundred times *more* dangerous. While “crackpot” Islamists fly jets into buildings, laureate particle physicists build ever bigger hadron colliders. Which is the more damaging? Obvious, right? Ask the question again in five hundred years.

The White Man’s “mistake of shallowness” has led the world to the brink of environmental disaster. Beyond it, indeed. And I say this not as one looking in, as one angry and bitter about material wealth. I am a highly privileged white Englishman, Eton and Oxford educated, as much a child of the West one can be. I am exactly he who built the British Empire. No. I speak the truth happily, with no sense of guilt, precisely because I am speaking it. I am, unlike so many in the West, looking the Facts in the face. I’ve been wrong so many times, I rather like it. To one who has gone deep, even pointing out one’s own mistakes is a laugh; to those who have not, *nothing is*. Life, for the Western academic, is dull and dreary, a brooding and endless defense of Now in the service of the Red Queen.

It is precisely this lack, this dissatisfaction, this constant spinning of the hamster wheel, that, historically, so many peoples have read in the eyes of white Conquistadors. Jung recalled a conversation with a Pueblo chief in 1925, right in the middle of the quantum “revolution”:

“How cruel the whites are: their lips are thin, their noses sharp, their faces furrowed and distorted by holes. Their eyes have a staring expression. They are always seeking something. What are they seeking? The whites always want something, they are always uneasy and restless. We do not know what they want, we do not understand them, we think that they are mad.”

This judgement was entirely correct. It turns out, in a most scientifically rigorous fashion, that the old equation of *perceived reality* and REALITY, such as we have all believed, such as sits at the heart of “developed” thinking, such as we have implicitly been taught never to question, to doubt, never even to *consider* is wrong. And, therefore, the state of the world is our fault, our mistake. If we are to see our way out of our current predicament, if we are to live freely, love freely, to *laugh*, then we have titanic work to do. It’s time for the world to grow up.

# 3

## DEPTH AND DIMENSION

That which exists of itself is called Reality (*dao*). This true Reality has neither name nor will. It is the one substance, the one primordial essence. Substance and life cannot be seen. They dwell in the Light of Heaven. The Light of Heaven cannot be seen. It dwells in the two eyes.

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*The Secret of the Golden Flower*

To understand the nature of the deeper Reality that underpins our perceived world, we must be clear about DIMENSIONS. Here, the word “deeper” refers to “a larger set of dimensions”. *Dimensions* is taken in a mathematical sense, and I will elucidate that definition shortly. But before we come to that, one must expunge from one’s mind any notion that the presence of extra dimensions implies the existence, à la science fiction, of an “alternate realm” or “parallel universe”. These notions are logically incorrect, and are, in fact, prime examples of the Western fallacy. With the perceived world taken to be a *physical* realm, a true Rose in its own right rather than a photograph of the same, one is forced to put that which does not fit into this realm “out there”, beyond the photo, in the manner of a sci-fi dimension, or religious Heaven/Hell. These ideas are embedded in the Western psyche, and must be dispensed with if understanding is to be had.

Let's consider briefly the idea of a "parallel universe", such has been mooted in countless science-fiction stories, including the Many Worlds interpretation of quantum mechanics (QM). That the latter has come to be accepted by a good many physicists, who thus call themselves "Everettians", is evidence enough of the lack of perspective. Just because I happen to enjoy the Lord of the Rings doesn't make me a Tolkienian, nor do I think it appropriate to use Middle Earth to explain quantum experiments. The proposed existence of parallel worlds "side-by-side", splitting endlessly and infinitely, is total nonsense. At least Tolkien's elves and dragons *mean* something.<sup>1</sup> As ever, Establishment physicists have, without doing the hard yards, simply latched onto whatever idea allows them to sleep at night, i.e. whatever convinces them that the square peg of the experimental data does indeed fit into the round hole of their erroneous worldview. A *parallel universe* is an impossible concept,<sup>2</sup> posing all sorts of unanswerable questions. Why is there no interaction between these worlds? Given that, in every other dimension we know about, matter may move freely, why is there a special dimension with the magical property that nothing that goes on in one sheet may affect what goes on in another? In what sense are these parallel worlds part of the same universe if they don't interact? I wouldn't expend energy trying to answer these questions; they don't have answers. The parallel worlds idea is a misconception which can be traced, as with so many mistakes, back to Western over-concretising of the world-image: if one erroneously takes the world as a *physical* entity, then other things must, by definition, be "elsewhere".

That notion belongs in science fiction.

## Cloudgazing

"Reality is deeper, *dimensionally speaking*, than the perceived world."

What does this mean?

Consider, by way of analogy, a thin stratus cloud high up in the sky. Such an entity is three-dimensional. Now, looking up at such a cloud, one doesn't see a 3D object, but rather a 2D one. A stratus cloud is too far away to provide any binocular data, and it appears flat. The cloud is 3D, the perceived cloud is 2D.

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<sup>1</sup>Einstein said (possibly apocryphally): "If you want your children to be intelligent, read them fairy-tales. If you want your children to be more intelligent, read them more fairy-tales."

<sup>2</sup>A parallel *cosmos*, it turns out, is not an impossible concept. It is possible that there are multiple *cosmoi* housed by the same Universe. But the *cosmos* is an *image*, while the Universe is what is.

There is no magic going on here; there are no “extra dimensions” in the sci-fi sense. There is simply an entity, namely “the cloud”, that appears as a lower-dimensional version of itself in perception. Now, does the *perceived cloud*, the 2D one, exist? The answer is Yes and No. With our Western intolerance of contradiction, we don’t like such answers, which is what got us into this mess in the first place; our minds, with their over-reliance on Hellenic logic, have difficulty recognising that binary questions do not always have binary answers.<sup>3</sup> When a question is posed, we make a tacit assumption that our question will have an answer, i.e. that there is some fount of immaculate truth from which one of the two responses {Yes, No} can be plucked. This is completely erroneous. As anyone with a shred of wisdom knows, many questions can only be answered with a smile and a shrug. It is categorically false to say that the perceived cloud exists physically; there is no physical entity that is a 2D cloud. There is not even a *subset* of a physical entity that is the 2D cloud. After all, the perceived cloud is not the *front* of the 3D cloud. A cloud is mostly translucent, so, if the cloud is stratus and thus fairly thin, one may see the *entirety* of the 3D cloud in the 2D image. The perceived cloud is not a slice of the cloud; rather, it is a *perceived image of the entire cloud*.

Mathematically, this is known as a PROJECTION.<sup>4</sup>

PROJECTION is the process by which the information in a dimension (here the vertical thickness of the cloud) is filtered out, leaving a lower-dimensional object. In the case of the cloud, what existence does this lower-dimensional object have? *Some*. It does not exist as a physical entity, for the reasons given above. However, given that it is the image, in perception, of the entire physical cloud, it is also incorrect to say that the perceived cloud *doesn’t* exist. It exists in *perception*, which is a perfectly good place for it to exist.

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<sup>3</sup>Indeed, we fail to realise that they *never* do.

<sup>4</sup>I refuse to pander to the corporate whims of those who say “Every equation in your book will halve its sales”. It is precisely such people who, by casting mathematics as magic, by pandering to the God of Markets, have handed power to the algebraically literate. If you want to be a thinking member of society, it simply isn’t good enough to give in to a fear of mathematics, just as it isn’t good enough to give in to a fear of poetry. Do either and you’re a slave to the whims of others. Our civilisation is in dire trouble, and if the artistic cognoscenti, through fear of facts, remain fluffy and incapable of thinking finely, then they leave the scientific cognoscenti to dictate the Zeitgeist: number as God. As Zhuangzi, the wily old Daoist, said, “Each fails to push the one lagging behind.” This one-sidedness pervades every element of our thinking: science vs religion, head vs heart, right vs left. The *only* way to think clearly about the world is to use both, all, the whole lot, everything. It is only the dominance of a certain breed of chalk-bashing crusty that has spawned our current fear of mathematics. The subject is spoken of as something you get right or wrong. Pah! Is *poetry* something you get right or wrong? Is *music*? Is *dance*? Mathematics is a language, a Zen parable, a toy, a set of wings with which to soar.

See the perceived 2D cloud as *perceived reality* more broadly, and the true 3D cloud as REALITY more broadly. The historical Western error, then, was to take the perceived cloud to be a physical entity in itself, rather than an image. This error predates and hence pervades science. It goes back (at least) to the ancient Greeks: a pre-scientific, pre-Christian worldview.<sup>5</sup> It is the assumption that, just because something *seems* to exist, it therefore has 100% existence. Given our current environmental predicament, the *logos* of the Hellenes may, depending on what we do next, end up being seen as either the greatest triumph or the greatest calamity to befall the world. Binary {Yes, No} logic required that entities like the perceived cloud fall neatly into one of two categories: *existent* or *nonexistent*.

- ① The West chose *existent*.
- ② The East chose *nonexistent*.

Buddhist doctrine holds that perceived reality has no reality, and is *maya*, illusion. This is closer to the truth, and contains much wisdom, but it remains unempirical, which is why it has been rejected by the Western mainstream. It isn't true that the perceived 2D cloud has 0% existence. The perceived cloud is an *image* of a physical entity. When one watches a 2D cloud evaporate in the midday sun, one is watching a real physical process. It is only that the *dimensionality* of the perceived and physical entities are different, not that they live in different worlds. The perceived 2D cloud **is** the 3D cloud, in one sense. More precisely, the perceived cloud is a PROJECTION of the cloud. This is a mathematically advanced idea, a triumph of the West, that was not available to the Easterners of yesteryear.

## Plato's Cave

Here, it was Plato, a far grander soul than the nitpicking logicians (Aristotle, *yawn!*) of his era,<sup>6</sup> who came closest to REALITY. In his *Allegory of the Cave*, he described perceived reality as a set of shadows on the wall of a cave, cast by a fire. Shadow-casting is the prototypical mathematical projection: a physical object of three dimensions is reduced to a two-dimensional shadow. Does such a shadow exist? Yes and no. A shadow is not a physical entity—shadows can move faster than the speed of light—but it is nevertheless an entity. One could make a science

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<sup>5</sup>Indeed, Christianity itself was a response to Hellenism.

<sup>6</sup>How easily I fall into the Western trap of binary juxtaposition, *picking a side!*



of *shadow-ology*. Shadows obey strict rules, albeit not the same strict rules as the deeper objects that cast them. Plato was a scientist. Tragically, however, a vast truth, a truth deeper than anything found at the Large Hadron Collider Energy Guzzler, was ignored, passed off as mere “Allegory”. But the cave is a truly *scientific* model. As you will see, the Schrödinger equation emerges from exactly this idea. Combine Newton’s system of shadow laws and Plato’s allegorical projection, and you get... quantum physics! That’s a big, **big**, **big**, big deal.

The problem with Plato’s cave, and the reason it didn’t succeed historically in curing the White Man of his sickness, is that, in it, the shadow-caster and the shadow are *separate* entities. Hence, to visualise the perceived world as shadow, one must yet again place the shadow-casting world “out there”, somewhere else, parallel to the rock wall. This is antithetical to the Western mind, in anything but a religious sense. It is ludicrous to image that, beyond the sky, beyond the cosmos, in some magical nether-kingdom, there are “true entities” that cast the shadows we see. But Plato lived over two thousand years ago!<sup>7</sup> To update Plato’s cave, return to the *cloud*. Take the 3D cloud to be Plato’s cave, viz. Reality. Take the perceived 2D cloud to be a dimensionally-reduced shadow on the cave wall, viz. perceived reality. The key fact is this: in the *Allegory of the Cloud*, the cloud as perceived and the cloud are **not** separate entities. The one is simply the image, in perception, of the other, dimensionally reduced by a FILTER (high altitude). While the shadows on the wall of Plato’s cave were a wholly different type of entity to the physical objects that cast them in the firelight, a perceived 2D cloud is not a wholly different type of entity to the 3D cloud that sits in the sky. The *dimensionality* is different, yes, but the *cloudness* is the same.

This is key. Contra the West, perceived reality and Reality are not the same entity; their dimensionalities differ. Contra the East, however, perceived reality and Reality *are* the same entity; the one is a dimensionally reduced projection of the other. The world we live in, the world we perceive, which is by definition a world of variations, does not include the dimensions in which matter does not vary, or, to be more precise, the dimensions in which it varies symmetrically. This is what projects out a number of the dimensions of the Universe—we will analyse this process in detail in the next chapter—in the construction of our perceived reality. What remains after filtering is seen as the 3D realm SPACE.

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<sup>7</sup>How tragic that the so-called scientists of the West have failed to build on and refine his idea. How dismal that generations of academics have, so as to remain dull themselves, misread Plato as being what he was in his duller moments, an ethicist and moraliser. No. He was by far the greatest physicist (I’m not sure even *he* realised this) in antiquity, a profound genius.

# A Big, Almost Stupid Question

Let me ask a big question bluntly. I urge you, in considering this question, not to fall into the White Man's trap,<sup>8</sup> to which we are all blind to some extent, of thinking that, simply because I ask this question, it has an answer, to be chosen from the binary set {Yes, No}. Words are imperfect models.

## DOES THE WORLD EXIST?

To some extent, it's a stupid question.<sup>9</sup> But, as the Zen masters understood deeply, the fact that koanish questions (*What is the sound of one hand clapping?*) don't have answers doesn't mean it is pointless asking them. The point is recognising that they don't have an answer. These pages in your hands, do they exist? Does the Atlantic Ocean exist? Do electrons exist? Does matter exist? Does light exist? Does love exist? Do any of these things exist? YES and NO and BOTH and NEITHER. The physical world, as described by Western science, does exist in a certain sense. It's like an icon onscreen. Do the icons on a touchscreen exist? In one sense, yes. They exist as 2D pixelated pictures, transmitting light. But, importantly, their *behaviour* isn't governed by that 2D world. Those icons are SYMBOLS, i.e. representations of an unseen Reality, the Reality of electronic circuitry. And, as such, it is impossible to judge the behaviour of an icon from its iconic image alone. The same icon may link to two different things, depending on the underlying Reality of microchips; it isn't icon-law that governs icons.

The analogy "PROGRAM  $\mapsto$  icon" translates to "REALITY  $\mapsto$  world-image" with one key difference. The icons on a computer screen themselves have a physical realm, a 2D screen, in which they live. That is their domain, and it is physically

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<sup>8</sup>Of course, I use the phrase "White Man" metaphorically. It is only very broadly related to either lightness of skin or masculinity. However—let me be both racist and sexist—it is certainly related to both. It is a nonsense, characteristic of the Western error, to claim, in worship of the false idol "Equality", that races and genders do not conform to stereotypes. Of course they do, as anyone with a brain knows. The French are broadly French, the Chinese broadly Chinese. The fact that there is much intra-race and intra-sex diversity doesn't change the fact that there is also much inter-race and inter-sex diversity. I have yet to find anyone who can show me a shred of evidence to support the idiot conclusion that men and women are the same. And it was, broadly, White Men who fucked the world up. The fact that everyone else is now fucking the world up too, and in some places to an even greater degree, doesn't change that. The buck stops here.

<sup>9</sup>There's nothing wrong with a stupid question, provided one is willing to learn. The best response to a stupid question may well be "That's a stupid question." In which case, the asking of the question was correct: one has found out a much more useful thing than the answer to the question.

real. But the 3D *world-image*, which is taken by so many to be exactly what is real, does not, in fact, even live in a physically real domain. *Space itself* is a phenomenon that emerges in the process of perception. An aeon ago, the sage Ashvaghosha was already clear on this:

“Understand that space is nothing. It has no existence and is not a Reality. It is a term in opposition to Reality. We only say this or that is visible in order that we might distinguish between things.”

SPACE is 3D due to the 3D information that arrives at perception, not because there is, anywhere, even as a corner of a broader domain or as a sheet in a stack, a 3D place “space”. Buddha taught this admirably. This is the sense in which the world we know *doesn't* exist. The three dimensions of space do correspond to three of the dimensions of Reality, such as generate the world-image in projection, but we aren't experiencing a “wall of the cave”, as Plato (allegorically) suggested. Rather, we are experiencing *the cave itself*, dimensionally reduced in perception. This is the sense in which the world we know *does* exist. It is a representation, a world-image, an iconic depiction of the Reality beneath.

It is important to face the facts above with courage. As I said, this book, and my work more generally, is not for the faint-hearted. It can, at first encounter, be alarming to discover that the world of perception isn't what it was cracked up to be. The material world is not Reality, but rather a PROJECTION of Reality. This can feel strange. But I can offer reassurance. Upon realising this fact and accepting it fully, one does not, in that brave acceptance, abstract oneself from the everyday facts of life. Unity theory is far from a nihilistic philosophy,<sup>10</sup> which is the usual criticism aimed, with some justification, Eastwards. Eastern doctrines, with their broad-brush supposition that the world is *pure* illusion, can lead, as the Westerner interprets things, to the world-abnegation of hippies, i.e. to doing *nothing* apart from taking mushrooms and playing sitar in one's pants.<sup>11</sup> Where is the zest, the affirmation of life? Where is the wholehearted *living* of life? From a certain point of view, it's a fair criticism. But Unity theory is not Eastern philosophy; it is empirical Western science. These are facts of Reality. I am not suggesting a withdrawal from life in 3D, an abnegation of rationality, a disengagement of the brain and a lurch towards vaguery and mysticism. Not a bit of it! I urge *greater* commitment to Life, *greater* rationality, *greater* empiricism, *greater* consideration of the observable facts! Be skeptical, oh yes, but do it *properly*.

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<sup>10</sup>Nihilism is the philosophy of the zero; Unity is the philosophy of the One.

<sup>11</sup>I have nothing against either mushrooms or the sitar, by the way.

The boon of Unity theory, as a unification of Eastern and Western views, is that it retains the world as the image of all existence. Life, in all its facets, in all its ugliness and beauty, is precisely what there is to be experienced. There is no other world somewhere else. There is—although death does lose its sting!—no magical heaven beyond the stars. Heaven isn't a place on earth, but it is, it turns out, a place on capital-E Earth. Perceived life, the life of these entities we call *human beings*, is exactly what there is. Just because we are looking at a dimensionally reduced version of the Universe, just because space isn't the be-all and end-all, just because the true nature of Reality is far grander, far broader, far deeper, far more elegant than the White Man has previously imagined it to be, doesn't suggest *withdrawal*. Quite the opposite. To accept that the world of perception is an image of a fuller WORLD, to accept that life is an image of a deeper LIFE, to accept these facts wholeheartedly is to see the material world filled out, broadened, enriched in every sense.<sup>12</sup>

With depth and dimension, life takes on new meaning.

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<sup>12</sup>I have found, in my years of teaching, that one of the most important things is simply being fully present in the room, giving one's full attention to one's pupils. People, young and old, respond deeply to someone who is fully there, and fully enjoying being there. This is, ironically, the great boon of non-materialism. By giving value to the deep information that cannot be summarised in perceptible concept, one makes one's peace with God; this allows one's *own* presence in the room. Where a human being allows him or herself to see the full glory of Reality, unfettered by space, unbound by ego, he or she becomes the channel of God. And others see it. Somehow, the Universe sees it. That's what's so interesting. Those folk, whether young or old, aren't looking for the spiritual—they may be simply looking for a way to pay the bills—but one's answers become the right answers, because they partake of deep information. And there is divinity to be had in paying the bills. A truly holy person doesn't stop being holy when they go and take a piss. Everything, even the most mundane of tasks, becomes imbued with a spirituality. Not God-bothering mysticism, but earthy simplicity. Step beyond the material, and things just start working out. It's amazing. By broadening one's horizon's beyond the material, one become more useful, in a practical, material sense, to those nearby. By taking on the breadth of the Universe, one focuses oneself, *condenses* oneself, in a certain sense, in the realm of space. I don't know how it works. But by accepting the deep task allotted by fate, you become far more capable of mundane tasks, energy flows through you, and titanic work feels like a laugh. And, in recognising the Self beyond the image, the image becomes that which others look to. It's a Mystery!

# 4

## THE AXIOM OF UNITY

Sages hold to the One, and so take care of this world.

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*Laozi*

We're clear: the *world-image* and REALITY aren't the same thing.

We know all about the perceived world; science has studied it for centuries. What do we know about Reality? Well, this is where Unity theory comes in. Unity is about looking under the bonnet of perception: it's a theory of Reality with a capital R. It's an empirical study of the processes by which the world is made: a science of the deepest Unknown.<sup>1</sup> The reason that, despite intensive study, it has taken an age for the simple idea behind Unity theory to emerge is that, to engage with it, one must accept the fact that the *world-image* and REALITY are not the same thing, that the world is a filtered projection of the Universe proper. This idea is antithetical to the Western mind, whose long centuries of naive rationalist and naive religious training have forced the *perceptible* and the IMPERCEPTIBLE apart, further apart, and yet further apart. This process has now reached its logical nadir, with the imperceptible banished from culture altogether.

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<sup>1</sup>This, of course, is precisely what the Western physicist *claims* is his M.O., the scientific method being "empiricism re the unknown". But it is the last thing most physicists are actually interested in.

The bipolar groupthinks of, on the one hand, Abrahamic religion and, on the other, Newtonian physics have ensured blindness to a simple truth, a truth that sits patent in the equations of quantum mechanics and special relativity, astronomy, and the data of the collider. If one retains the idea that the world we perceive, the world of the lab, has full existence, i.e. 100% *Yes* existence with not a shred of *No*, then the equations of quantum physics have no basis whatsoever.<sup>2</sup> They are postulate and paradox, and make no sense. However, if one sets aside the egoic notion that “How I see the world is exactly how it is”, then the equations of quantum physics, the theories of relativity, and the symmetries of the Universe emerge without so much as a single discrepancy. That’s all of physics, as far as I can tell. Indeed, the equations emerge simply enough that they do not require degrees in mathematics or physics to understand them. Intelligence is required, of course, but no specialism. I will derive (with awareness of a non-mathematical audience) the SCHRÖDINGER EQUATION and the SPECIAL THEORY of relativity. And you’ll see, even if you have no training, that these mathematical laws, verified a gazillion times, are the product of a certain type of Reality. That type is exactly the type I have been describing. So, since these laws, along with all sorts of other results, are exactly what appears in the lab, we must conclude, at least until someone comes up with a better explanation, that *our* Reality, therefore, is of that type.

The simplicity is reassuring. The mathematics is not very complicated, so there is little possibility of fine-tuning it, that it to say, of fiddling the theory (as we are all wont to do) to *over-fit* the facts. This is why I do not feel any need for verification of the overall idea of Unity theory by my scientific “peers”. I’m not asking the permission of the Nobel laureates; I’m *telling* them straight: the theory is correct. They can either get on board or not; that’s their choice. Were the mathematics brutal, I would feel differently, but it isn’t. Compared to the levels of complexity to which physics has stooped, it’s child’s play. Literally. I have taught the basics of the theory to (mathematically talented) students at school. They have then derived the Schrödinger equation and special relativity, both empirically validated beyond question yet lacking *raison d’être*, from a set of assumptions. There can be no question: the mathematics is valid. I will unpack it in coming chapters. Have no fear of this, even if you know no mathematics. Where mathematics represents Reality, it can be explained and understood *on any level*. Describing conceptual content using algebraic language (this I will do)

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<sup>2</sup>How ironic that it is precisely addiction to the world-image that stops people understanding the nature of the world-image; how *tragic*, then, that it is precisely addiction to the world that has us destroying the world.

is very different to describing algebra as the conceptual content (this I would never do, because it is a nonsensical idea). The derivations are, of course, slicker performed by or for someone with mathematical training, but that only dictates the elegance of the derivation, not its validity. And, indeed, understanding is *better* achieved when your hands get dirty, that is to say, when the mathematical bonnet is open. The facts of Reality are there! To understand them fully, you only need read with courage, intelligence, and an open mind.

Such is the main task of this book.

As with the last Church, which resisted translation of the Bible from Latin so as to maintain its own quavering grip on the truth, physics has disappeared up its own algebraic arse. Professors inundate their charges with mathematics, and then, when hands go up, tell them to “Shut up and calculate!” For the attainment of qualifications, students are required not to seek but to *sacrifice* the truth, to set aside their youthful enthusiasm, to leave all the deep questions unasked and become dull cogs in an even duller system.<sup>3</sup> The hoops Western youth has to jump through! The sedatives intellectuals have to imbibe! Only once a student is numb, only once he or she has set aside all hope of meaning, only once he or she has proven unswerving loyalty to the gods of Mount Collider, can a graduate gain the password (“Don’t Ask”) to the Citadel of the White Coat. Every Establishment in history has done this. As a teacher, I stand opposed to the idea in the most vigorous way. “If you can’t explain it to a six-year old,” the great Einstein said, “you don’t understand it yourself.” And the reverse holds: a six-year old can understand what is well understood. Now, I can’t claim to understand all of physics—there’s a boatload of it!—but I do understand Unity theory, which is the core. And I’m probably safe in assuming (you never know) that you are older than six. So, I’ll explain the mathematical derivation of the major equations of physics, and, if you are *willing* to understand, you will do so, whatever your specialism or level of education. Why? Because every algebraic symbol in this book represents a piece of REALITY. It’s the REALITY that I’m hoping you’ll understand, not the algebraic symbols. Mathematics is the language, nothing more. This is the key that isn’t available to the old guard: they can’t marry mathematics with REALITY,

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<sup>3</sup>As a teacher, I am duty bound to tell you: learning Unity theory will not, in a short-term sense, make you better at doing exams or getting qualifications. Western education, within which I myself am thoroughly ensconced, is set up to reward *tangible* progress, and there is scant (perceptible) reward on offer for looking under the veil. However, my faith in you, as a deep person, is infinite. Study hard! Learn the material! Get good qualifications! There’s no point in checking out of culture altogether; one ends up an idiot bum. You have to be *in* a culture to change it. That’s what’s so hard.

because they are trying to marry it with the wrong thing, viz. the *world-image*. The relevant connections between concept and truth lie outside the paradigm, outlawed. But we're beyond that. We don't have to make the same mistakes as our culture has historically made. *You*, who are young and hopeful, don't have to. You will, in time, be a custodian of your culture, and you can *change* it.

My substantial aim, in writing *FIRST STEPS* and the other books that make up the Theory of One, is to haul the Establishment academics down off their pedestals and to teach everyone what is actually going on. Yes, I mean *everyone*. I'm talking about a major CULTURAL ENLIGHTENMENT. That's why I wrote, in the introduction, of the need for broad shoulders. It was no idle boast. There has been Herculean work done here,<sup>4</sup> and there is much more of it ahead. I am, as I write these words, aware that I and we—I cannot, of course, do this alone—are faced with the heaviest task there is: teaching an entire civilisation, sick to its core, the nature of Reality. Hence, the big men of the Establishment? Fuck 'em! The fate of our human world hangs in the balance, and it is crucial that one or other group of hamster-faced paunches not be permitted to stand in the way of the one idea that could save the rich from themselves. If some Nobel laureate, living well on his reputation, wants to take aim at my derivations, I say good luck to him. I will happily stand before all the physicists in the world, and teach them what is going on. That's the nice thing about giving precisely zero shits for status; if I'm wrong, then there's an even *better* explanation for all of this! If so, I'd like to know what it is: I'm very curious about such things.

Don't think for a minute that the high echelons of Western academia contain a group who know what is going on, and who understand the world more clearly than you do. They do not. There are a great many extremely clever people in physics, yes, but the majority are the opposite of wise. They are shallow, proud, one-sided, unaware of groupthink, and they hate to be told so by people like you and me. Imagine what it's like, if you will, to have a Nobel prize. Imagine you won it some years ago, and are now a known and respected figure. Imagine you have promulgated your work for years, teaching it, defending it, defeating others in complex debates with mathematical elan. Imagine how proud you would feel of your intellectual prowess! Then... imagine an outsider coming along, presenting a simple, almost *obvious* logical argument, and saying: "I'm afraid you were wrong. All of your work was based on erroneous models. Your Nobel prize, the money,

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<sup>4</sup>I still find myself surprised, sometimes, by the sheer magnitude of this work, and I wonder at the stamina it has required. But that's the boon of offering to serve. As Goethe said "Be bold, and mighty forces will come to your aid." Considering the big picture makes me chuckle.



the fame, the batted eyelashes: you earned all that for ingloriously sweeping the truth under the carpet, and, thereby, allowing the maintenance of a fallacious paradigm such as holds the potential for the annihilation of the human race.” Haha! One can understand the fear. But we shouldn’t allow sympathy to stand in the way of truth; that makes for spoiled man-boys. I’m sure you will have no difficulty summoning images of public figures who fall into *that* category; the same personae appear in every Establishment towards and through which money flows. We think of science as “better”—it yet lives on its Golden Age reputation—but its High Priests are the same as all High Priests: in it for the Highness. Just because the content is mathematical physics rather than tax or Jehovah doesn’t change a thing. Human nature is what it is. Such an Establishment figure is a fake, if he (and they are mostly “he”) has promulgated a theory that he did not understand deeply.<sup>5</sup> Such drab fools must simply be swept aside, plain ignored, if we are to avoid mental and environmental catastrophe. The wiser ones will benefit—when it comes to the truth, wise people always do—whereas those with meagre souls will fade in bitterness.

Such are the choices people face.

## The Central Idea: Oneness

I said that Unity theory’s take on *What Reality Actually Is* is simple. But that didn’t go far enough. In fact, the foundation of Unity theory, viz. the key idea that underpins the whole show, couldn’t possibly be simpler. While there are many aspects of the Unity model, while its implications are myriad, they can all be traced to one source. That source, Oneness, is simplicity personified. I call it

### THE AXIOM OF UNITY.

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<sup>5</sup>Tolkien had a keen sense of this idea, as he did for much of the Western condition. That, of course, is why the Lord of the Rings, over and above the thousand dragon-based fantasies it has inspired, occupies the unique place it does in Anglophone culture. Saruman the White, a wizard of greater power than Gandalf the Grey, wished to use a Palantír, a seeing stone created by the Elves of the First Age; he didn’t understand it, and didn’t understand that, in using it, he was slowly enslaving himself to Sauron’s will. Saruman ends up twisted, as the embodiment of destructive industry, surrounded by dark Satanic mills. He tears down the forests to build machines of war, until, in the end, the trees themselves turn on him, drowning his citadel in floodwater. In Tolkien’s epic, Saruman the Whitecoat and Gandalf the Greyscale are the two sides of Western science. The lesser power of Gandalf, and his human capacity to feel *fear*, contra falsifiability, require of and give him the greater wisdom.

Mainstream physics, in the *Standard Model* of quantum field theory, holds that Reality consists of a wide variety of different “fundamental” particles, such as electrons and positrons, quarks and photons, neutrinos and antineutrinos, all moving around against a background of spacetime. Quite how anyone with some intelligence can maintain the belief that some twenty-seven different types of stuff are all “fundamental” is (almost) beyond me, but that’s the way the cookie crumbles. Unity is different. Rather than proposing that the Universe consists of a bunch of *foreground* stuff, namely matter and radiation, moving about against a flexible *background* of spacetime, I propose that the Universe is, in fact, ONE SUBSTANCE; I propose that there is no foreground/background distinction, and that everything that exists partakes of the same.

Unity theory, then, is an unpacking of this core content. And there is much unpacking to do! The word UNITY refers to the *oneness* of the Universe.<sup>6</sup> Unity states that, in an empirical, scientific sense, there is one type of Universe-stuff, and one type only. In other words, there is a Universe (obviously!) and it is made of something (equally obviously!) I call this substance the PROTEAN SUBSTRATE, if I’m being fancy, or just the SUBSTRATE for short. Etymologically, a *substrate* is the “layer beneath”, upon which other entities grow, exist or move. *Protean* is from Proteus, Greek god of the sea, who was infinitely flexible, capable of taking on many forms. Hence, the PROTEAN SUBSTRATE is the underlying substance of which the many forms (e.g. the twenty-seven “stuffs” of particle physics) partake.

We are, in fact, accustomed to the Unity idea, at least on one level. In the 19th century, chemists discovered that *elements* such as oxygen or lead, which seem at first glance to be categorically different, are *combinations* of a very small set of building blocks: essentially the PROTON and the ELECTRON. This was a major step, a grand unification. Hence now, when we look at wood or water, we know that wood-ness and water-ness is a *secondary* effect, and that, below the apparent differences, the underlying fabric of wood and water is the same. By proposing THE AXIOM OF UNITY—the Universe is one substance—I simply take this idea to its logical conclusion. We know that *wood* and *water* are configurations of PROTONS and ELECTRONS. I am now proposing that, at a deeper level, *electrons* and *protons* are themselves configurations of a ubiquitous SUBSTRATE. This is the foundation of Unity theory. There is, I’m sure you’ll agree, no simpler foundation.

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<sup>6</sup>While Unity theory is certainly “new”, as far as Western physics is concerned, it is also old as thinking itself. The fundamental Oneness of the Universe has always been obvious to real thinkers, especially in the East. It is only the Western error that has led us away from this obvious truth. To people thinking broadly, there is nothing radical in the Unity idea.

The UNI-VERSE (the clue is in the name) exists, so it must have some kind of substance. That is the stuff of the Universe. Without such a substance, there would be nothing at all. And that's that. I propose no further substances. Space, matter, radiation, force: all of these, in the Unity model, are configurations of the SUBSTRATE. This is the simple foundation on whose basis all of the major mysteries of physics (and there are many, the field being riddled with paradox) are resolved. If you assume that the Universe is one substance, combine this idea with the philosophy of perception as described by Buddha and Plato, you get the Schrödinger equation; you get the special and general theories of relativity; you get the Dirac equation; you get quantum spin; you get antimatter; you get all of QM and all of QFT.<sup>7</sup>

You get the whole show!

Indeed, the axiom of Unity not only produces the empirical *equations* of physics, as formulated by Newton, Maxwell, Einstein, Schrödinger, Dirac and Feynman, but it also models the *physical process* by which information is projected out in the making of the world-image. In other words, it gives you not only the why of the perceived world, but the why of perception itself; not only the how of the laboratory, but the how of the *making* of the laboratory. The simplest system, ONENESS, provides a model not just for Reality and the world-image, but also for the filtering/modelling process by which Reality becomes the world-image. This removes a major obstacle to understanding: there is literally *zero* suspension of disbelief required.<sup>8</sup> The model is consistent. The internal structure of MATTER,

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<sup>7</sup>But... and this is the “but” that has stopped so many, the theory that emerges absolutely *requires* that the perceived world of three dimensions be taken not as a physical object in itself, but as a dimensionally reduced PROJECTION of Reality. Unity's formulation can only be understood, can only be worked with, can only be envisaged at all if you set aside the idea that the “world” is a “thing”. This breaks down barriers that many see as unbreakable. People afraid of their own depths always seek to stay shallow. The idea that the world isn't a physical object is a cause of visceral fear in an egotistical person, who identifies naively with his self-concept. This is because, in identifying with his own ego, he ties his identity to its concepts, the most significant of which is, of course, the *world-image*. Hence, the suggestion that the world-image isn't a physical object sounds like incitement to rational suicide. It isn't, of course; it is the path to enlightenment. Nevertheless, the fear is real. If you want to live a genuine life, be brave: don't fall into this trap. Life is always deeper than your thinking about it.

<sup>8</sup>Once you've seen through it, it becomes clear that the touted rationalism of the West involves *massive* suspensions of disbelief. Indeed, it is no exaggeration to say that the last thousand years, viz. the purported Age of “Reason”, has consisted of a series of ignoble, hypocritical, vicious, and ultimately doomed attempts to maintain belief in the 100% existence of the world-image, **against** ever-mounting stacks of evidence. Specialised scholarship narrows the mind so. This is why, if you have any respect for yourself, you cannot *only* be a scientist, *only* be a priest, *only* be an artist, *only* be a poet, *only* be a philosopher, *only* be a mathematician. Cleave to any such identity, and groupthink

as dictated by the axiom of Unity, *necessitates*, in the same breath as it generates the verified equations of the lab, that the world-image end up as a dimensionally reduced projection of Reality, in precisely the manner borne out by experiment. The cause of *imperceptibility* itself, that is to say, the reason **that** the world is an image, flows from the Unity idea. How elegant! No extra hypotheses are required, no fudges. Which is as it has to be, because it is impossible to fudge Unity theory. With only one substance to play with, there's very little wiggle room. This is why I have no doubt as to the validity of the core idea, whatever the inevitable failings of its author. While much of modern physics is fine-tuned all to hell (and I'm not saying I'm not susceptible to this), Unity theory simply doesn't *allow* fine-tuning. You can't propose things arbitrarily: there's the SUBSTRATE, and that's it. Such a conception could have generated equations that don't match up with scientific experiment. But the Facts speak otherwise, and very clearly. The Axiom of Unity generates, in precise mathematical form, *exactly* what has stood, for a hundred years, at the heart of physics. To view that as coincidence would be absurd.

## The Levels of Reality

How does one visualise the depth of Reality?

We do it by ANALOGY, by using *simplified models in lower dimensions*. We view “toy models”, as they are sometimes known, which are pictures containing the core ingredients of Reality, boiled down to manageable objects in space. We strip away all extraneous detail, e.g. reducing the three  $(x, y, z)$  dimensions of space to one  $(x)$ , so that we can visualise aspects of the model as “things” in 3D. And each of us has powerful tools, honed over billions of years of evolution, with which to visualise three dimensions. We are quite used, even as non-mathematicians, to the difference between zero-dimensional POINTS, one-dimensional LINES, two-dimensional PLANES and three-dimensional VOLUMES. Likely enough, you are happy picturing such things. Or, even if you aren't an abstract visualiser, you can simply look at the objects around you: a full stop, a pencil, a piece of paper, a chair. Don't fear the visualisation of abstract spaces; you literally have billions of years of training in it. Indeed, that's the whole point: *space itself* is an abstract space!

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(paradigm submersion) strikes you from *all* the lists. The rub is that there is far more worldly success, far more status, far more adulation to be had from being exceptionally talented at one narrow thing—this isn't, in the end, useful to anyone—than there is from being a rounded human being. Those are useful to everyone. I recommend being the latter; you'll have far more fun.

It's only familiarity that makes you think it real. Any prior lack of understanding you have had about how Reality is, i.e. how physics works, has not been due to your incapacity to visualise things, it has been due to the fact that your teachers did not understand it deeply. No one has ever tried to explain to you (just as no one ever tried to explain to them) what is *actually* going on; rather, they have tried to explain, often bravely and meaning well,<sup>9</sup> fallacious attempts to reconcile the empirical facts of Reality with the error of the Western paradigm. But we are beyond that. You just have to see with new eyes.

Consider the book in your hands. In the old paradigm, this is viewed as a collection of *protons* and *electrons*, bound together in space. Move the book from left to right and back again. What has happened? According to the old view, MATTER has moved through *space* and back again. And, on one level, the level of perception, this is correct. But, at a deeper level, it is fallacious. Move the book again, and this time recognise that what is moving is not matter through space, but rather a CONFIGURATION of the substrate. It is an *idea* that is moving.<sup>10</sup> This doesn't mean, as Buddha might have said, that the book doesn't exist. No. The book does exist. But the word "book" is not a name for a thing that exists *on a fundamental level*. The word "book" is a name for an icon on the screen, not the program underlying it. What is moving? An idea, a wave, a *set of variations*. As you move the book to and fro, there is no "transporting of stuff," at least not on a fundamental level. No deep "thing" has moved.

Shadows give a good toy model. Look at the *shadow* that the BOOK casts on the floor. Move the BOOK, and the *shadow* moves across the floor. On the floor, has any thing moved? Yes in one sense; No in another. The idea "*shadow*" has moved, but that is not a physical object, at least not on the same level as the book. It is the *image*, in a certain type of shadow perception, of a physical object. Now, all you have to do, to understand Reality, is realise deeply that *the book itself*, in its three-dimensional form, is a type of shadow. As you move the book, what is moving is a configuration of the SUBSTRATE of Reality. Then, when the filters of perception have had their say, this emerges in the world-image as a physical "thing" moving in "space". And, if a light is shining then, in turn, the book-image produces a "shadow-image" moving across the floor. You are already quite used to stepping back conceptually, returning from shadow-image to book-image. We

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<sup>9</sup>My strident criticism of physicists does not extend to *teachers* of physics. Anyone who stands up in front of young people and tries to explain things honestly is brave and has my admiration. My criticism, rather, is of those clever fools who *refuse* to teach, and hide, instead, in fortresses of algebra.

<sup>10</sup>This is exactly the content of the famous line from The Matrix: "There is no spoon."

are simply taking the *next* step back, out of Plato's cave.

This lends much magic to the world.

As a shadow moves from A to B,  $(x, y, z)$  locations in space, there is no stuff that moves, at least not in the global sense of translated matter. The amount of light changes at A and at B, and that is perceived as the motion of "a shadow". But no fundamental physical object, even in the language of space, has moved from A to B. Only a secondary (or, more accurately, tertiary) *idea* has. Now, move the book in your hands to and fro again. Take the extra step back: the *book* itself is the shadow of a deeper BOOK. As the book moves from A to B, even as the deeper BOOK moves in and behind the scenes, there is *still* no substance that moves, at least not in the global sense of translation. The configurations of the substrate underlying the points A and B are altered, and that is perceived as the motion of a book. But no fundamental physical object has moved from A to B. Only a secondary *idea* has. The BOOK, underlying the *book* at A, is a wave configuration of the SUBSTRATE; when it moves to B, it is the *configuration* that has moved, not the SUBSTRATE.

WAVES are the central object of quantum physics, and they are the central object of Unity theory. In both, wavefunctions such as  $\psi$  or  $\Psi$  form the basic mathematical structure. Why? Because a WAVE is, by definition, a configuration that moves *without* involving global transportation of the material supporting the configuration. Unity theory is, by construction, a wave theory. Imagine an ocean swell. As such a swell moves towards shore, the shape of the wave travels. But the underlying water doesn't. There are *local* movements of water, yes—water here goes up and water there goes down—but, as an ocean wave travels thousands of miles, no water makes that *global* journey. The only thing that travels globally is a profile, a configuration, a location of high energy, a particular recognisable shape, a heightened swell, a pattern, a concept. All of these are equivalent *secondary* ideas. The ocean swell is not rendered nonexistent by this; on the contrary, ocean swells sink ships. But ocean swells nevertheless exist at a higher conceptual level than the water that underpins them.<sup>11</sup>

I particularly enjoy imagining this when looking at the Moon. As you watch the Moon circling the Earth, you are not looking at a set of fundamental matter

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<sup>11</sup>Both WATER and WAVE exist simultaneously, without contradiction. Look close enough at a wave, and all you see is water. The wave exists, but it is a configuration or idea. It isn't a fundamental *thing*. This is borne out by the fact that, if you zoom in close enough, waves disappear. That's because waves, like all secondary concepts, consist of variation data, rather than absolute data. And, since *natura non facit saltus*, sufficient magnification will remove any particular level of detail.

moving through space. No. That is the image in perception, accurate only on the level of the Western error. Rather, you are watching the white foam of a wave, as it slowly propagates across a protean ocean. There is, indeed, exactly as much substance in the space between you and the Moon as there is in you and in the Moon. Empty space, even the vacuum, isn't in the least bit empty. It simply has no *detail*. The empty space into which the Moon moves is a stretch of flat ocean, undisturbed SUBSTRATE, awaiting the arrival of an interesting configuration.

And, of course, you Yourself are such. When you walk across the road, the substrate that sustained you on the near side remains on the near side. What moves is a WAVE. Have no fear about this notion. Take courage! All good things lie down this path. Suggesting that your body is a set of perceived variations doesn't mean you don't exist, nor does it suggest disappearing into a nihilistic funk and changing your name to M. Blank. It just means that the Reality of which your body partakes is not the same type of reality as you were previously taught. You'll still eat, you'll still work, you'll still laugh, you'll still make love. The idea "you" is every bit as existent as it was before, *and more so*. You have the same existence you did before, as a perceived entity in a perceived world, and also a deeper existence, as a BEING of higher dimensions. There is nothing escapist in this.<sup>12</sup> The Unity conception offers a grand vision of life, a grander vision than that of Newton and the Age of "Enlightenment". Is the love between people lessened in its strength or beauty when one recognises that love exists in higher dimensions than the ones we see? No. In the Unity model, human emotions,

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<sup>12</sup>Don't be tempted by the escapism of those who throw their hands up and say "Why should I bother taking the bins out, nothing is real anyway." Laziness and twattishness will find any excuse. I can guarantee you that any person, whatever their philosophical standpoint on Reality, still finds it worthwhile using loo-roll. A paying member of the ÉLITE BOURGEOISE DES NIHILISTES, despite his intellectual prowess at sucking all the meaning out of life, doesn't walk around incessantly scratching his behind. So, he clearly still feels that his arse is worth a few moments. If I were you, I'd apply the following test to intellectuals. Before you listen to any of the logical content of a theory, ask "Is the person who wrote this happy?" With regard to just about every *modus vivendi*, whose basis is the clever head rather than the wise heart, you'll find the answer is an emphatic no: in Toryism, communism, cancel culture, eco-activism, religious fundamentalism, old Hollywood, the trans issue, misogyny, misanthropy, bleeding-heart liberalism, abortion campaigning and the War on Drugs you'll find sour-faced drones finding someone to blame, other than themselves, for their own misery. Don't buy it. The only people worth listening to are the ones that are happy. Miserable people are sick, that's all. Pity them. Find someone cheerful to talk to, and go back when you've cured yourself. Then you'll be of use. It doesn't pay, if you want to get cured, to seek out the company of sick people. They'll just convince you that everyone is sick and unhappy, and that hoping for something better is a stupid idea. They have failed the challenge of Life. I have not. This book is all AMOR FATI. That's why its author doesn't call himself an intellectual, and, *ipso facto*, why you can trust him.

love first among them, become reinterpreted as higher, nobler, greater, *deeper*. Once you free yourself of the Western error, once you permit the full gamut of joy in existence, once you make yourself what you have always been, you will find that the wonderful intangibles of life—Faith, Hope, Love of the first kind, those extraordinary feelings without homes in the stuff-mill—are orphans no more.

For those with the guts to see it, *bliss* awaits.



# 5

## CASTLES IN THE SAND

How about a positive LSD story? I think it would be newsworthy. *“Today, a young man on acid realized that all matter is merely energy condensed to a slow vibration, that we’re all one consciousness experiencing itself subjectively. There’s no such thing as death, life is only a dream and we’re the imagination of ourselves. Here’s Tom with the weather.”*

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*Bill Hicks*

In 1924, Louis de Broglie hypothesised that particles of matter, which had long been seen in Newtonian terms as dot-like ball-bearings, are, in fact, MATTER WAVES. This bold hypothesis was vindicated fully. For instance, electrons were seen to interfere constructively and destructively, with the crests and troughs from different electron sources forming characteristic interference patterns. They do this in exactly the fashion that light waves, sound waves and water waves do. Now, in the old paradigm, it has never been clear, nor even quarter-way clear, what these MATTER WAVES actually *are*. The fundamental question regarding any wave, namely “What medium is undulating?” had no answer in 20th century physics. It had no answer then, and still has no answer now, at least in the world of perception. In itself, this should have been enough to convince everyone that

the world of perception isn't all there is. After all, if there's something undulating (this is definitely true) which isn't an element of perceived reality (also definitely true), then there is—call me a logician—at least *some* aspect of Reality that doesn't feature in the laboratory. Physics has bent over backwards to avoid admitting the huge, humbling and glorious implications of this fact. In the Unity model, however, the answer is elementary: MATTER WAVES are *waves in the substrate*.

I'll address the QUANTISATION of matter, from which “*quantum*” mechanics gets its name, in due course. That (classically) unexpected discreteness of energy seen on small scales isn't, in fact, relevant to matter-wave equations, other than in its role as an experimentally determined constant of proportionality. As is most pertinent here, it isn't relevant to derivation or concomitant understanding of the SCHRÖDINGER EQUATION, towards which we are making a slow approach. That equation, which Schrödinger postulated in 1925 for the express purpose of modelling de Broglie's 1924 matter waves, is a nice *continuous* wave equation. So, for now, we only need consider MATTER, in particular the *electrons* which are the subject of quantum mechanics, as consisting of small waves in the substrate. As Hicks's tripper realised, “matter is merely energy condensed to a slow vibration.”<sup>1</sup> In Unity theory, the fact that matter is formed of waves in the substrate is true *a priori*, because substrate is all there is; so, energetic vibration is all *any* particle of matter or radiation could ever be! Unity, that is to say, Oneness, is precisely the statement that every element of perceived reality, is, at the most fundamental level, a wave-like configuration of the One.

This is a restatement of the key distinction introduced earlier. At the level of perception, an electron is a *particle* consisting of matter, as per classical physics. Viewed at the level of the substrate, however, an electron is Really a wave. This dual analysis is exactly the content of the famous *wave-particle duality*<sup>2</sup> of quantum physics. In the world-image, an electron is a *particle*; in Reality, an electron is a WAVE. There is nothing paradoxical in this, so long as one isn't a materialistic infant sucking the lab tit. To anyone capable of viewing the same entity from two different points of view, wave-particle duality is entirely natural.

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<sup>1</sup>It's actually quite a fast vibration, involving as it does the speed of light. As scientists are loathe to admit, there are many other ways of thinking, and many of those ways lead to the same conclusions. Carlyle said “A judicious man uses statistics, not to get knowledge, but to save himself from having ignorance foisted upon him.” And precisely the same is true of physics.

<sup>2</sup>With upper-case Reality as opposed to lower-case perceived reality, it would be correct to term it “Wave-particle duality”. I won't keep that up, though; there are too many “Waves” in this book. I'll capitalise Reality, to distinguish it from perceived reality, the Universe, to distinguish it from the cosmos, some other things occasionally, and Unity, well, just because.

Consider a *sandcastle* on a beach. At one scale, the thing is a sandcastle, but zoom in closely and it's just Sand. The seeming "paradox" of wave-particle duality, which is only a paradox due to the Western error, states that the thing on the beach is both sandcastle and Sand. Of course it bloody is! The point is that sandcastles (matter) and Sand (substrate) exist on different *levels of concept*. They aren't alternatives. It is not that, in some scenarios, a particle "becomes" a wave or vice versa, although this is the *impression* that presents itself, via the quantum, to the laboratory physicist, it is that a WAVE configuration exists at the fundamental level of the substrate, which is subsequently rendered, in the perception of matter-based entities, as a *particle* at the secondary level of space.<sup>3</sup>

UNITY, in one of its many intriguing juxtapositions, implies such perceived DUALITY. The particles we see are configurations of the substrate, i.e. castles in the Sand. Deeply, they fade. Zoom in closely, and, as particle physicists have failed to appreciate, you don't see matter resolving itself into ever finer gradations of fundamental particles. No. That's like imagining that a sandcastle should resolve itself into ever smaller *castles* as you zoom into it. That may happen briefly, with the turrets on the walls, but very soon, at high enough magnification, there is only Sand. Thinking fundamentally enough, *there is no castle*. Again, this doesn't rob the sandcastle of existence: it exists on one level of analysis. But it doesn't exist on *all* levels of analysis. The Sand, however, *does* exist on all levels of analysis, which is why the level of the substrate is the only level on which to do "fundamental" physics. No perceived particle could ever be fundamental.

This is why we have hitherto, in the West, so spectacularly and so tragically failed to understand our own existence. To focus only on the *perceptible*—this is a regimen that physics has actively promoted as being the height of logic and rationality—is, in fact, to *banish* the truth. What the children of the Greek *logos* have done, for millennia, is focus only on the icons on the screen, not what is going on beneath. Is it any wonder that we have emerged with a twisted set of values? Is it any wonder that we are trashing the natural world? Is it any wonder that folk are grown miserable? No. Simply, the White Man got it wrong. The truth of *perceptible* reality lies in the IMPERCEPTIBLE. This great and vital maxim is true psychologically, logically, scientifically, mathematically, philosophically, however you want to look at it.

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<sup>3</sup>The "collapse of the wavefunction" is a term used in physics to describe the process by which a probabilistic wave becomes a physical particle. The whole thing is backwards, however. There is no such collapse. The *wave* is, in fact, the physical entity, and the particle a perceived image. "Collapse" is merely the fact that interaction partakes, via the quantum, of an all-or-nothing nature.

# Propagation

By definition, waves *propagate*.<sup>4</sup>

If you throw a rock into a pond, you don't need to know the wave equation that governs ripples to know that ripples will surge outwards from the point of contact. Indeed, you need no algebra to know that this will happen at a *constant speed*, i.e. that the ripples will be circular. This happens in every medium; it's a simple result of symmetry. Make a disturbance, it must disturb nearby points; in turn, those disturbances must disturb the points next to them, and so on. This is wave propagation. And, if the medium is homogeneous, which the Unity theory substrate is by definition, then it must happen symmetrically, requiring a *constant speed* of propagation.

We can work out what the speed is. LIGHT travels through perceived reality at  $c$ , around 300,000,000 m/s. No perceived image travels faster. Hence, we must take the speed of *substrate waves* to be the speed of light. This presents us with a seeming conundrum. According to Unity, the Universe is one substance, which means that substrate waves must propagate at a consistent speed. We can only assume<sup>5</sup> this speed to be the speed of light  $c$ . But hold on! Doesn't that mean that all *matter* must be moving at the speed of light? A nonsense, surely...? Ah, far from it! Remember that *particles* of matter, which most certainly do not travel at the speed of light, are summarised (projected) *images* in perception; they are not waves themselves. Logic dictates that, at least at this first level of modelling, we consider substrate waves as propagating at the speed of light, yes; but logic does not necessarily dictate that the *perceived images* of those waves must do so.

If all of the dimensions of the Universe were, like the  $(x, y, z)$  dimensions of space, broad, open and oceanic, then yes, logic would stipulate the obviously false conclusion of matter's propagation at the speed of light  $c$ . Clearly, that won't do. But fear not, there is an alternative formulation which *does* make sense of things. Indeed, it makes sense of the whole show! Rather than supposing the unseen substrate dimensions to be broad and open like those of the ocean, consider the matter-hosting ones, which are physically Real but not contained in the world-image, as being *small* and CIRCULAR. This is a key aspect of Unity theory.

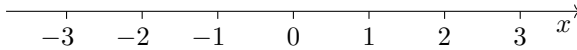
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<sup>4</sup>*Propagation* is the technical term for "movement as a wave". The implication is that no physical entity makes the journey. Unity requires this: with one substance, propagation is the *only* motion.

<sup>5</sup>In fact, substrate waves travel *faster* than  $c$ . More on this shortly. The assumption that electron waves travel at the speed of light  $c$  is entirely correct at one level of modelling.

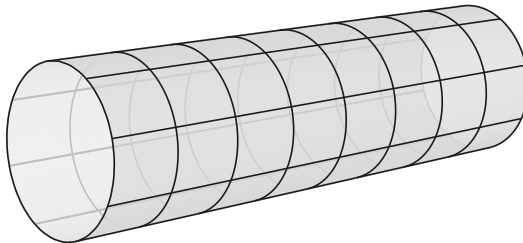
# Inner Dimensions

Let us work in one dimension of space  $x$ . In one dimension, space has the structure of a line, the familiar old-fashioned NUMBER LINE, the set of reals  $\mathbb{R}$ , also known as the  $x$  axis. Now, SPACE, and the number line with which we are going to model it, is open and (effectively) infinite; while it is almost certain that the spatial  $(x, y, z)$  dimensions do, in fact, loop back on themselves on the scale of the Universe, that isn't relevant here. Space, as far as we and the empirical laws of quantum physics are concerned, is broad and oceanic. So, consider an infinite  $x$  axis as representing SPACE.



To this line, we add a small, circular dimension. In Unity theory, I use capital  $W$  to represent this first extra dimension, choosing a peculiar symbol deliberately to highlight the fact that  $W$  is not a dimension of space.<sup>6</sup> I refer to small dimensions of this kind as INNER DIMENSIONS.

If the  $(x, W)$  plane were laid out like the surface of the open ocean, there would be no distinction between  $x$  and  $W$ ; the two dimensions would form a fully symmetrical plane, like the familiar axes of a graph. Kept flat, like good old Cartesian  $(x, y)$  planes are, such a realm couldn't generate the material "fatness" of matter, because everything would travel at the speed of light. But all we need do, to model the (empirically necessary) existence of inner dimensions, is take such a plane, squared with an  $(x, W)$  grid, and roll it up, forming a CYLINDER. The  $x$  axis remains an open number line, with infinite extent; the  $W$  axis becomes a closed circle, with finite circumference.



The substrate modelled as an  $(x, W)$  cylinder.

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<sup>6</sup>I am proposing that  $x$  is a perceptible dimension, but  $W$  is not, hence the capitalisation.

Here, it would be reasonable to ask: “Why do these cylinders exist?”

Now, according to Unity theory there is, in fact, a physical process by which such structures emerge in the substrate. I’ll address that process, which involves the global expansion/contraction of the Universe itself, in due course. But there’s a lot to get through first. For now, let us just hypothesise such structures, and see whether the idea works. No suspension of disbelief is required in this. Assuming a *mathematical* structure like an  $(x, W)$  cylinder is not the same as assuming that there are literally cosmic drainpipes floating around in a *physical* sense. Nowhere in the substrate is there a hole through which you could put your arm. What I am suggesting is different. I am suggesting that are (physically real) configurations of the substrate which *mimic the effects* of cylinders.<sup>7</sup> Logic suggests that matter is the projected image of waves propagating in closed dimensions, and this, in turn, suggests that cylindrical structure should appear in the empirical mathematics of the lab; with  $(x, W)$ , I am simply laying that idea out in practical form, so that we can work with it; I’m picturing the  $(x, W)$  substrate cylinder as a physical object in 3D as a tool for visualisation.

In short, we are working with a MATHEMATICAL MODEL.

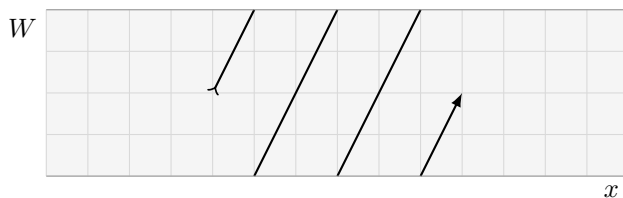
So, there is a small leap of faith to be taken, yes, but only a small one. I suggest you take it! The very first step hits solid ground. Working with cylindrical structure bears immediate and copious fruit; the  $(x, W)$  cylinder, even if we had no clue as to its origin,<sup>8</sup> resolves a variety of longstanding questions of physics, both qualitative and quantitative, promptly. On this simple foundation, with courage and undergraduate mathematics, one can generate (and thus understand fully) the Schrödinger equation, special relativity, the Pauli and Dirac equations, Maxwell’s theory of electromagnetism and general relativity, none of which have *raison d’être* in the old paradigm. That’s no mean feat. The Unity model does, in fact, contain other elements, required to understand the QUANTUM itself, the “quark” structure of the proton, radioactivity and various other phenomena. But cylindrical  $(x, W)$  structure contains the essence of the Unity model. Most of what you need to understand how the world-image comes to be is contained in  $(x, W)$ . This is why I suggested that, even if you are a non-mathematician, you shouldn’t be alarmed by the prospect of an algebraic derivation of the Schrödinger equation. All you’ve got to do is visualise a cylinder, on whose surface waves propagate. This is beyond no one with a brain.

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<sup>7</sup>In technical language, the circular topology is *emergent*. It emerges from the fact that a *helix*, which is not closed, is projected to a *circle*, which is closed, when its axis dimension is projected out.

<sup>8</sup>I do have a moderately precise clue, in fact, which I explain in UNITY THEORY

To *work* with the  $(x, W)$  cylinder, it is helpful to picture it unwrapped. In the following diagram, I include the grid squares, but will leave them implicit in further diagrams. The arrow depicted, then, is a single *continuous* line, wrapping around the cylinder like a snake around a log. The wrapping of the  $(x, W)$  plane is that often found in video games: the top and bottom of the “rectangle” are, in fact, the same line, the location of the glue when the cylinder is wrapped.<sup>9</sup>



$(x, W)$  cylinder unwrapped to a plane.

A benefit of this unwrapping is that it allows us to see that, *locally*, the cylinder is like open ocean. You don’t have to tear or crumple paper to form a cylinder. It bends easily. *Globally*, there is a circular structure, meaning that the arrow depicted above, which represents a propagating wave, can wind around and loop back on itself (in a manner that ocean waves cannot), but, nevertheless, at every *local* point on the cylinder, the wave is identical to an ocean swell: it propagates in a straight line at constant speed.

## The Duality of Levels

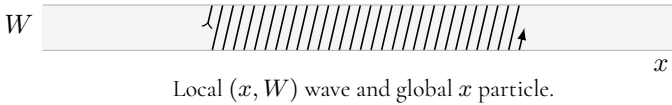
We can now start to understand the behaviours, seen in both the lab and the street, that emerge when the processes involved in perception filter out an inner dimension such as  $W$ . Particularly, we can see how the same wave, viewed at different levels—*REALITY*  $(x, W)$  and *perceived reality*  $x$ —can come to have two different, but both mathematically well-defined speeds:

- ① The *LOCAL* substrate wave propagates at one speed,
- ② The *global* configuration travels at another.

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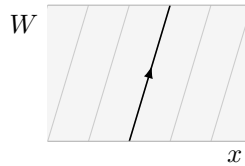
<sup>9</sup>If you really want to understand this, I suggest you find a sheet of paper and *make* such a cylinder. Mark an  $x$  axis running along the cylinder’s length and a  $W$  axis running around its circumference. With that, you have the tools you need to understand what no Nobel laureate has.

To bring this out, let's look at another version of the same unwrapped picture, with the dimensions exaggerated somewhat. Tighten the cylinder, shrinking the  $W$  circle down. This is accurate experimentally: the  $W$  dimension is indeed very small, around  $10^{-12}$  metres in circumference. Our substrate wave now winds many more times around it. This can be visualised as, say, a bamboo cane (long length in  $x$ , short circumference in  $W$ ) with a piece of string wrapped tightly around it.

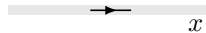


The duality of levels emerges clearly: you can see both the underlying WAVE, which is represented by the arrow itself, and the perceived *particle*, which is represented by “the hatched section”.<sup>10</sup> The WAVE itself moves at  $c$ , but most of that motion is taken up with winding rapidly around  $W$ . Such inner motion is imperceptible. Only the small component of wave speed in  $x$  appears in the world-image, once the inner  $W$  dimension has been projected out. We can bring this out by zooming in closer, looking at one  $x$  neighbourhood of the wave:

- ① At the fundamental level, that of REALITY, a matter wave propagates at the speed of light through the substrate of the  $(x, W)$  cylinder. The length of the heavy velocity vector represents speed through the substrate.



- ② At a higher level, that of the *world-image*, a perceived particle moves to the right in space  $x$ . The shorter velocity vector means lower speed.



<sup>10</sup>As I draw these pictures, note that there is no sense in which the waves depicted are *restricted* to arrow-like lines. I use arrows to show the direction of motion and the extent in  $x$  of the wave, but the wave itself, like an ocean swell, fills the  $(x, W)$  cylinder, at least in the neighbourhood of the relevant particle. So, it is appropriate the view the arrow as essentially equivalent to *shading*: where there is shading, that's where there is wave activity.



# Matter and Space

Modelling particles in this way, as the perceived images of waves travelling around cylinders, offers a simple yet, as far as I can tell, rigorous resolution of one of the deepest and most enduring questions of physics: what is matter? What is the mechanism by which matter sits, as it apparently does, as a foreground object against or, as the West phrases it, “in”<sup>11</sup> background space? What is the physical relationship between matter and space? How do they interact with one another? How do particles such as electrons get to sit still? How do *we* get to sit still?

## HOW DOES MATTER ACTUALLY WORK?

Real physicists, such as Einstein and Feynman, those who would rather die than tell a student to “Shut up and calculate!”, have always wondered at this question. It’s deep. Riemann and Clifford, two of the best mathematicians of the 19th century, both pondered it extensively, and both contributed much to the solution I offer here. It’s the type of fundamental question, interdisciplinary, demanding of personal courage, and offering no possibility of practical reward, that a meagre materialist, addicted to the predictability of the particle and the lure of “doing tenured physics”, simply cannot find the guts to consider. It’s a question for real scientists, not the fetid jokers who have stolen that admirable name.

Its answer is at once simple and most profound. The Unity idea—matter as waves in the substrate—to which both Clifford and Riemann naturally gravitated, resolves all of the questions posed above in the same breath. At the fundamental level, when one has moved beyond perception, when one has gone all the way down the rabbit-hole, there is no *matter* and there is no *space*; they are shapes and details, nothing more substantial. There is no interaction between matter and space, because to suggest such an interaction is akin to asking “How does a flock interact with its birds?” or “How does a song interact with its tune?” or “How does a room interact with its walls?” To all but a Zen master keen on a good koan, these are non-questions.

MATTER particles are castles in the Sand.

SPACE is where the Sand has no castles.

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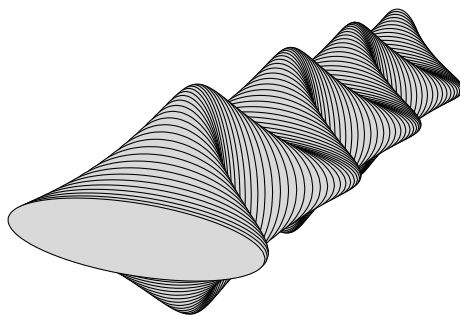
<sup>11</sup>“In” isn’t the right word at all, it turns out. Since both matter and space are emergent, perceived entities, it is much more accurate to say that matter and space *coexist in perception*, giving neither conceptual primacy. Both depend on the underlying substrate. One of the greatest impediments to scientific understanding has been the idea, beloved by the Western mind, that matter is *within* space, in the manner that people live within a house. Space is not a box; it cannot *contain* anything.

# The Substrate

How does the substrate undulate?<sup>12</sup>

The form of Unity theory's matter waves is, it turns out, already well known to physics: they are akin to GRAVITATIONAL WAVES,<sup>13</sup> which Einstein predicted in general relativity (GR) and are thought to have been observed experimentally. Gravitational waves are undulations in the fabric of space, which means that, ipso facto, they are undulations in the substrate. Now, gravitational waves take a specific form. About this form, we can be confident, as not only does it follow from the axiom of Unity, but it also has the same experimental verification in Unity as it already has in the GR. Gravitational waves aren't waves like those on a guitar string or a duck pond. Rather, they are EXPANSION/CONTRACTION waves. The substrate doesn't move up and down like an ocean swell—that's a non-idea, in fact, because there's no "non-substrate" region into which it could move—instead, the substrate (or space in a gravitational wave) *expands* and *contracts* locally. It doesn't travel anywhere against a backdrop; rather, it stretches and compresses.

Waves in the substrate look something like this:



Expansion/contraction wave in the substrate

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<sup>12</sup>Considerable care is needed, when discussing substrate waves, regarding the use of analogies, particularly ocean waves. An ocean swell, being so readily visualisable, is often a very useful analogy, but not always. That is because, in the substrate, waves don't move "across the surface" of anything, like ocean swells do. There is no "above" or "below" the substrate. Waves move *through the substrate*, more like shock waves sent out from a depth charge.

<sup>13</sup>The so-called "gravitational" waves of GR have, in fact, nothing to do with gravity. According to GR, they don't transmit gravitational force. Unity, however, does predicts true *gravity waves*, which, in line with the nomenclature of particle physics, I call GRAVITONS.

Let me clarify two points, to avoid subsequent confusion.

- ① The previous diagram is *not* a depiction of the  $(x, W)$  cylinder. It makes no reference to inner/outer dimensions. What we're looking at, in each grey ellipse, is a depiction of the amount of expansion/contraction at a *single* location in the substrate. Indeed, *gravitational waves* have nothing to do with the inner dimensions, which is why they are already well studied in physics. The picture could represent any three substrate dimensions.
- ② The diagram doesn't represent a wave travelling *within* SPACE, but rather represents a vibration *of* the SUBSTRATE. It isn't a picture of a foreground object against a background; the white background and the grey object are, in fact, the same substance. It's a picture of a *configuration* (in grey) of SUBSTRATE (in white): a grey sandcastle made of white Sand.

A substrate wave such as the one depicted is a TRANSVERSE DENSITY WAVE. It is a *density* (expansion versus compression) wave because the substrate stretches and compresses rather than actually going anywhere; it is *transverse* because the stretching and compression takes place at right angles to the direction of wave travel. For comparison:

An **ocean swell** is a transverse wave but not a density wave. It

- actively *moves* water (not a density wave)
- *at right angles* to its propagation (yes a transverse wave).

A **sound wave** is a density wave but not a transverse wave. It

- *compresses* air (yes a density wave)
- *along* its direction of motion (not a transverse wave).

Expansions/contractions obey a specific law in general relativity, and they obey exactly the same law, albeit in more dimensions, in Unity theory. GR is a special case of Unity theory. The law is this: when space *expands* locally in one direction, say  $x$ , it must *contract* locally in another, say  $y$ . This may be considered verified experimentally via GR, so needs little in the way of logical justification, but it is logical too. To say that any expansion of the substrate must be traded off against contraction is another way of saying:

THERE IS A FIXED AMOUNT OF UNIVERSE.

Unity dictates that we go even further.

The axiom of Unity actively rules out *flow*. Flow, which is what fluids do, is a spatial process in which *matter* particles move freely against a background, *space*. It has no equivalent at the substrate level, because background and foreground are one. Therefore, since the substrate cannot flow, not only must the global *quantity* of substrate be constant, but the local *density* of substrate at every point in the Universe must be constant. There is simply no physical mechanism by which one could get a local “pile-up” of substrate. Which dictates that empty space is formed of precisely the same density of substance as the Earth or the Moon is. It tells us that the voids surrounding atoms in a gas are precisely as full, in substrate terms, as the atoms are themselves.

This is an exceptionally stringent restriction.

## The Substrate Equation

In translation from English to mathematics, the “constant local density of substrate” idea yields the central equation of Unity theory, whence all the others derive. I denote this the SUBSTRATE EQUATION. In the language of Riemannian geometry,<sup>14</sup> I write it  $R_8 = 0$ , where  $R_8$  is a quantity called the *Ricci scalar*. The Ricci scalar is a formal encoding of the idea “overall local expansion” or “local density above baseline”. The subscript denotes its extension to a Universe of eight dimensions. The equation  $R_8 = 0$  says: “Everywhere in the Universe, there is no departure from baseline density”.

Hence, the following statements are equivalent:

- ① The Universe is not fluid.
- ② There is a constant local density of substrate.
- ③ All disturbances in the substrate satisfy  $R_8 = 0$ .
- ④ Locally, expansion must be matched by contraction.

These have major significance for the mathematics of the waves that generate matter. MATTER WAVES, exactly like gravitational waves, *cannot* be described as having only a single dimension of polarisation. A guitar string may oscillate in only one transverse dimension, but the substrate underlying a matter particle may

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<sup>14</sup>The language of GR is Riemannian geometry. It is complicated, but also well understood. The wealth of work done in that field can be translated for use in Unity theory. It is not my area of expertise, because, in studying its *foundations* extensively, I have spent little time *using* GR.

not. Firstly, it is not oscillating in the sense of *motion* as a guitar string does but rather *expanding*, and secondly, any expansion in one dimension must be traded off against *contraction* in another. This requires two dimensions of polarisation.

- ① A guitar string undulates in *one* dimension of polarisation.
- ② A matter wave undulates in *two* dimensions of polarisation.

In a gravitational wave, this is easy to visualise; we have already done it. If a transverse density wave in the fabric of space travels in the  $x$  direction, then it expands/contracts space in the  $y$  and  $z$  directions, perpendicular to propagation. As the wave passes through a certain point in space, the  $(y, z)$  plane stretches vertically and squashes horizontally, and then vice versa. The undulation that occurs is not the one-dimensional up-then-down that moves a guitar string, but is a two-dimensional ( $y$ -stretch,  $z$ -squash) followed by a ( $y$ -squash,  $z$ -stretch).



Gravitational waves, which obey  $R_8 = 0$ , are often depicted as above, with the effect on a small circle in the plane of polarisation, undulating, as the wave passes, between tall-and-slim and short-and-fat.<sup>15</sup> The grey *area*, representing “density of substrate”, remains constant; hence the total *change* in area, encoded algebraically in the quantity  $R_8$ , is always zero. To see this in action, look up “gravitational waves” online: there are many good visualisations of this type of undulation, which, according to Unity theory, represent MATTER WAVES moving through the *substrate* to exactly the same extent as they represent GRAVITATIONAL WAVES moving through *space*.

## Sinusoids

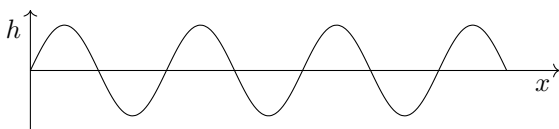
One-dimensional waves are described by classic *sinusoidal* (sine-like) waves, which oscillate in one dimension of polarisation. A wave with *two* dimensions of polarisation, then, is a combination of two such oscillations. There are various ways of encoding this, depending on how you choose to combine the component

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<sup>15</sup>The ellipses do not rotate, but rather are *reshaped*. Analogously to the absence of flow, there is, in fact, no such thing as rotation at the local level of the substrate.

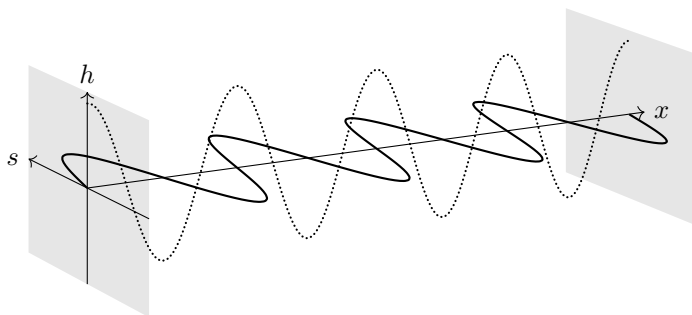
oscillations. In our case, one way is best. This is because our two oscillations are not independent of each other: when  $y$  expands,  $z$  contracts, and vice versa. We can use this to our advantage.<sup>16</sup>

Picture yourself in an anchored fishing boat, as ocean swells travel beneath you. At any moment, the state of the ocean can be described by a single number: *vertical height*. If you plot your motion, in the fishing boat, your various states can be summarised as a vertical line. This line is the *line of polarisation* of the wave. As a wave moves through, you undulate up and down this line. A snapshot of the ocean (made mathematical) is:



Sinusoid polarised in one dimension.

Now, extend to *two* dimensions of polarisation. So, not only does the fishing boat move up and down, but it is also buffeted side to side (still perpendicular to the propagation of the waves). Any motion of the fishing boat can then be described with state along the vertical line of polarisation (wave height  $h$ ) and state along the horizontal line of polarisation (side-to-side buffeting  $s$ ). This is shown below. The grey end-squares represent the POLARISATION PLANE, which is *orthogonal* to wave propagation in  $x$ .



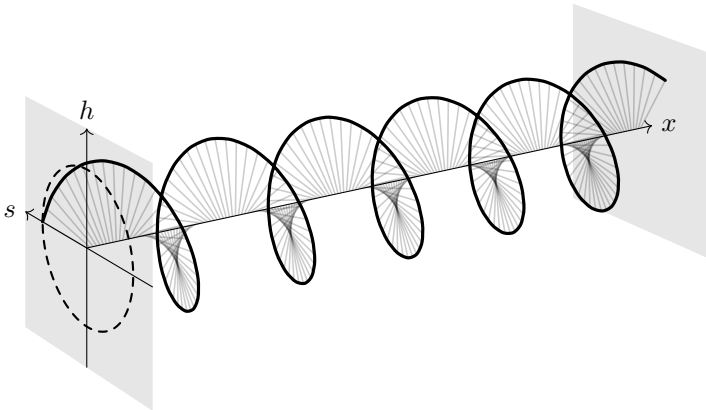
Two sinusoids polarised (out of phase) in two dimensions.

<sup>16</sup>Mathematically, the two dimensions of undulation in a matter wave aren't *independent*. Hence, the information in the wave itself is, in fact, one-dimensional. Nevertheless, when viewed against the underlying substrate, a matter wave has two dimensions of undulation.

## Helices

We are looking for a way to *encode* such pairs of sinusoids in algebra. The simplest way, it turns out, is in terms of *rotations*, i.e. with **HELICES** or corkscrews. A **HELIX** is mathematically well behaved, and hence easy to work with. While a sinusoidal wave has peaks, troughs, and points that are neither, a circular *rotation*, such as produces a helix, is fully symmetrical. In a helix, every point is the same. That's why you use a *wood saw*, which is basically a metal wave polarised in one dimension, to hack wood into bits, but a *corkscrew*, which is basically a metal wave polarised in two dimensions, to take a cork out intact. Every point on the corkscrew is the same, so only one hole is needed: once one bit of metal is inside the cork, the rest will automatically fit. This “every point being the same”<sup>17</sup> is useful practically and mathematically for the same reason.

In the diagram below, the **POLARISATION PLANE**, shaded grey, contains a circular rotation, shown as a dashed line. That rotation contains the same pair of sinusoidal motions as before. If an (unlucky) fisherman found himself on such a corkscrewing sea, he would experience a sinusoidal fluctuation in height  $h$ , and a sinusoidal buffeting side-to-side in  $s$ . Hence, the information contained in the two earlier sinusoids is exactly contained in this corkscrewing wave. Indeed, this is precisely the mathematical definition of the sine and cosine functions: they are the vertical and horizontal coordinates of a circular rotation of radius 1.



Out of phase sinusoids summarised as a helix.

<sup>17</sup>Quantum mechanically, this is equivalent to the wave having a spin/mass *eigenvalue*.

Using such helices allows us to model *individual* sinusoids as well. The sum (superposition) of two symmetrical helices of opposite handedness is a sinusoid polarised in one dimension. Picture or draw two rotations of opposite wise, both starting from the right: the up-and-down components will cancel out, whereas the right-and-left components will reinforce each other. Hence, just as a helix can be expressed as the superposition of two sinusoids, a sinusoid can be expressed as the superposition of two helices.<sup>18</sup>

HELICES: sum and difference	SINUSOIDS: sum and difference
$\curvearrowright + \curvearrowleft = \updownarrow$	$\updownarrow + \leftrightarrow = \curvearrowright$
$\curvearrowright - \curvearrowleft = \leftrightarrow$	$\updownarrow - \leftrightarrow = \curvearrowleft$

And *any* type of two-dimensional polarisation, whether it be helical, saw-toothed, or a stormy sea of indescribable mayhem, can be decomposed into sinusoids in its polarisation dimensions. So, any two-dimensional polarisation can, therefore, be equivalently decomposed into constituent *helices*. Therefore, while the quantum mechanics in this book and the wave derivations of Unity theory more broadly are concerned only with *helical* waves, we sacrifice no generality thereby. In working only with helical waves, the (false) assumption “All substrate waves are helical” is **not** needed. Whatever mathematics applies to helices must also, for reasons well understood but beyond the scope of this book,<sup>19</sup> apply to *any* wave.

I'll close this chapter with another visual, and an important note re all such visuals. A warning to the wise, indeed! This concerns *reification*, also known as HYPOSTATISING, which is the (unconscious) taking of a model, concept or idea to be the entity it is trying to describe. That, as I have explained, is one of the great errors of modern physics: the assumption that *mathematics*, which is undoubtedly the best language we have for describing physics, is itself *physics*. That's the old mistake of thinking that a picture of a rose is a rose. As I hope is obvious to you, such is not the case.<sup>20</sup> While a line-drawn helix, as shown two pages ago, contains the *mathematical information* of the substrate waves we are about to model, that isn't what substrate waves *look* like. Now, one can't, of course, say what substrate

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<sup>18</sup>Mathematically, this is equivalent to saying that waves polarised in  $\mathbb{C}$  can be given in terms of *linear* polarisation, with basis  $\{\cos \theta, i \sin \theta\}$  or *circular* polarisation, with basis  $\{e^{i\theta}, e^{-i\theta}\}$ .

<sup>19</sup>A full treatment of this mathematical idea requires *Fourier analysis*. It being a piece of undoubted pure mathematics, and not of major conceptual significance, I take it as read throughout Unity theory.

<sup>20</sup>There is such hidden peril, as the world has experienced in pain but not yet in understanding, in that razor-sharp tool of thinking invented by the ancient Greeks: the LOGOS, or *abstract concept*.

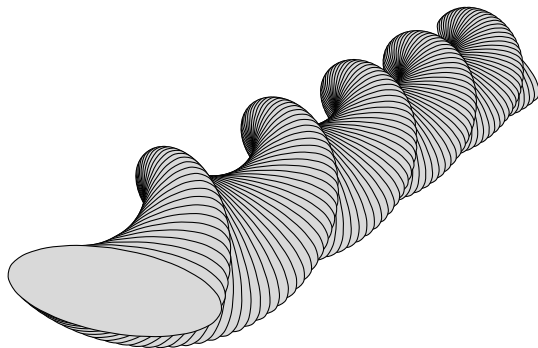


waves look like, because, by definition, no one could ever look at them! Matter is what it is. Nevertheless, there is a *spectrum* of representations, from the purely mathematical to the more pictorial. The algebraic wavefunction

$$\Psi = \phi[\mu(W - ct)],$$

which I will explain shortly, contains the same information as the previous graph of the helical wave, which also contains the same information as the picture below. Just remember, as we press on, that none of these *are* the waves; each describes, imperfectly, a physical configuration of the substrate. So, in the diagram below, the grey ellipses aren't physical objects rotating; rather, they represent local *states* of the substrate. Despite the fact that helices may be and should be described in terms of "rotations", and despite the obvious sense of corkscrewing "rotation" that presents itself in the picture below, what is being *depicted*, i.e. the physical substrate of the Universe, does not rotate. Rather, the closest short-and-fat ellipse represents a state in which the substrate is stretched horizontally and compressed vertically; more distant locations have different states. Only an *idea* rotates.<sup>21</sup>

In this book, when you see  $\Psi$ , picture the following:



Helical matter wave  $\Psi$  in the substrate.

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<sup>21</sup>Concepts aren't substantial; they speak of process. To attain enlightenment, one must escape the Western addiction to concept. This, paradoxically, requires the use of concept. One must broaden and broaden and broaden one's concepts, until they fade to Life. Individually, as in CARRY THE SKY, the key step is recognising that one's *concept* of one's mind (ego) is not one's mind. One's concept of one's mind is an abstract concept, as invented by the Greeks. Attempting to live a life in accordance with the whims of that abstract concept is the road to egotism and madness. Instead, see that your mind can only be free when it sets aside its own concept of itself, and lives as MIND, rather than *concept-of-mind*. For centuries, the West, alas, has tried to live in the old photo it took of itself.

# 6

## MAKING BRACELETS

Develop the imagination. Everything comes from that. If you want mathematicians, give your children fairy tales.

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*Charles Hermite*

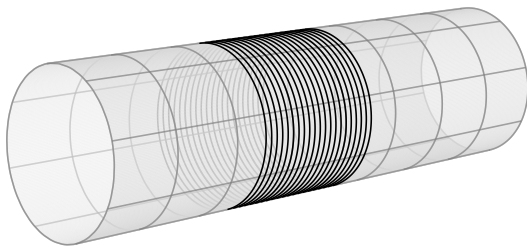
The behaviour of matter can be described in terms of helical substrate waves. Having built one *visually*, we are now going to build one *algebraically*, naming it “the wavefunction of an electron”. Then, we’ll use this algebraic electron to derive, and thus understand, the SCHRÖDINGER EQUATION, which is a law governing the behaviour of electrons. The Schrödinger equation/law will be seen, firstly, to hold for all *well-behaved* electron waves; we’ll then be able to generalise to *all* electron waves, whether well-behaved or not: as Fourier showed,<sup>1</sup> rough seas, up to a point, obey the same wave rules as calm ones do.

The Schrödinger equation is an (approximate) law governing *slow-moving matter*, i.e. particles that travel through space at nowhere near the speed of light. Now, the speed of light, at which our helical matter wave must travel, is very fast. So, the underlying substrate wave of a *slow-moving* electron must be directed

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<sup>1</sup>Fourier showed that e.g. musical notes can be analysed by their frequency spectra. Complex timbres (stormy seas) are built up of sinusoidal waves of different pitches/frequencies.

almost exactly *around* the cylinder. If you point a wave travelling at  $c$  in any other direction than  $W$ , it has a large component of velocity in  $x$ , and moves very quickly through space.<sup>2</sup> So, as an approximation—an appropriate one, it turns out, since the Schrödinger equation is itself an approximation—we can assume that our matter wave propagates in *exactly*  $W$ , as shown below. This will generate a negligible (small enough to be taken as zero) error term, which we will then neglect when the time comes. Each heavy circle represents a WAVEVECTOR: the direction of propagation.



Electron wave circumnavigating the  $(x, W)$  cylinder.

Since a wave moving in  $W$  has no  $x$  component, we can (at least for now) ignore the  $x$  dimension; this is equivalent to supposing the same heavy black circle is repeated everywhere in  $x$ . Note that, so as to give a meaningful visual, I have shown the wave semi-localised in  $x$ . Nevertheless, none of the *algebraic* waves in this book are localised in space. At every  $x$  location, then, we have the same substrate wave racing madly around the  $W$  circle, travelling at the speed of light. Projected in perception, then, the semi-localised wave shown above would be seen as the semi-localised “particle” below.<sup>3</sup>



To encode these ideas algebraically, then, we need to describe:

- ① Helical waves in the substrate.
- ② Looping motion around the  $(x, W)$  cylinder.

<sup>2</sup>Such waves are *relativistic electrons*, and are governed by the more complicated *Dirac equation*. This equation also emerges from the same cylindrical structure, but the mathematics, which cannot be boiled down into one dimension of space, is beyond the scope of this book.

<sup>3</sup>The word “particle” is to be treated with care. Here (and implicitly in particle physics) it does not mean, as it does in classical mechanics, an entity with negligible size. Rather, it means “projected image of wave”. I’ll address the fact that these images have *quantised* energy later in the book.

We need to model, in algebra, a corkscrew-like wave, with the “into the cork” direction set *around* the  $(x, W)$  cylinder, along the heavy wavevectors depicted. To visualise such waves, one need only imagine the heavy rings in the previous diagram as *bracelets* made of twisted metal. Location “around the wrist” is encoded in  $W$ , location “along the arm” is encoded in  $x$ , and “the twisting of the metal” is the thing we are then going to describing mathematically: the *amount of rotation*.

## Input and Outputs

There are many ways of expressing rotations in mathematics. Here, I’ll build one for purpose. This isn’t, perhaps, the slickest way to notate what we’re doing,<sup>4</sup> but it is, in my experience, easiest to follow. We’ll encode our rotation with a FUNCTION mapping from *location* inputs to *state-at-location* outputs:

$$\text{Location} \xrightarrow{\text{MAPS TO}} \text{State at location}$$

Since locations on our cylinder are described with  $(x, W)$  coordinates, this means setting our function up to take  $(x, W)$  coordinates as inputs. These are in metres. The mapping then spits out the state of the substrate at that location. In this book, I notate input-trays with square brackets, as in function-acting-on[inputs].<sup>5</sup>

$$\text{Location input } [x, W] \xrightarrow{\text{MAPS TO}} \text{State of substrate at } [x, W]$$

To model motion, we also need, beyond static bracelets, a *time dependency*. In other words, we’ll need an  $t$  input, in seconds. The full mapping needs to be not a photographic snapshot, with  $[x, W]$  inputs, but rather a *video*, with  $[x, W, t]$  inputs. When we’ve finished, the full state of the  $(x, W)$  cylinder, at any moment in time, will be given by a function of the form:

$$\text{Location/time } [x, W, t] \xrightarrow{\text{MAPS TO}} \text{State of substrate at } [x, W, t]$$

---

<sup>4</sup>If you’re familiar with complex numbers, I’m defining  $\phi[\theta] := e^{i\theta} := \cos \theta + i \sin \theta$ .

<sup>5</sup>The reason I’m using square brackets, which isn’t standard, to notate input-trays is that it brings out a difference between them and normal brackets. For example, in the expression  $p(q + r)$ , if the brackets are interpreted as regular brackets, then  $p(q + r)$  is a multiplication  $p \times (q + r)$ . But if they are interpreted as input-tray brackets, then  $p(q + r)$  means “apply the function  $p$  to the input  $q + r$ ”. I’m making the distinction explicit; in this book,  $p(q + r)$  *always* means “the number  $p$  times the number  $q + r$ ”, while  $p[q + r]$  *always* means “apply the function  $p$  to the number  $q + r$ ”.

# The Phase Function

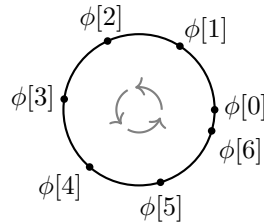
A rotation function is called a PHASE FUNCTION. The word “phase”, in this context, translates as “amount of rotation” or *angle*. I’ll use *phi* for *phase*. The glyph  $\phi[\dots]$  translates, then, as “Amount of rotation at ...” So, writing  $\phi[0.03]$ , we mean “the amount of rotation at input 0.03.” The following statements, given in increasingly formal language, express the same underlying idea:

- ①  $\phi$  describes the substrate at a particular location and time.
- ② The state at  $[x, W, t]$  is given by  $\phi[x, W, t]$ .
- ③  $\phi[x, W, t]$  models the rotation-state at location  $(x, W)$  and time  $t$ .
- ④ Location/time  $[x, W, t]$  MAPS TO  $\phi[x, W, t]$ .
- ⑤  $[x, W, t] \mapsto \phi[x, W, t]$ .

To set the thing up, we start as simply as possible, leaving aside the  $x$  and  $W$  inputs, and working only with a single time input  $\phi[t]$ . Practically, this means that, for now, we are considering a phase function  $\phi[t]$ , which is effectively a *video* (varying input  $t$ ) of *every single location* (no mention of the other variables) in the substrate. We’ll then reintroduce the other inputs  $x$  and  $W$  once we’ve got a handle on the function  $\phi$  itself. Without their input, we don’t yet have a HELIX;  $\phi[t]$  is merely a mathematical summary of *rotation at constant speed*. It takes inputs  $t$ , and processes them as “amounts of rotation”.

$$\phi[t]$$

“Amount of rotation at time  $t$ ”



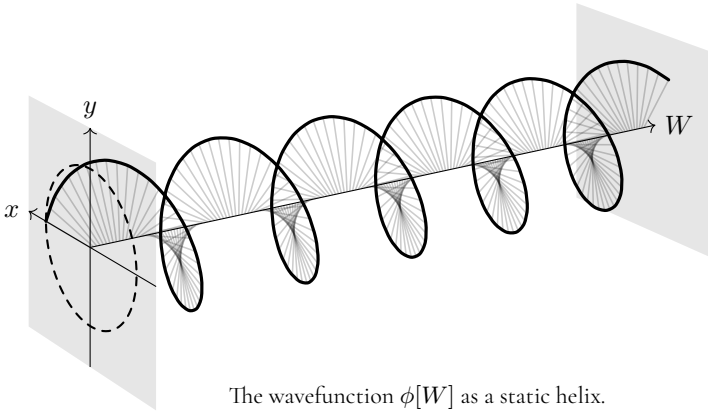
We design the function  $\phi$  as simply as possible. We give the circle of rotation a radius of 1 unit; the circumference of the circle, therefore, is  $2\pi$ . We define rotation to go from  $\phi[0]$  (generally thought of as the positive real axis), and set the speed to be 1 unit of circumference per second. The *period* of  $\phi[t]$ , or the time for one cycle, is therefore  $2\pi \approx 6.3$  seconds.<sup>6</sup>

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<sup>6</sup>This is equivalent to an angular speed of 1 *radian* per second.

## Step 1: Forging the Bracelet

So, this function  $\phi[t]$ , which enacts rotation around the unit circle at speed 1, is the slow twist of a corkscrew's hand. But  $\phi[t]$  doesn't yet model a helix, because nothing moves *forwards*; rather, we have the same rotation everywhere, in the plane of polarisation. In combination with such a circular turn, we need to push forwards; that's how we get a HELIX. So, if we are to model the twisted metal of our bracelets, the  $\phi$  rotation needs to happen with  $W$ , around the wrist. So, we need  $\phi[W]$ . Unwrapping the  $W$  dimension (laying the bracelet out on the table), and labelling the two polarisation dimensions as  $x$  and  $y$ ,<sup>7</sup> we have:



The wavefunction  $\phi[W]$  as a static helix.

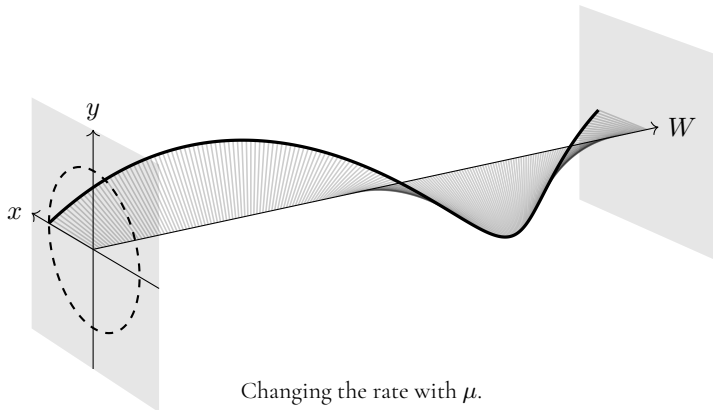
## Step 2: Closing the Bracelet

A tweak is required to make a bracelet. Since, in Reality, the  $W$  dimension has a specific circumference, only a specific *rate* of twisting will allow the two ends of the bracelet to join up smoothly. Just as a silversmith would need to engineer this precisely in the workshop, so we need to engineer it precisely in the mathematics. In the diagram above, we can visualise the two grey planes of polarisation as being the *same plane* in the *same place*: the journey from one to the other is “once round the  $(x, W)$  cylinder”. To enact the correct twist rate, then, we multiply  $W$  by a constant number, which changes the rate of twisting per unit

---

<sup>7</sup>The default direction of phase is, in mathematics, generally taken as anticlockwise. Nevertheless, the same function  $\phi$  can, in fact, be used to describe rotation in *either* wise, depending on the axis directions. Above, the  $x$  axis is set leftwards, giving a clockwise rotation.

of  $W$ . Greek  $\mu$  is standard,<sup>8</sup> giving  $\phi[\mu W]$ . As we crank up  $\mu$ , the silversmith gives the metal more twists. Logically, there is one specific value of the constant  $\mu$  which allows the silversmith to join the bracelet flawlessly. Using lab data, I'll produce this value in due course. For now, to keep the algebra easy, it's best we leave it as  $\mu$ .



### Step 3: Making It Move

To set our helix in motion, we take the static helix/bracelet depicted above, whose equation is given by  $\phi[\mu W]$ , and we *replace*  $W$  with  $(W - 1)$ . This gives a new helix/bracelet-state

$$\underbrace{\phi[\mu W]}_{\text{Old state}} \rightarrow \underbrace{\phi[\mu(W - 1)]}_{\text{New state}}.$$

Consider a location such as  $W = 4$ . For the new  $\phi[\mu(W - 1)]$  helix, the input tray contains  $W - 1 = 3$ . This means that the *new* state at location  $W = 4$  is the same as the *old* state was at location  $W = 3$ . In other words, replacing  $W$  by  $(W - 1)$  has translated the helix by +1 in  $W$ : the value of  $W$  has to be greater, by 1, to produce the same output. Good, we have movement!

---

<sup>8</sup>There are two standard versions of this same concept:  $\mu$  (Greek *mu*), which is the number of *radians* per unit of distance, and  $\nu$  (Greek *nu*), which is the number of *cycles* per unit of distance. The latter is known as the **WAVENUMBER**, the former as the **ANGULAR WAVENUMBER**. In this book, everything is angular, i.e. I never work with cycles, always radians.

We can then move the helix continuously in the same direction by replacing the 1 with the time variable  $t$ :

$$\underbrace{\phi[\mu W]}_{\text{Old state}} \rightarrow \underbrace{\phi[\mu(W - t)]}_{\text{New state at time } t}.$$

Our helix is now mobile: it is a bona fide WAVEFUNCTION, that is to say, it is a summary of the information in a matter wave.<sup>9</sup> It doesn't yet move at the correct *speed*, however. One second of time generates only one metre of forward motion in  $W$ . We want the bracelet to rotate at the speed of light,  $c$ ; so, one second must generate 300000000 metres of forward motion in  $W$ ! To enact this, we scale  $t$  up by a factor of  $c$ , i.e. we make everything happen  $c$  times faster. This gives our wavefunction as:

$$\underbrace{\phi[\mu(W - ct)]}_{\text{Electron wavefunction.}}$$

## Interpretation

With the algebraic wavefunction  $\phi[\mu(W - ct)]$ , we have made our bracelet. If you can understand the content of that wavefunction, that is to say, the *physical configuration of the substrate* so modelled, then you will be able to understand the content of this book. Now, the abstract visualisation of space is my fort  ; it may not be yours. But I imagine you are happy enough picturing corkscrew-like waves rattling around a cylinder. All I'm asking you to do, if you want to be able to make up your own mind about Reality, is to play with that idea algebraically. This may take work, but I don't believe it is beyond anyone with intelligence and a soul. Like I said, you do not have to be a trained mathematician to understand physical Reality. That's because it is Real, so it *has* to make sense. Where it doesn't make sense, that is the fault of the paradigm, not of Reality.

---

<sup>9</sup>A WAVEFUNCTION such as the above is, in the end, nothing more complicated than a function describing a wave. But it's a useful word, because it straddles the modelling divide. It reminds us (and we do need reminders!) that what is a "function" on one level is a "wave" on another. Broadly,  $\phi[\mu(W - ct)]$  is a *function* to a mathematician and a *wave* to a physicist. Neither of these views is incorrect, so long as one understands both, and, therefore, one doesn't fall into the trap of imagining that one's words for something are that something. This is analogous to the fact that a photograph of a rose is, correctly, a "photograph" to a photographer and a "rose" to a botanist.



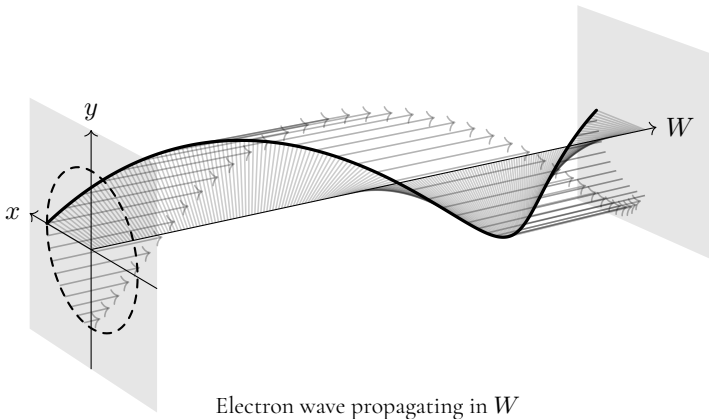
With mathematical subtitles, our wavefunction is:

$$\phi \left[ \mu (W - ct) \right]$$

Input-tray bracket
Input-tray bracket  
Bracket
Bracket  
Fixed twist rate
"Forwards"
Time  
Phase function
Dimension of travel
Speed

This translates visually as below. Two points to note in this diagram:

- ① As throughout this book, the diagram isn't to scale! This can't be helped:  $c$  is vast and the  $W$  dimension is tiny. Hence, scaling from the previous diagram,  $\mu$  has taken a *visual* value smaller than 1, stretching out the twists. In fact,  $\mu$  is an extremely large number, around  $2.60 \times 10^{12} \text{ m}^{-1}$ .
- ② Helical wave motion isn't, in fact, exactly like a corkscrew: nothing physical rotates. Rather, the *entire corkscrew* moves in the  $W$  direction. Locally, this looks like a rotation; globally, however, it looks as every wave should, like a *translation* of a particular waveform. It's a useful mental exercise to visualise the local rotation behaviour on the dashed circle as the wave below propagates.



# 7

## THE WAVE EQUATION

O nobly-born ... listen. Now thou art experiencing the Radiance of the Clear Light of Pure Reality. Recognise it.

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*Tibetan Book of the Dead*

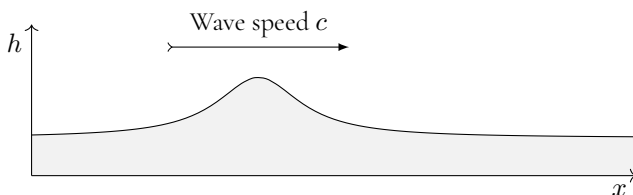
The next three chapters, unlike much of this book and Unity theory more broadly, consist of mathematics that is centuries old and well understood in the mainstream. The algebra presented is independent of the axioms and assumptions of Unity theory; hence, we need make no mention of the inner dimensions or the effects of perceptibility. Firstly, I'll derive the WAVE EQUATION, the universal mathematical law which governs the behaviour of all waves, whether perceptible or imperceptible. I'll then, later on, use this *primary* WAVE EQUATION<sup>1</sup> to derive the *secondary* wave equations of quantum mechanics.

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<sup>1</sup>THE WAVE EQUATION is not to be confused with “a wave's equation”. The latter phrase, which is a generalisation of the familiar *equation of a graph*, e.g.  $y = mx + c$ , isn't helpful. In Unity theory, as in quantum physics generally, to avoid confusion, I refer to specific waves as having *wavefunctions*, not equations, reserving “equation” for broader LAWS governing the behaviour of multiple waves. So, a *wavefunction* describes the behaviour of a specific wave-particle; the WAVE EQUATION is a law governing the possible behaviours of wavefunctions.

Among the laws governing wavefunctions, a number of which appear in this book, there is a clear logical *hierarchy*. For orientation, it's worth keeping in mind. Quantum mechanics uses wavefunctions, often encoded in upper-case/lower-case  $\Psi/\psi$ , like the one we derived in the last chapter; these describe de Broglie's matter waves in terms of helices. These are the entities governed by the laws: the “people” of the theory, if you will. Above them, wave equations such as the Schrödinger and Dirac equations are broad laws that govern the possible *behaviours* of those helical matter waves  $\Psi/\psi$ . But there's another step up the hierarchy. If the Schrödinger and Dirac equations are two of the Ten Commandments, then the subject of this chapter is the Voice of God as heard by the prophet Moses. The WAVE EQUATION is the universal law governing *all* waves, perceptible or imperceptible; in turn, this dictates the algebraic form of secondary wave equations such as Schrödinger's; in turn, these dictate permissible behaviours in the particular wavefunctions that describe matter such as electrons.<sup>2</sup>

Consider the simplest and most readily visualisable wave scenario, that of a single ocean swell, viewed in cross-section. Height  $h$  varies in space  $x$  and time  $t$ .



In the snapshot above (with time frozen), the wavefunction is given by  $h = f[x]$ . The function  $f$  describes the shape of wave, also known as the WAVE PROFILE. Now, we know that, to make such a profile *move* at speed  $c$ , all we have to do is replace its input tray  $[x]$  with the input tray  $[x - ct]$ . Regardless of the nature of the function  $f$ , the wave  $f[x - ct]$  will travel at speed  $c$  in  $x$ . The function  $f$  can be as weird as you like, with a graph shaped like a sphinx or a stegosaurus, but an input tray looking like  $[x - ct]$  will ensure that this shape propagates at speed  $c$ .<sup>3</sup>

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<sup>2</sup>The WAVE EQUATION is itself a linear approximation to the SUBSTRATE EQUATION  $R_8 = 0$ , which governs *all* configurations of the substrate, both wavelike and not. The SUBSTRATE EQUATION governs the nature of God; this then dictates the form of the primary WAVE EQUATION, which is the perceptible voice of God; this then dictates the form of the secondary quantum equations, which are the commandments of God; these then dictate the behaviour of wavefunctions, which are the individuals so governed.

<sup>3</sup>The letter  $c$  is used generically for all wave speeds, not only for the specific speed of light. It

# The Variation Question

We now ask the VARIATION QUESTION of our generic wave  $h = f[x - ct]$ . We ask this question in English, and then translate into mathematics:

*How does the height of the water vary?*

The first stage of translation is to restate this question in terms of the variables *wave height, position* and *time*. In algebra, these are  $h$  (metres) as it depends on  $x$  (metres) and  $t$  (seconds). Still in English, then, but with reference to algebraic variables, the VARIATION QUESTION is:

*How does  $h = f[x - ct]$  vary as  $x$  and  $t$  vary?*

Now, full knowledge of the variations of a wavefunction  $h = f[x - ct]$  depends, of course, on its particular shape, encoded into the symbol  $f$ . Were we to produce a wave in the shape of a sphinx, then knowledge of its variations would require knowing the detailed shape of the sphinx. That, requiring specific information, can't yield a universal law across all waves. The only thing we could possibly know *universally* across all waves is about the relationship *between the variations* of  $h$  as  $x$  varies and the variations of  $h$  as  $t$  varies. Since **both** of these depend on the specific shape, we may be (are, in fact!) able to find a universal relationship between the two. The VARIATION QUESTION becomes:

*What is the relationship between changes in  $h = f[x - ct]$  as  $x$  varies, and changes in  $h = f[x - ct]$  as  $t$  varies?*

Continuing to formalise the translation, we can write this in terms of *rates of change*. In the language of calculus, these are DERIVATIVES. With more than two variables involved, they are technically PARTIAL DERIVATIVES. That doesn't change the concept, it just means funkier notation. There are various. I'll give the two most common in this chapter. The first uses the curly  $\partial$  (pronounced "d") for  $\partial$ ifferentiation or  $\partial$ erivative, and the second uses subscripts, as in  $h_x$ . Quite apart from both being useful, it's important to recognise that, in mathematics as elsewhere, the same thing can have many names. Algebraic symbols are exactly that, *symbols*; they aren't ideas, rather they are *labels* for ideas. The idea, in this case, is the process of DIFFERENTIATION, or "finding rates".

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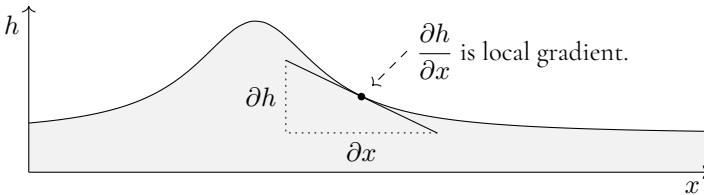
stands for Latin *celeritas*, speed. This is the root of the word "acceleration".

## The Rate in Space

The idea behind the  $x$  derivative is this. Take a time snapshot (i.e. freeze the input variable that isn't  $x$ , namely  $t$ ) and look at the variations in wave height across different positions  $x$ . Equivalently, treat  $t$  as an (unknown) constant, and calculate the rate of change with respect to  $x$ . The following expressions are all ways of encoding this same idea:

- the variation in water height  $h$  as we move in the  $x$  direction,
- the rate of change of  $h$  as perceived by someone moving in  $x$ ,
- the partial derivative of  $h$  with respect to  $x$ ,
- $h$  differentiated with respect to  $x$ ,
- $\frac{\partial h}{\partial x}$ , pronounced “ $dh$  by  $dx$ ”,
- $h_x$ .

Visually, you get a spatial GRADIENT. The rate of change of  $h$  with respect to  $x$  is simply the *steepness of the wave*, as experienced by a floating duck:



The curly  $\partial$  stands for “a vanishingly small change in...”. Hence, the numerator  $\partial h$  and denominator  $\partial x$  of the derivative stand for vanishingly small changes in  $h$  and  $x$ . Once such changes have become *vanishingly* small, however, you can't draw them! So, in the above diagram, they are depicted as having finite length.

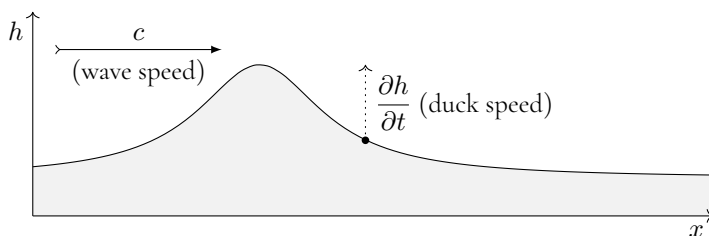
## The Rate in Time

The idea behind the  $t$  derivative, then, is this. Pick a position (i.e. freeze the input variable that isn't  $t$ , namely  $x$ ) and look at the variations in wave height as time progresses. Equivalently, treat  $x$  as an (unknown) constant, and calculate the rate of change with respect to  $t$ . The meaning of the curly partial derivative notation  $\partial t$ , as opposed to the ordinary derivative  $dt$ , is simply “treat all input

variables that aren't  $t$  as frozen". The following expressions, then, are all ways of encoding the same idea:

- the variation in water height  $h$  as time  $t$  passes,
- the rate of change of  $h$  with respect to  $t$ ,
- the partial derivative of  $h$  with respect to  $t$ ,
- $h$  differentiated with respect to  $t$ ,
- $\frac{\partial h}{\partial t}$ , pronounced " $dh$  by  $dt$ ,"
- $h_t$ .

Visually, you get a vertical VELOCITY. The rate of change of  $h$  with respect to  $t$  is simply the *vertical velocity of the surface of the water*, or, equivalently, the velocity at which a floating duck is raised or lowered.



## Mathematically...

The VARIATION QUESTION becomes:

*What is the relationship between the partial derivatives of the wavefunction  $h = f[x - ct]$  with respect to  $x$  and with respect to  $t$ ?*

Continuing to translate, we can give the VARIATION QUESTION in algebra. Firstly, using the curly  $\partial$ :

*What is the relationship between  $\frac{\partial h}{\partial x}$  and  $\frac{\partial h}{\partial t}$ ?*

Secondly, and equivalently, using subscripts:

*What is the relationship between  $h_x$  and  $h_t$ ?*

# The Variation Answer

Once the question is understood, the answer is easy, because of the simple form, universal across all waves, of the *input tray*. Both rates of change are going to involve (identically) the shape of the profile  $f$ , which means we can ignore it for purposes of analysing their relationship. We don't know how  $f$  varies, but that doesn't matter. All that matters is the form of the input tray  $[x - ct]$ , and that is a simple linear expression. A variation in  $t$  produces a greater (oppositely directed) effect than the same variation in  $x$ , by a factor of  $-c$ . This can be seen explicitly. What happens to the inputs of the wavefunction  $f$  when either  $x$  or  $t$  increases?

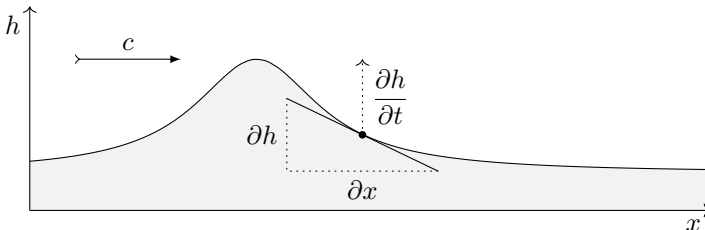
- increase  $x$  by one, and the input tray  $[x - ct]$  increases by one,
- increase  $t$  by one, and the input  $[x - ct]$  decreases by  $-c$ .

Hence, the scale factor between the rates is  $-c$ . In Leibniz  $\partial$  notation, this is

$$\frac{\partial h}{\partial t} = -c \times \frac{\partial h}{\partial x}$$

“The rates are proportional, with scale factor  $-c$ ”

This can be seen visually by considering a floating duck. As a wave passes beneath it, a floating duck experiences two things: a *raising*  $\frac{\partial h}{\partial t}$  and a *sloping*  $\frac{\partial h}{\partial x}$ . In the diagram, in which a right-moving wave is meeting our duck,  $\frac{\partial h}{\partial t}$  is positive and  $\frac{\partial h}{\partial x}$  is negative: the duck is being *raised*, but the front-slope of the wave angles *downwards*. This is the minus sign in the wave equation. And, the faster the wave travels, the faster the raising, while the steepness is unaffected. This is the factor of  $c$ . Taken together, we have a constant of proportionality  $-c$ : the *raising*  $\frac{\partial h}{\partial t}$  is  $-c$  times the *sloping*  $\frac{\partial h}{\partial x}$ .



# The Open Ocean

The wave equation, in the end, is not complicated. You are eminently capable of understanding it. It is nothing more than a mathematical translation of the statement “Waves travel at a constant speed.” We have, in the simple example of waves travelling in one direction, encoded that idea into an input tray  $[x - ct]$ , and seen that it generates the equation  $h_t = -ch_x$ . The task now is to generalise to the open ocean. This has two stages.

- ① We consider waves travelling in the opposite  $x$  direction.
- ② We consider waves travelling in arbitrary  $(x, y)$  directions.

## One Dimension

In one dimension of space  $x$ , waves can travel in the *positive* direction, with input tray  $[x - ct]$  or in the *negative* direction, with input tray  $[x + ct]$ . If you follow the previous argument through with a left-travelling wave  $h = f[x + ct]$ , then you don’t get the same equation. Whereas previously a factor of  $-c$  appeared, this time we get a factor of  $+c$ . With a wave of the form  $h = f[x + ct]$ , we get

$$\frac{\partial h}{\partial t} = c \times \frac{\partial h}{\partial x}$$

Proposed law for  $h = f[x + ct]$  waves.

But this is not what we want. We are looking for a universal law that governs *all* wavefunctions, not two different equations depending on which way the wave is going. Fortunately, the problem is easily dealt with. It’s as simple as the fact that  $(-c) \times (-c) = c^2$ . All we have to do is apply the same process, i.e. differentiation, *twice*, and hey presto! In one case we’ll get two factors of  $-c$ ; in the other we’ll get two factors of  $+c$ . These are, of course, equal.

Differentiating twice, that is, finding the second derivative, is analogous to calculating the *acceleration*, as opposed to the *velocity*. The second rate is the rate of change of the rate. In our partial differentiation languages, the second derivatives are, in Leibniz  $\partial$  notation,

$$\frac{\partial^2 h}{\partial t^2} \text{ and } \frac{\partial^2 h}{\partial x^2},$$



or, equivalently, in subscript notation

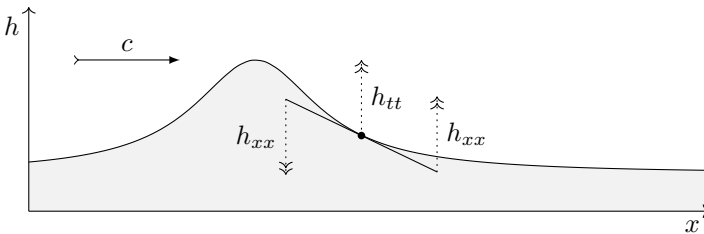
$$h_{tt} \text{ and } h_{xx}.$$

With waves, the *first* derivatives obey piecewise laws  $h_t = \mp ch_x$  depending on direction, but the *second* derivatives obey a consistent equation for both right- and left-travelling waves. The proportionality between the second derivatives is  $(-c)^2 = c^2$ , which means that both types of wave, i.e. *all* types of wave travelling through one dimension of space, satisfy the same universal law. That law is the WAVE EQUATION in one dimension:

$$\frac{\partial^2 h}{\partial t^2} = c^2 \times \frac{\partial^2 h}{\partial x^2}$$

“The second  $t$ -rate is  $9 \times 10^{16}$  times the second  $x$ -rate”

Bringing out our duck once again, we can interpret the law physically. The second  $t$  derivative is straightforward; it is the vertical *acceleration* of a floating duck. The second  $x$  derivative is marginally more complicated, but still readily visualisable. Being the rate of change (in  $x$ ) of the rate of change (in  $x$ ), it is a measure of *how the slope is changing* across the picture. In other words, it describes the *curvature* of the water’s surface: the rate at which at a duck, upon swimming rightwards through the frozen picture, would encounter changes in the slope of the wave.



Above, a duck is on the front-slope of a wave, but has not yet encountered the steepest part of the swell. Hence, the duck is being *raised at an increasing rate*, which corresponds to  $h_{tt}$  being positive. Similarly, while the slope is down to the right for our duck ( $h_x < 0$ ), any rightward change in position  $x$  brings a *positive* change in slope, which corresponds to a positive value of  $h_{xx}$ . Hence, for

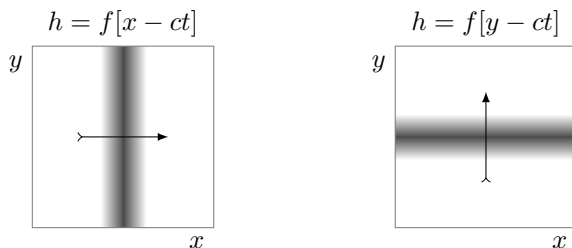
a right-travelling wave, the second derivatives  $h_{tt}$  and  $h_{xx}$  have the same sign. This is reflected in the lack of negative signs in the algebra:

$$h_{tt} = c^2 \times h_{xx}$$

“Vertical duck acceleration is  $9 \times 10^{16}$  times wave curvature.”

## Two Dimensions

Fortunately, the above enables us not only to extend to both directions in  $x$ , but, in the same breath, solves the problem of describing multiple dimensions of wave travel. That is because Pythagoras’s theorem is a sum of *squares*:  $a^2 = b^2 + c^2$ . It is precisely this fact, such as allows  $[x \pm ct]$  waves to obey a single law, that allows  $[x - ct]$  and  $[y - ct]$  waves to obey a single even broader law.<sup>4</sup> Picture now a *plan view* of the ocean, as seen by a gull. Wave height is no longer depicted as a physical dimension, rising as it does out of the plane of the paper. Setting  $(x, y)$  as the horizontal dimensions of the ocean, we depict wave height with *shading*: darker points correspond to greater wave height. Waves travelling positively in  $x$  and  $y$  are therefore:



There is, in fact, only one candidate for an overarching law governing all such waves. Since the  $x$  waves satisfy  $h_{tt} = c^2 h_{xx}$ , the  $y$  waves, having exactly the same form with  $y$  in place of  $x$ , must satisfy the equivalent equation  $h_{tt} = c^2 h_{yy}$ . The only plausible way of combining these into a single equation is as follows:

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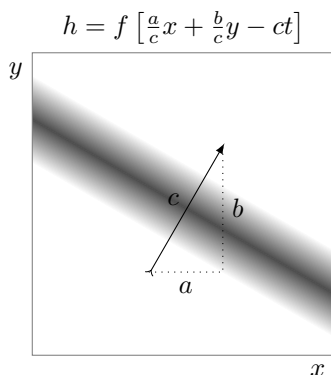
<sup>4</sup>Indeed, the fact that  $(-c)^2 = c^2$  may be thought of as a special case of Pythagoras.

$$h_{tt} = c^2 (h_{xx} + h_{yy})$$

“The second  $t$ -rate of change is  $9 \times 10^{16}$  times  
the sum of the second spatial rates of change”

This is automatically satisfied by waves travelling in  $\pm x$  and waves travelling in  $\pm y$ : the former do not vary in  $y$ , hence  $h_{yy} = 0$ , and the latter do not vary in  $x$ , hence  $h_{xx} = 0$ . All we need to do, then, to verify that this is, indeed, the correct law, is send a wave in an arbitrary direction, some combination of  $x$  and  $y$ , and check that such waves also satisfy our proposed law. As you will see, this is just Pythagoras’s theorem. In the picture below,  $a$  and  $b$  are the components of the overall wave velocity in the  $x$  and  $y$  directions. Hence,  $\frac{a}{c}$  and  $\frac{b}{c}$  are the *fractions* of the wave speed in  $x$  and  $y$ ; these are old-fashioned SOHCAHTOA trig ratios. If  $a^2 + b^2 = c^2$ , which, by Pythagoras’s theorem, is always true for perpendicular components, then the wavefunction  $h = f[\frac{a}{c}x + \frac{b}{c}y - ct]$  travels in the direction specified by  $a$  and  $b$  at speed  $c$ .

Our plan view of the ocean is:



We can now verify our law by checking the second derivatives. Exactly as before, the wave shape  $f$  is common to all three: only the scale factors from the input tray  $[\frac{a}{c}x + \frac{b}{c}y - ct]$  are relevant. Changes in  $x, y, t$  are scaled by, respectively,  $\frac{a}{c}, \frac{b}{c}$  and  $-c$ . Upon differentiating again, these effects are squared, and the second derivatives are duly scaled by  $(\frac{a}{c})^2, (\frac{b}{c})^2$  and  $c^2$ . When *added together*, then, the

second  $x$  and  $y$  rates give, by Pythagoras, a total scale factor of

$$\frac{a^2}{c^2} + \frac{b^2}{c^2} = \frac{a^2 + b^2}{c^2} = 1.$$

So, the second  $t$  rate, whose scale factor is  $c^2$ , is  $c^2$  times bigger than this sum. *Viola!* This completes our derivation of the WAVE EQUATION in two dimensions:

$$\frac{\partial^2 h}{\partial t^2} = c^2 \left( \frac{\partial^2 h}{\partial x^2} + \frac{\partial^2 h}{\partial y^2} \right).$$

This equation is nothing more than a translation of the English phrase “the wave  $h = f[x, y, t]$  travels at speed  $c$ ”. It is Pythagoras’s theorem, expressed in the language of waves. And, since Pythagoras’s theorem generalises to any number of dimensions, the same is true here. I will use a 2D version on the  $(x, W)$  cylinder to derive a 1D perceptible equation on the line  $x$ , but that derivation extends; the same argument, using a 4D version on  $(x, y, z, W)$ , produces a 3D equation in space  $(x, y, z)$ . Governing waves  $\Psi = f[x, y, z, W, t]$  propagating at  $c$ , the wave equation is

$$\frac{\partial^2 \Psi}{\partial t^2} = c^2 \left( \frac{\partial^2 \Psi}{\partial x^2} + \frac{\partial^2 \Psi}{\partial y^2} + \frac{\partial^2 \Psi}{\partial z^2} + \frac{\partial^2 \Psi}{\partial W^2} \right).$$

We won’t need to deal with all that; the entire behaviour can be summarised on  $(x, W)$ , which can then be pictured as  $(\text{SPACE}, W)$ . Indeed, there’s a useful piece of notation, the nabla symbol  $\nabla$ , which enacts this representation, summarising all of the spatial derivatives in one. It appears in all of the equations of quantum mechanics, so I’ll mention it here. Again, we won’t need to use it; in this book, you can take it as a pretty picture. Re-expressing the above:

$$\frac{\partial^2 \Psi}{\partial t^2} = c^2 \left( \nabla^2 \Psi + \frac{\partial^2 \Psi}{\partial W^2} \right).$$

As you will see, this equation, once the right-hand  $W$  rate has been projected out in perception, yields all of the observed equations of the quantum laboratory.

# 8

## COMPLEX NUMBERS

Il n'y a quelquefois aucune quantité qui  
corresponde à celle qu'on imagine.

---

*René Descartes*

Before we can subject our proposed *matter waves* to the WAVE EQUATION, we must understand clearly the language in which we are writing. Everything in Unity's wave mechanics and QM is defined in terms of corkscrewing helices, which are, stripped down to their essentials, *rotations*. I'm describing these using a PHASE FUNCTION  $\phi$ , which encodes rotation at unit speed around a unit circle. Thus far, we haven't considered how to work with such rotations algebraically: we have some basic vocab, in the form of  $\phi$ , but no grammar. This chapter, which is mathematics and the philosophy of mathematics, concerns the construction of meaningful *sentences* out of expressions like  $\phi[\mu(W - ct)]$ .

The language we need is that of COMPLEX NUMBERS.

Now, complex numbers, while they sound complicated by definition, are not. They are just a way of extending the “real” number line  $\mathbb{R}$ , which encodes the familiar ideas of  $+$   $-$   $\times$   $\div$ , to incorporate the idea (which is not complicated in itself) of *rotation*. And rotation is as “real” an activity as, say, subtraction.

Just because rotation doesn't have, in basic arithmetic, a symbol as elementary as  $+-\times\div$  doesn't make the activity being described any less tangible. With objects on a table, you can do both *rotation* and *subtraction*. Nevertheless, rotation has no home on the standard number line. While you might think of the number  $-1$  as a *reversal* of the number  $1$ , there's no way, at least while sticking to  $\mathbb{R}$ , to get from one to the other by rotation. That's exactly what a line is: it is a *one-dimensional* set of numbers. Staying within  $\mathbb{R}$ , you can't get from  $+1$  to  $-1$  without going via  $0$ , which annihilates (lit. *renders as zero*) the number  $1$ .

The COMPLEX NUMBERS  $\mathbb{C}$  sort this problem out.

## Broadening the Domain of Reality

$\mathbb{C}$  is a *two-dimensional* number system, extending the real number line  $\mathbb{R}$ . Now, leaping off the number line may seem, at first glance, to be a loopy idea.<sup>1</sup> I'm going to explain why it isn't. There's nothing nonexistent, imaginary, fake, unreal, impossible, immaterial, bizarre or bonkers about the complex numbers. They are exactly as "real" as the real numbers are. The idea of a two-dimensional number system is only thought of as bonkers because we have the wrong idea about what the (apparently self-explanatory, but very far from it) *real* numbers are. This category error, viz. taking the concept of "number" as corresponding to a THING IN ITSELF, is closely related to the Western error more broadly: the complex numbers are misunderstood because folk imagine "real" numbers to be 100% "real".<sup>2</sup> In attempting to subject  $\mathbb{C}$  to the same (erroneous) over-reification, paradoxes arise.

But paradoxes are only ever in the minds of those that consider them. It is only when a concept is *hypostatized*, that is to say, held to have some sort of absolute existence independent of its use by people, that paradoxical behaviour is possible. Nothing is paradoxical until one makes theories about it. To understand the complex numbers, one doesn't have to do anything magical or mystical—there are no leaps of faith involved—one simply has to overwrite the prior error. In this case, the prior theory is that of the REAL NUMBERS, for far too long concretised by the very clever, yet also exceedingly misguided White Man.

Goddamn Romans!

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<sup>1</sup>For a longer exposition of the story of  $\mathbb{C}$ , see *Imaginary Numbers*, in CARRY THE SKY.

<sup>2</sup>"Real" may be one of the most counterproductive words in the (current) English language.

There's quite a deep point here, in philosophy, mathematics and the history of mathematics. It is relevant not only to quantum mechanics, but also to broad understanding of the Western psyche, so it's worth us taking time to unpack it. Before addressing the Great Leap Forward from the real line  $\mathbb{R}$  to the complex plane  $\mathbb{C}$ , I'll run through an analogous historical process. This was a previous Great Leap, which took the natural numbers  $\mathbb{N} := \{1, 2, 3, \dots\}$  to the integers  $\mathbb{Z} := \{\dots, -2, -1, 0, 1, 2, \dots\}$ . This was the invention/discovery of NEGATIVES. Both Leaps cast light on the Western error.

## From the Naturals to the Integers

Negative numbers are now standard. Having been educated in the use of the whole real number line  $\mathbb{R}$ , which runs infinitely both sides of zero, we take them for granted. We are accustomed, whether in school mathematics or the household accounts, to equations like  $3 + x = 1$ , and have little difficulty, provided we have been reasonably well taught, seeing that the answer is  $x = -2$ . Furthermore, we are happy to say that  $-2$ , the answer to the question "What do you add to 3 to get 1?" is an entity of the same category, the category NUMBERS, as 1 or 3. The difference between numbers is a number, whether it is positive or negative.

But this idea, first treated rigorously by Brahmagupta in the 7th century, has been viewed by many (to whom it has not been explained) as nonsense. Even now, you may have inklings of doubt if you try to pin down the metaphysical nature of  $-2$ . You would not be alone. Diophantus of Alexandria, for whom whole fields of mathematics are named, called a negative number that appeared in his work "absurd".<sup>3</sup> The point is, it was, and remains, a nontrivial conceptual leap to view the "subtraction of 2", which is a *change* in numbers, as a NUMBER in its own right, namely  $-2$ . But, whenever arguments arise, it isn't the things about which people *disagree* that are the problem; disagreement is the natural and healthy state. It is the ways in which people *agree* that end up making them all look like chumps.

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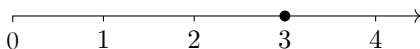
<sup>3</sup>Francis Maseres, a prolific 18th century English mathematician, wrote that negative numbers "make dark of the things which are in their nature excessively obvious and simple". His friend, William Frend, was also "a noted oppugner of all that distinguishes Algebra from Arithmetic." In other words, in classic English fashion, they disliked what they couldn't pin down. They viewed the calculation  $-2 \times -2 = 4$  as pointless; they didn't see how  $-2$  could, on its own, possibly represent a number. They misunderstood entirely, and argued vociferously against negatives. If this seems crazy, hold that thought. People still do this with the complex numbers, exactly as they still do with God. Understanding *how* people could and can think like this is the key to Western salvation.

If one is to understand mathematics, and hence, as Carlyle recommended, not have the wool pulled over one's eyes by a long-entrenched Establishment of clever fools, it is crucial to get a good conception of numbers.<sup>4</sup> Don't imagine, simply because symbols like  $1, 2, 3, \dots$  exist, that they point to the same thing everywhere. There are no things. There is no Elysian fount of logic from which the natural numbers spring. Like everything else, the numbers  $\mathbb{N} := \{1, 2, 3, \dots\}$  are models and concepts, thoughts and ideas. Mathematics, the Queen of the Sciences, occupies no philosophical high ground of "immaculate truth", as has often been claimed by... er, *mathematicians*. Haha, who else!

## The Naturals

The original meaning of NUMBER, encoded in the naturals  $\mathbb{N}$ , is "Number of sheep, according to a Bronze Age shepherd". Back then, as in  $\mathbb{N}$  now, there were no negatives, no fractions, no zeros. According to an ancient Celt wandering a windy fell, *minus two sheep* is a problem to be solved, *half a sheep* is cause for alarm and *no sheep* is a disaster. Numbers other than  $1, 2, 3, \dots$  just didn't enter into thinking back then. But, while zero didn't enter *arithmetic* until relatively recently, it was always there, implicitly. The counting of a shepherd is meaningless unless it comes with the assumption that one starts at zero. To say "Second" is to imply that there must have been a "First", and to say "First" is to imply that, before "First", there was nothing. Indeed, this is exactly the logical content of Dedekind and Peano's axioms of arithmetic. The implicit idea in all counting, if it is to be rendered tangible and hence "real", is that it is an activity starting at zero.<sup>5</sup>

We often represent numbers with zero-dimensional • points on a line. It is a very common and rarely questioned visualisation to suggest that the number THREE, say, is a value/point/place/position on a number line:



It is precisely this ubiquitous visualisation which we must deconstruct. The above diagram, unless understood deeply, can be a major hindrance to mathematical understanding. Why? Because it implicitly posits THREE as a Thing. Now, I'm

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<sup>4</sup>In a certain sense, this is a tautological statement. Of course mathematicians need to understand numbers! However, it is remarkable, given how tall the Tower of Algebra is, quite how poor the average understanding is of its foundations. It's a status thing. Even though it's where all the joy is to be had, proud people don't like playing in the dirt.

<sup>5</sup>In the formal language of group theory, zero is known as the *additive identity*.



not saying the *picture* is wrong. The number 3 definitely shouldn't go elsewhere but between 2 and 4. Indeed, we will end up returning to this very picture! But we need to know what the picture *means*. It isn't the picture that's the problem, but rather our *understanding* of the picture. As ever, we must separate the symbol from the idea symbolised. Such a point • may represent the concept, yes, but it is the Short Road to Mathematical Ruin to think that such a placed point • *is* (in the hardest sense of the word *is*) the number THREE.

The number THREE is not a Thing floating around in a magical netherworld. There is, contrary to what many schizophrenic physicists think, no Platonic world of mathematical forms. No. THREE is the name of a *physical process*.<sup>6</sup> The number 3 is, at the fundamental level, something you *do*: you count “Zero, One, Two, Three”. In the axioms of arithmetic, whatever their formulation, you can't give THREE any type of self-contained existence independent of the *process* of getting to three from nothing. The very term “three” is that process. And this is true not only on the level of an old Celtic shepherd or market mathematician. Climbing to the higher storeys of the tower of abstract concept doesn't change the underlying nature of its foundations; all it does is make those foundations harder to see. In the hierarchy of sets  $\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R} \subset \mathbb{C}$ , a natural number such as 3, which is an element of each of the sets above, is, by definition, the same number wherever it appears.<sup>7</sup> It refers, whatever the context, to an *activity*.

## The Process of Number

All NUMBERS, whatever their type, are descriptors for *actions* not objects, *verbs* not nouns, *variations* rather than absolutes. What confused Diophantus was this: he assumed 3 to be categorically “realer” than  $-2$ , in terms of tangibility, because one can immediately *see* three sheep grazing, while one has to wait and *watch* a wolf enact minus two sheep. But, deep down, there is no difference. Three sheep is just as much of a *process* as minus two sheep is. The failure of thinking, which is (yet again) Western civilisation's error in microcosm, is to assume that, simply because one can sit and paint a picture of “threeness”, that this makes the concept any realer than “minus twoness”. It doesn't. *Plus three* and *minus two* are

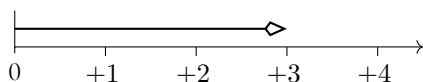
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<sup>6</sup>You might think that physicists would like the idea that numbers are physical. But no. With that idea, *all* of physics must be given physical reality, including everything that lies beyond the lab.

<sup>7</sup>These are: the natural numbers  $\mathbb{N}$ , integers  $\mathbb{Z}$  (from German *Zahl*, numeral), rationals  $\mathbb{Q}$  (from Latin *quotiens*, how many times?), reals  $\mathbb{R}$ , and complex numbers  $\mathbb{C}$ .

ideas of exactly the same category, namely counting from BASELINE, which is why the real number line  $\mathbb{R}$ , with its negative numbers the other side of zero, works.

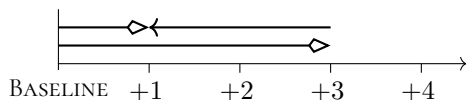
Viewing numbers now as *processes*, let us reconsider THREE. The number 3 is, in fact, more accurately represented as, at its simplest,  $+3$ . There is no three without a plus, minus, times, divide or some such. THREE should be taken to represent “Count three from nothing”, or “Take three steps from zero”, or “Move three units rightwards from zero.” Picturing this on a number line, using a  $\rightarrow$  arrow to depict the *action*  $+3$ , we have



Consider the equation  $3 + x = 1$ , with solution  $x = -2$ . The number  $-2$ , which enacts the *change* between 3 and 1, can seem, as it seemed to Diophantus, to have a rather different existence to the *locations* 3 and 1. But this is now and was then a hypostatising of the concepts THREE and ONE into the cardinal numbers 3 and 1. In fact, both of those locations on the number line are *labels* for PROCESSES, namely  $+3$  and  $+1$ . Recast the equation, then, as  $+3 + x = +1$ , with solution  $x = -2$ . This is a much truer representation of what is being described. The whole thing is an equation of changes. Written explicitly, our equation is

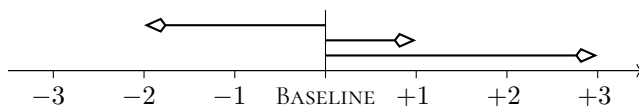
$$\text{BASELINE} + 3 + x = \text{BASELINE} + 1.$$

It is only with reference to the imperceptible that one can perceive anything. In fact, *every single equation* of mathematics comes with such a tacit BASELINE on both sides of the equals sign. And the zeroth algebraic step, which has already happened before the student even *sees* the question, is that the BASELINE has been subtracted from both sides of the equation. The true meaning of the equation  $3 + x = 1$  is: “When combined with a change from BASELINE of Three Steps Right, what subsequent change gives a total of One Step Right?” Well, Two Steps Left, obviously!

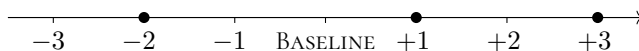


So, despite the asymmetrical notation in the equation  $3 - 2 = 1$ , in which only  $-2$  has an *explicit* sign, and despite the different *appearances* of the arrows in the

diagram above, the three PROCESSES depicted are of precisely the same category. Hence, the change  $-2$  can, and should, be represented in exactly the same way as the original processes  $+3$  and  $+1$ . Whether or not the baseline ZERO is taken to represent true *nothingness*, as in the Celtic shepherd's fell devoid of sheep, doesn't matter. That choice isn't, in the end, mathematics; it's a modelling decision, which concerns the application of mathematics to flocks of sheep and the like. The point is, all numbers, whether they are explicitly tied to a BASELINE or not, are implicitly descriptions of *change*.



And this is true whether we choose to denote our numbers with arrowheads or simply as dots:



## The Complex Plane

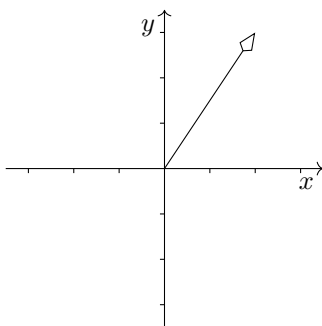
Having established a finer conception of NUMBER as description of a change from BASELINE, we will have no difficulty extending our one-dimensional number system  $\mathbb{R}$  (the integers  $\mathbb{Z}$  and all the numbers in the gaps) to a two-dimensional number system  $\mathbb{C}$ . Now that it is recognised that the true meaning of the number 3 is, in fact,  $\text{BASELINE} + 3$ , it should come as no surprise to find out that we can apply other *processes* to a BASELINE state, specifically *rotations*. Remember, there is nothing “imaginary” or “complex” about complex numbers. All real numbers, whether positive or negative, are descriptions of processes applied to a BASELINE, and the process of rotation is every bit as real as that of counting. When meeting a number off the real number line, it is a common initial reaction to ask “How can you have a number of sheep that isn't on the number line?” It's a very fair question. The answer is, “You can't!” And that's exactly the point. The new numbers of  $\mathbb{C}$ , lying off the number line  $\mathbb{R}$ , don't try to encode the process of *counting* at all. The reals do that perfectly well: the shepherd's needs were fulfilled long ago. Rather, the *new* numbers are labels for a *new* set of processes: they encode, alongside the prior ideas of addition and subtraction, multiplication and division, *ROTATIONS*

between two perpendicular directions. A moment's thought will convince you that such rotations aren't described by  $+$   $-$   $\times$   $\div$ . While familiar numbers like 3 encode counting and scaling, the new numbers encode, alongside counting and scaling, *rotation*. This makes a distinction between the axes of the complex plane. Here, I will make the distinction explicit, referring to them as the *number line*  $x$  and the *rotating axis*  $y$ .<sup>8</sup>

## Addition

Addition, being the original process of counting, must act identically in both of our perpendicular directions. Were it not to, we would end up with nonsensical statements involving two steps out and two steps back not returning us to BASELINE. The concept of *counting* itself, which must be incorporated into our new system, dictates that addition does what it has always done. So, with regard to addition and subtraction, the *number line*  $x$  and the *rotating axis*  $y$  are the same. The origin of the plane is BASELINE, i.e. no change, and additive processes are motions from there in either of two directions.

For example, the additive process represented by the point  $(2, 3)$  is



BASELINE + 2 steps in  $x$  + 3 steps in  $y$ .

A SUM of complex numbers, then, is straightforward; it is nothing more than moving around a plane. So far, I've introduced no rules that are anything other than obvious. Points in the plane add together exactly as one would expect, as simple  $\mathbb{R} \times \mathbb{R}$  vectors. With addition, things couldn't be simpler. For example, the

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<sup>8</sup>The *rotating axis* is generally known as the *imaginary axis*. But, as Gauss noted, this is unhelpful terminology, with connotations of vaguery. I avoid it here: there is nothing imaginary about rotation.

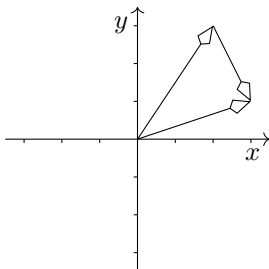
combination of the additive processes represented the points  $(2, 3)$  and  $(1, -2)$  gives an overall process:

$$\begin{aligned} & \text{BASELINE} + 2 \text{ steps in } x + 3 \text{ steps in } y \\ & \quad + 1 \text{ step in } x - 2 \text{ steps in } y \\ = & \text{BASELINE} + 3 \text{ steps in } x + 1 \text{ step in } y \end{aligned}$$

When, as it customary, the BASELINE is left out, the above sum is

$$\begin{aligned} & \cancel{\text{BASELINE}} + 2 \text{ steps in } x + 3 \text{ steps in } y \\ & \quad + 1 \text{ step in } x - 2 \text{ steps in } y \\ = & \cancel{\text{BASELINE}} + 3 \text{ steps in } x + 1 \text{ step in } y \end{aligned}$$

Then, it seems to become a statement about fixed numbers  $z \in \mathbb{C}$ , rather than a statement about physical processes. Nevertheless, behind the scenes, the sum is, in fact, referring to the simple process of counting changes from wherever one began in two perpendicular directions:



As yet, there is still full symmetry between the number line, whose coordinate is  $x$ , and the rotating axis, whose coordinate is  $y$ . But that changes when we come to the higher level concept of *multiplication*.

## Multiplication

MULTIPLICATION sits on a higher storey of the tower of process concepts than *addition*. While the process  $+5$  says “Take five steps from wherever you are”, the process  $\times 5$  says “Apply the aforementioned process five times.” Both use the counting concept FIVE, but in different ways. In addition, we are counting *steps*;

in multiplication, we are counting *applications*. Hence the temporal word “times”. Where *addition* is a first-level process, MULTIPLICATION is a second-level process of processes: a counted repetition of additions. Under the bonnet, the number process  $+3 \times 5$  means

$$\text{BASELINE } \underbrace{+3 + 3 + 3 + 3 + 3}_{\text{Addition applied five times}}$$

But the numbers on the *rotating axis y* do **not** multiply in this way. That’s because we already have, in  $\times$  multiplication by real numbers, a perfectly good encoding of “counted repetition of addition”. Addition is identical on both axes of the complex plane; so, to apply the (complex) addition “+2 steps in *y*” five times, we need only multiply the complex number “+2 steps in *y*” by the *real* number five. So, complex multiplication is something new. But that was the whole point! We want to encode, in arithmetic, the idea of ROTATION, and multiplication is where we do it. Importantly, this takes us away from the familiar idea of “times”. That is why the multiplication of two complex numbers, unless one of them happens to lie on the number line, is not generally referred to as “times”, and we don’t tend to use the symbol  $\times$  for it. Rather, we use JUXTAPOSITION, such as  $z_1 z_2$ , which is familiar from real algebra. Or, in this book, where the application of scaling and rotation needs to be made explicit, I use a custom-built spiral:

$$z_1 \odot z_2$$

“Combined scaling/rotation application of two complex numbers”

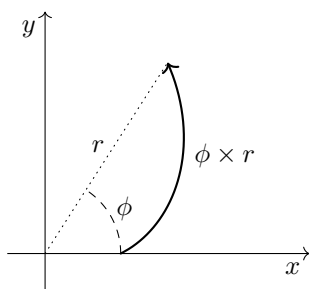
We only *refer* to the combination  $z_1 z_2$  or  $z_1 \odot z_2$  as “multiplication” because it happens to follow the same algebraic rules as multiplication, particularly in how it combines with addition in e.g.  $a \odot (b + c) = a \odot b + a \odot c$ . But, beneath the bonnet, only the combination of *scalings* has anything to do with the process of “multi-plying” or many-folding; the combination of *rotations* doesn’t. The process  $z_1 \odot z_2$  should, therefore, be thought of as a *generalisation* of multiplication.

## Combining Scale and Phase

The separated effects of scaling (*magnitude*) and rotation (*phase*) can be seen in reference to our original phase function  $\phi$ , which is a pure rotation, magnitude 1, with no sense of scaling. It is, in fact, the only phase function we *ever* need, because every complex number can, for purposes of multiplication, be split apart

into its scaling effect and its rotation effect. These are orthogonal, that is to say, at right angles to one another, acting as they do along the *radial* “away from  $O$ ” direction and the *tangential* “around  $O$ ” direction.

Again, correct conceptualisation of numbers as *processes* is crucial. We aren’t thinking of phase  $\phi$  as *being* a point on a unit circle. We have recognised that  $\phi$  is a symbol for an *activity*: ROTATION.<sup>9</sup> So, while  $\phi$  can be and is *expressed* in terms of or *represented* by points on the unit circle, it is not and its effects are not limited to points of the circle; the rotation  $\phi$  describes rotation of *an entire plane*, whichever plane one happens to be modelling.

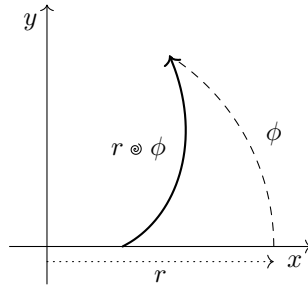


Since outputs of  $\phi$  represent “amounts of rotation”, every application of complex multiplication, viz. every scaling/rotation process, can be represented, as in the diagram above, with a single complex number  $z = \phi \times r$ , where  $\phi \in \mathbb{C}$  involves no scaling, and  $r$  involves no rotation.<sup>10</sup> For conceptualisation, an old-fashioned “times” is fine here, because  $r$  is a real number. Above, a rotation  $\phi$  [of one radian] is being enlarged by a real number. To scale, that real number is 3, i.e. “tripling”. The complex number represented above is  $z = \phi[1] \times 3$ . The pure  $\phi$  rotation, which maintains radius, is scaled up by 3, causing an outward spiral. All complex multiplication looks like this, which is why I use my  $\otimes$  notation. And the analogy between rotation and regular multiplication continues. The *order* in which the processes are applied can be reversed (commuted). Instead of  $z = \phi \times r$ , consider  $z = r \otimes \phi$ . So, rather than *rotating* first, try *scaling* first. Again, note that, while we may *represent*  $\phi[1]$  with a point on the unit circle, it is a rotation of the entire

<sup>9</sup>It is common, especially in physics, to write e.g.  $\phi[\dots]$ , when inputs aren’t relevant, as simply  $\phi$ .

<sup>10</sup>Statements in set notation like  $r \in \mathbb{R}$  are useful guides as to what kind of process a symbol represents. “ $r \in \mathbb{R}$ ” stands for “ $r$  is an Element of the set of Real numbers”. So,  $r$  contains counting and scaling information. The broader “ $z \in \mathbb{C}$ ” stands for “ $z$  is an Element of the set of Complex numbers”. So,  $z$  contains counting, scaling and rotation information.

plane, and belongs equally well at any radius.



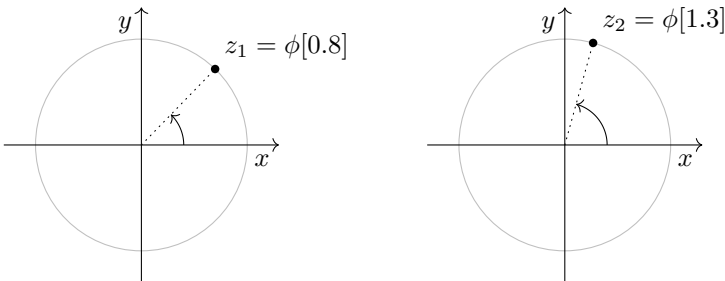
The effect is exactly the same, which is why multiplication of a real number by a complex number is commutative, viz. can be done in any order. In this example,  $\phi[1] \times 3 = 3 \otimes \phi[1]$ . This is *commutativity*, one of the rules of real multiplication.

$$z = \underbrace{\phi \times r}_{\text{rotation, scaled.}} = \underbrace{r \otimes \phi}_{\text{scaling, rotated.}}$$

Hence, we can safely switch the order of multiplication of scaling processes and rotation processes. It's conventional, then, to write the real part first, as in  $r\phi$ .

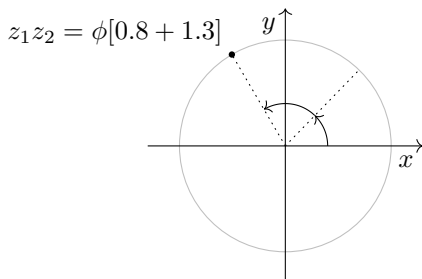
## Combining Phase and Phase

The last piece of the complex number puzzle, and the place the Unity magic happens, is the *combination of two rotations*. It's obvious how we want this to work: the combined effect of a pair of rotations needs to be... well, the combined effect of the pair of rotations! Below, two scaleless, magnitude 1 rotation processes  $z_1, z_2 \in \mathbb{C}$ ,  $|z_1| = |z_2| = 1$ , are depicted:



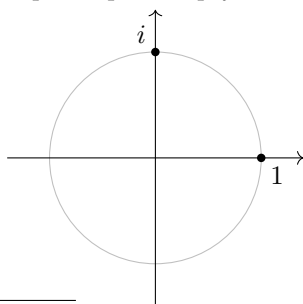


Using the language of time, these are the rotations enacted by  $\phi[t]$  in 0.8 seconds or 1.3 seconds. Obviously, the combination of the two phase rotations must give the *sum* of the two angles. So, the only complication in complex multiplication (a simplification, in fact!) is that the combination  $z_1 \otimes z_2$ , which is thought of and described as MULTIPLICATION, requires *addition* of the relevant phase angles.



## The Complex Unit

One last piece of notation remains. We come to the famous figurehead of complex numbers, the elegant and much misunderstood  $i$ . A great deal of modern mathematics, and all of quantum mechanics, is built using the complex unit  $i$ . And yet, even though pure mathematicians have grown somewhat comfortable with it, it has remained, throughout the century of quantum mechanics starting in the 1920s, a mystery what the hell  $i$  was doing in all the *physical* equations. Wondering at the appearance of the “imaginary” number  $i$  in QM has been one of the standard pastimes of philosophers of physics for the past century.<sup>11</sup>

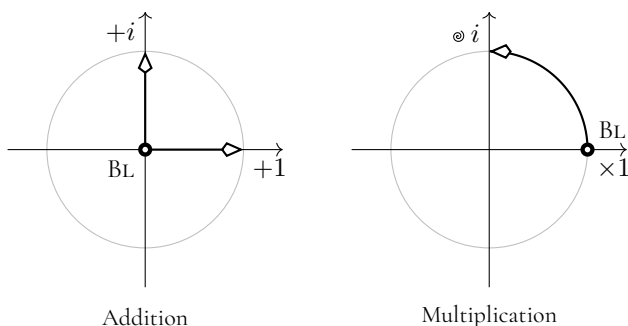



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<sup>11</sup>The majority of this speculation was, in the end, fruitless. Studying hard is worthwhile, yes, but only if one's ego permits the conclusions that the rest of one's mind is trying to draw. That's why some studying feels wonderful, and some awful. I recommend not doing the stuff that feels awful.

The confusion regarding  $i$  was, of course, paradigm-inflicted. There's nothing "imaginary" about  $i$ . Or rather, the number  $i$  is no more and no less imaginary than all the others are. Every number is a shorthand for description of a set of PROCESSES: hence,  $+1$ ,  $\times 1$ ,  $+i$  and  $\otimes i$  have exactly the same level of reality as each other. These are processes that exist as configurations in minds, and serve well as models for various processes that occur in Reality.

The notation  $i$ , introduced by the great Leonhard Euler, is excellent. It fits perfectly with the roman numeral  $i$ , for 1. The italic  $i$ , then, is used to denote processes that have certain aspects, but not all aspects, in common with those of 1. As an ADDITION,  $+i$  is a leap of exactly the same distance as  $+1$ ;  $+i$  just moves along the rotating axis, rather than along the number line as  $+1$  does. As a MULTIPLICATION,  $\otimes i$  leaves the magnitude of things unchanged, just as  $\times 1$  does. The only difference, then, is when  $i$  combines with itself, in  $i \otimes i$ . While  $1 \times 1 = 1$ ,  $i \otimes i \neq i$ : the reason for this is now clear.



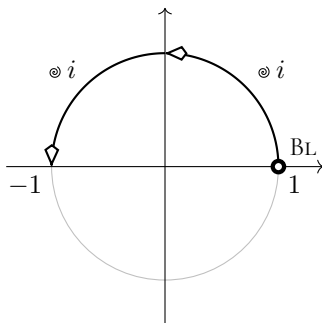
Addition and multiplication have different BASELINES,<sup>12</sup> and, as seen above, both are on the real number line. This is what generates the asymmetry of the complex plane, separating the rotating axis from the number line.  $1 \times 1 = 1$ , because  $\times 1$  is "No scaling and no rotation." However,  $i \otimes i \neq i$ , because  $\otimes i$  is "No scaling and right-angle rotation." This brings up a famous result:

$$i^2 = -1$$

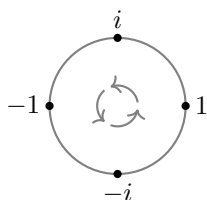
"Two right-angled rotations makes a reversal"

<sup>12</sup>In the language of mathematical GROUPS, this is equivalent to saying that the *additive identity* 0 and the *multiplicative identity* 1 are different. The asymmetry is that both lie in  $\mathbb{R}$ .

This plugs a gap discussed previously. While  $-1$ , that is to say, *negation* or *reversal*, can be thought of as a rotation by  $180^\circ$ , such a rotation cannot be enacted in the real numbers. However, it can be in the complex plane:



Continuing in the same vein,  $i \otimes i \otimes i \otimes i$  must be equivalent to no rotation at all. This is equivalent to multiplication by 1, which leaves everything unchanged. In other words, we know that



$$i^4 = 1$$

“Four  $90^\circ$  rotations make no rotation at all”

## Knowns and Unknowns in Notation

Some care is needed in notating complex numbers, particularly, as in this book, when dealing with complex-valued phase functions. In the real numbers  $\mathbb{R}$ , the distinction between *known* numbers, such as 3, and *unknown* numbers, such as  $x$ , is self-evident in conventional algebra. The fixed numbers 1, 2, 3, ... and their various combinations in fractions, decimals and so forth, are written in Arabic numerals. The numeral 3, say, has certain specific meanings, and those meanings are fixed;  $+3$ ,  $-3$ ,  $\times 3$ , and  $\div 3$  represent precisely one process each. The Latin or Greek alphabets are then used when the processes are not (yet) known. Hence, in the real numbers, when we write  $3 + x$ , the meaning is self-evident: we are adding some unknown number  $x$  to the known number 3.

But it's a bit trickier in the complex numbers. That's because, having used up all of the Arabic numerals in  $\mathbb{R}$ , the *known* complex numbers and wavefunctions end up, by necessity, looking like *unknowns*, because there is little choice but to use alphabetic characters to represent them. This prompts an assumption, reasonable on one level, that  $i$  represents less of a fixed, known process than 2 does. This is not the case, however. Both describe fixed, known processes: when multiplying,  $i$  represents rotation by  $90^\circ$ , 2 represents doubling. These have precisely the same level of "known-ness".

## An example

Consider the algebraic expression

$$2i\psi\phi[ct].$$

Similar expressions will appear throughout the algebraic work we are about to do, so I want to be very clear what the glyphs mean. There are six alphanumeric symbols: 2,  $i$ ,  $\psi$ ,  $\phi$ ,  $c$ ,  $t$ . There is considerable subtlety to the content symbolised by these glyphs, and to the relationship between that content and the languages (Arabic, Latin/Greek) in which the symbols are expressed.

- 2 This Arabic numeral represents a known scaling process, viz. *doubling*. It is conventionally fixed in its meaning. Hence, it is categorised as a specific REAL NUMBER,  $2 \in \mathbb{R}$ .
- $i$  This italicised Latin character represents a known rotation process, viz. *rotation by  $90^\circ$* . It is conventionally fixed in its meaning. Hence, it is categorised as a specific COMPLEX NUMBER,  $i \in \mathbb{C}$ .
- $\psi$  This Greek character represents an unknown rotation process. There is no indication of how it depends on any other variables, though the broad implication is that such dependence is fixed. Hence, it may be categorised as a *complex-valued variable* or, in the context of QM and Unity theory, a WAVEFUNCTION. Since  $\psi$  is complex-valued,  $\psi \in \mathbb{C}$ .
- $\phi$  This Greek character represents **the** mapping, fixed in meaning but not in output value, between angles and their rotations. Hence, it is categorised as **the** PHASE FUNCTION. Since  $\phi$  represents a mapping, rather than the output of that mapping,  $\phi \notin \mathbb{C}$ ; however,  $\phi[ct] \in \mathbb{C}$ .

- c* In physics, this Latin character represents a known scaling process, viz. multiplying by  $3 \times 10^8$ . In this book, it is fixed in its meaning. Hence, it is categorised as a specific REAL NUMBER,  $c \in \mathbb{R}$ .
- t* This Latin character represents a numerical input value. Its meaning is fixed as “the number of second steps from BASELINE time”, but that fixed *meaning* requires that it takes many different *values*. Hence, it is categorised as a REAL VARIABLE,  $t \in \mathbb{R}$ .<sup>13</sup>

## Further Clarification

- ① The distinction between  $\psi$ , a generic WAVEFUNCTION, and  $\phi[\dots]$ , the one and only PHASE FUNCTION, can be brought out by analogy with a clock. Since the phase function, when given a time input as  $\phi[t]$ , rotates every  $2\pi \approx 6.3$  seconds, the position of the second hand of a clock (ignoring the wise of rotation) can be described by

$$\psi = \phi \left[ \frac{2\pi}{60} t \right].$$

Here, the complex-valued  $\psi$  represents “a position of the second hand”, while  $\phi$  represents the *mapping* or “input-output translation” between times and positions of the second hand. The concepts represented by  $\psi$  and  $\phi$  sit on different levels. The following statement is the algebraic translation of “after 15 seconds, the second hand has rotated  $90^\circ$  from where it began.”

$$\psi = \phi \left[ \frac{2\pi}{60} \times 15 \right] = \phi \left[ \frac{\pi}{2} \right] = i$$

- ② Only the most important fixed processes get their own characters. So,  $\sqrt{2}$ , while a common number in mathematics, doesn’t get its own symbol. Nor does the number 14, which is built from the numerals 1 and 4. The same is true of the fraction  $\frac{2}{5}$ , the power of ten  $10^9$ , or the ratio between the sides of a  $(3, 4, 5)$  triangle,  $\arctan \frac{3}{4}$ . The main *mathematical* cast list of fixed processes which get their own symbolic characters is as follows:

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<sup>13</sup>The statements  $c \in \mathbb{R}$  and  $x \in \mathbb{R}$  do not distinguish between constants and variables, knowns and unknowns. The descriptor  $\in \mathbb{R}$  speaks only of the *type of process* being described, i.e. whether it contains rotation information, not whether it is constant/variable, nor whether it is known/unknown.

Symbol	Processes
0	Additive BASELINE, multiplicative annihilator
1	Additive unit, multiplicative BASELINE
2	Repetition
3	Successive repetition
4, ..., 9	Successive repetitions
$\pi$	Scaling from diameter to circumference
$e$	Scaling base of the natural exponential and logarithm
$i$	Rotation by a right-angle

The complex unit  $i$  is the only member of the list without a place on the number line. The other alphabetic characters  $\pi$  and  $e$  are housed there:  $\pi$  at around 3.14159 and  $e$  at around 2.78182. But don't let that fool you! All of the above represent fixed physical processes whose natures are well understood. Hence, all have precisely *the same* level of conceptual reality.<sup>14</sup>

## The Hellenic Logos

It's no coincidence that the history of "real" numbers is closely analogous to the history of the "real" world, as assumed by (stereotyping somewhat, but not that much) the average physicist. They are, *mutatis mutandis*, the same story. To close this chapter, somewhat at a tangent but of significant relevance to the overall thrust of the book and to the living of Life, I'll run through that story, which begins with the ancient Greeks, with reference to

- ① naive reification of  $\mathbb{R}$ ,
- ② naive reification of the world,
- ③ naive reification of the ego.

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<sup>14</sup>Incidentally, the three alphabetic characters in the mathematical list are all due, to some degree, to Euler. The letters  $e$  and  $i$  were both choices of Euler's, and, although the notation  $\pi$  wasn't his invention, it was he who cemented its use, at the expense of various competing notations, in 18th century Europe. In physics, of course, many experimentally determined constants also get their own alphabetic characters, the main ones being the speed of light  $c$ , the elementary charge  $e$ , the Planck constant  $h$ , the fine-structure constant  $\alpha$  and the gravitational constants  $g$  and  $G$ .

The first is, in the long run, of minor importance. However, it stems from the same source as and may be viewed as closely analogous to the other two, both of which are of profound importance for the living of a genuine Life. Hence, it is worth studying it with care, in order to conceptualise and understand logically the terrible danger inherent in conceptualisation and logical understanding.<sup>15</sup>

Here goes.

Every historical people has sought to control the world around it, whether it be with fire, animal-traps or the building of temples. What the ancient Greeks discovered is that they could conceptualise e.g. the building of a temple into a set of concepts *independent of* the actual building of a temple. Someone could technically be given all the skills they needed to build a temple, without ever having seen one being built; nay, the builder-by-concept doesn't even need to have *seen* a temple before! It's hard for us to understand quite how gigantic a step this was, now that we take it for granted. It was the most powerful and, in the same breath, most *dangerous* invention in the history of the human mind.

The Hellenic LOGOS, literally "word", is the very concept of "concept". Even in that last sentence, you can see, I am steeped in this tradition, as we all are. This entire theory is an attempt to convey a conceptual structure: Oneness. Every *ology* is such an attempt: X-ology is the LOGOS of X, i.e. the set of abstract concepts which allow you to think about X without actually having to have X on the table in front of you. Mathematics, and virtually all of Western philosophy, is *logical*, and when something is "logical", it pertains to a *logos*, that is to say, it pertains to an abstract set of concepts, existent in the psyche as ideas and in the brain as configurations of neural pathways, tools for thinking about this or that problem.

It is no exaggeration to say that the Hellenic LOGOS, the basis of Western civilisation, is now the basis of *world* civilisation, that same pattern of thinking having spread from ancient Greece to ancient Rome to pre-modern Europe to the empires of Europe and so to every corner of the modern globe. That's not to say that everyone thinks in the same way, of course—Chinese thought, for instance, where it has been untouched by Western ways, has none of this—nevertheless, the governments and cosmopolitan elites of every country and company in the world

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<sup>15</sup>This can sound paradoxical. And in some ways that's correct. But not all ways. The point is, we **do** conceptualise and we **are** logical; that cannot be undone. In the Garden of Eden, we ate of the Forbidden Tree. And, as in the Bible, there is an angel with a flaming sword guarding the gate; we cannot go back the way we came. The only way out is *through*. We are partially conscious, which can feel like agony. But the non-consciousness of the young child or the drunk is not an option. The only way out is *full* consciousness, also known as enlightenment, making one's peace with God.

now have this tool at their fingertips, and it is, increasingly, deeply embedded. Just think of the airports of the world: you cannot run an airline without an airline-ology, i.e. a set of abstract concepts {plane, airport, passenger, ...}.

The LOGOS is everywhere.

Prior to this psychic revolution, consciousness was undoubtedly a different thing. That's because one's own self-image is, by definition, an abstract concept, a *logos*. Without a concept of oneself, one's consciousness is, in Jungian language, *undifferentiated*, i.e. none of the mind is aware of any of the rest of it. The mind has not formed a concept of itself. We may assume that the minds of animals, while they undoubtedly house *thoughts*, viz. patterns of neural activity, are yet in this state. But the coming of the *logos* heralded a new dawn: once a person can hold an abstract concept such as "the building of a temple" in their mind, they are bound, in the same breath, to conceptualise *their own mind*. Psychologically, this is the *ego*, which is the mind's concept of itself, the idea "I".

The problem, of course, is that, just as the mind's concept of reality, prior to any correction by e.g. Platonism or Unity theory, is not Reality, the mind's concept of itself, prior to any correction by e.g. religion or Jungian psychology, is not the Mind. If you are young and willing to live with courage, I cannot impress upon you firmly enough the importance of recognising that your concept "I" does not encapsulate the totality of your personality. It is the recognition of this fact that will allow and encourage you to listen to the deeper parts of yourself, those parts which have not yet made it into the concept "I"; by accepting that these parts exist, which certainly requires courage but is eminently doable, you broaden the concept "I". The goal, then, is to broaden the concept "I" until it encompasses the entire personality. The instruction at Delphi was "Know thyself."

And the conclusion of this lengthy process, broadening one's self-concept so that it exclude no part of the Self, is somewhat surprising. In its growing, the sense of "I" so beloved of the egotist then seems to *diminish* in importance. Rather than keeping one's mind out in front like a fragile china figurine, which must then be guarded jealously against the slings and arrows of outrageous fortune, one *becomes* the Mind once again, returning to a state of fully conscious, highly capable, entirely grown-up, yet also childlike bliss. It takes work—Christ, does it!—but I recommend it heartily.<sup>16</sup>

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<sup>16</sup>Jung, the greatest Western psychologist, did almighty work on this process, which he called (in his building of a LOGOS for the psyche) *Individuation*. If there is one figure I recommend, it is him. Do not expect to read him easily, however; his work is famously difficult to decipher, and gets incredibly abstruse once you delve, with him, into alchemy. However, in his autobiography *Memories, Dreams,*



As I said at the beginning of this book, with reference to FILTERS, MODELS and PARADIGMS, trouble comes when there is no appreciation that one's concept of  $X$  is not  $X$ . This is the fundamental problem of the post-Hellenic mind: the reification, in the sense not just of *concretisation* but also of *over-valuation*, of the LOGOS, the abstract concept in the mind. This is the price that we have all paid for that most excellent skill: *reason*.

- ① In mathematics, the *real numbers*  $\mathbb{R}$ , which are a set of abstract concepts describing physical processes, have been given full reality. They have been reified as having a tangible existence of their own. Folk think that 2, which sits on the number line, is realer than  $i$ , which doesn't.
- ② In physical science, *space*  $(x, y, z)$ , which is an abstract concept modelling the domain of the variation-data that produces the world-image, has been given full reality. It has been taken as being exactly what is "real". Physicists say that an electron, which sits in space, is realer than the substrate waves of Unity theory, which don't.
- ③ In our civilisation, the conscious sense of self, or ego, which is the psyche's abstract concept of itself, has been given full reality. Life has, for a great many, become an exercise in trying to enact what the ego wants. People assume that their conscious mind is realer than the unconscious parts of their personality.

I'm writing this section, one of the later edits of this book, not because I am anti-reason, as some might claim, but precisely because I respect the raw *power* of the LOGOS. I am certainly a logician (modern wizard), and proud to be one. The Greeks weren't fools to think their invention extraordinary, nor was the rest of the ancient world around what the Greeks called *ἡμετερα θάλασσα*, "Our Sea", foolish to take up the baton. Reason is who we are. That's why Classics has always been taught; the ancient Greeks invented our very *minds*. I write because, while I believe the abstract concept to be the human tool *par excellence*, I am aware of the devastating effect that it has on *happiness*. I use the word "happiness" here, as opposed to the more modern "wellbeing" or similar, because "happiness" is *happen-ness*, that is to say, being **in** what happens. When a child is absorbed in

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*Reflections*, his layperson's introduction *Man and his Symbols*, and his essay on the state of Western civilisation *The Undiscovered Self*, there are ways in. You will not be sorry if you study Jung. As he said, however, Individuation cannot be achieved simply by book-learning. There is much *doing* to be done.

building a structure out of blocks, he or she is *happy*. There is, more than likely, no smile involved: for a child, building things out of blocks is a serious business! The phrase “happy in her/his work” is the same. Likewise, when someone is “in amongst it” or “experiencing flow” or however you put it, she is not comparing what she is doing to a concept of what she is doing: she is playing with blocks, rather than doing block-ology. The point is this: a person is happy *precisely* when he or she is **not** conceptualising what he or she is doing. Happiness is having the commentator hush.

- ① If the *number line*  $\mathbb{R}$  is taken to be the definition of the number, then the COMPLEX NUMBERS  $\mathbb{C}$  can't be real. Once one reifies  $\mathbb{R}$ , thinking that its easy (formed early in life) quantities aren't in fact concepts but rather *hard things out there*, everything that is not on the number line is forced to be “imaginary”. A mental split is introduced.
- ② If *space*  $(x, y, z)$  is taken to be the definition of reality, then imperceptible aspects of the UNIVERSE can't be real. Once one reifies space, thinking that its easy (formed early in life) objects aren't in fact concepts but rather *hard things out there*, everything that is not housed in space is forced to be “immaterial”. A mental split is introduced.
- ③ If *ego* is taken, by the mind holding the concept, to define the personality, then the unconscious aspects of personality can't be real. Once one reifies the conscious mind, thinking that its easy (formed early in life) self-notion isn't a concept but rather a *hard thing in there*, all aspects of the psyche not already in the ego are forced into the shadows. A mental split is introduced.

There is no way to unpick one's concepts. And you shouldn't try. Any attempt to reverse more than two thousand years of history is a fool's errand. Just as I am, you are a child of reason, and that's that. However, I do not, in the face of this heavy fact, recommend defeatism. I recommend precisely the opposite. The lazy despair into which the Western world has been sinking and continues to sink is counterproductive and stupid. Simply, it doesn't work. People unwilling to hope, unwilling to believe in anything, unwilling to believe in *themselves* end up as stunted gremlins. But here is where the hope lies. What so many people do not realise, indeed, what it is quite likely that you yourself do not yet realise, is that your *ego*, which is your mind's rational concept of itself, is utterly shit at hope. It doesn't know how. It was built to transfer knowledge about how to build temples

and empires, not how to love one's inner self. Simply, your mind is very clever, thanks to the Greeks, and it is divided in two, thanks to the Greeks, and it is also prone to sinking into despair, thanks to the Greeks. Fortunately—here's the good news!—the cleverness is a boon you can keep, even when you do away with the negatives. And, haha, those negatives rest on only two thousand years of culture.

A mere nothing! The blink of an eye!

You *also* have, beneath the rational concepts, beneath all the Western rules and regulations, beneath all the -ologies and -isms, *billions of years* of successful navigation of the world under your belt. You'll be astonished to find out what you can do once you start outgrowing your ego. You'll become a legend, a Queen, a hero, a princess, a wizard, an all-round badass. It turns out that, if you listen carefully and openly to the deep parts of yourself, they know *exactly* what to do. Those strange senses of "Well, I can't for the life of me see why, but X seems right" are exactly messages from your deeper self. Listen to them. They won't speak to you in English, but they will speak. And, years later, when your life is lived happily, filled with deep and ancient power, you will look back on those bizarre activities, which seemed to make no sense whatsoever, and realise that they were exactly training for Life, a Life you didn't know you were capable of.

# 9

## DIFFERENTIATION

Most of the machinery of modern language is labour-saving machinery; and it saves mental labour much more than it ought. Scientific phrases are used like ... piston-rods to make swifter and smoother the path of the comfortable.

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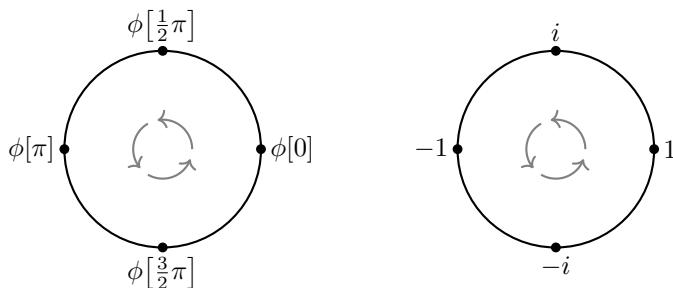
*G.K.Chesterton*

This short chapter is concerned with answering the question “What is the rate of change of the phase function?” or, equivalently, “How do we differentiate  $\phi$ ?” This question has a simple answer, which is taught at school level. But, as Chesterton warned, just because a question has a simple answer does not imply that *understanding* said answer is simple. Very often, it is the most apparently “self-evident” fact that requires the most thorough analysis. This is certainly the case with complex numbers, fine appreciation of which is crucial for understanding QM. Our first task is to pick apart and understand deeply the following rate-of-change statement:

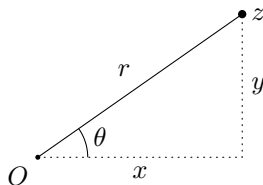
$$\frac{d}{dt} \phi[t] = i\phi[t]$$

# Standard Representations

When applied multiplicatively, our phase function  $\circledast \phi[t]$ , defined with a time input, is rotation at an angular speed of one revolution every  $2\pi$  seconds. This, in the language of the complex plane  $\mathbb{C}$ , is encoded in terms of complex numbers of magnitude 1, living on the unit circle. Below, the key locations in the complex plane are shown, representing either unit steps in  $\pm x, \pm y$ , in the case of additive application, or rotations by  $0^\circ, 90^\circ, 180^\circ, 270^\circ$ , in the case of multiplicative application. The four key complex numbers are shown in  $\mathbb{C}$ , both in the language of the generic rotation function  $\phi$  and the specific rotation  $i$ :



All of our processes are now represented by  $(x, y)$  points on a plane. With  $i$  as the complex unit on the  $y$  axis, every complex number can be expressed, therefore, either in Cartesian  $(x, y)$  coordinates as an ADDITION  $x + iy$ , or in polar  $(r, \theta)$  coordinates as a MULTIPLICATION  $r\phi[\theta]$ :



Note that, although the diagram above is of  $\mathbb{C}$ , the variables  $x, y, r, \theta$  are all real. The variable  $\theta$  represents a counting value, such as the time (in seconds) or angle (in radians), which then produces a complex rotation by insertion into  $\phi$ , as  $\phi[\theta]$ . Likewise, in additive terms,  $y$  represents a counting value, which is turned into a translation perpendicular to  $\mathbb{R}$  through multiplication by  $i$ .

- ① In ADDITION,  $z = x + iy \in \mathbb{C}$  represents the *translation* from the origin to  $z$ . The addition  $+z$ , where  $z$  is located at point  $(x, y)$ , gives translation by  $x$  units horizontally and  $y$  units vertically. The coordinate system  $(x, y)$  is *Cartesian*, as invented by Descartes; it's the most efficient way of encoding translation.
- ② In MULTIPLICATION,  $z = r\phi[\theta] \in \mathbb{C}$  represents an *enlargement* and *rotation*. The multiplication  $\otimes z$ , where  $z$  is located at point  $(r, \theta)$ , gives scaling by  $r$  and rotation by angle  $\theta$ . The coordinate system  $(r, \theta)$  is *polar*, also known as “modulus-argument form”; it's the most efficient way of encoding scaling and rotation.

## Differentiating the Phase Function

The question “What is the rate of change of the phase function?” is now equivalent to “At what *velocity*, i.e. at what speed and in what direction does the point  $z = \phi[t]$  move through the complex plane  $\mathbb{C}$  as time progresses?” Asked approximately in terms of finite, measurable changes, this is “At what rate do changes in position  $\Delta z$  occur during time periods  $\Delta t$ ?” This last statement is rendered exact, then, by letting the finite time periods  $\Delta t$  get vanishingly small  $\Delta t \rightarrow 0$ , and asking what happens to the ratio between the vanishingly small quantities. “Taking the limit”,<sup>1</sup> as it is known, we get a *ratio of infinitesimals*:

$$\lim_{\Delta t \rightarrow 0} \frac{\Delta z}{\Delta t} = \frac{dz}{dt}.$$

The above can be restated in *operator language*, in which we split apart the process of differentiation  $\frac{d}{dt}$  from the thing  $z$  which is being differentiated. This gives three equivalent descriptions for the rate of change of the phase function  $z = \phi[t]$  with respect to  $t$ :

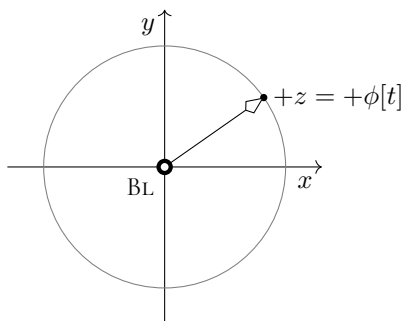
$$\frac{dz}{dt} = \frac{d}{dt} z = \frac{d}{dt} \phi[t].$$

Even more explicitly, since we are analysing the rate of change of the *position*  $z$ , we are, for current purposes, considering  $z$  as an addition  $+z$ , that is to say, as a translation from the origin. While the overall motion of  $z = \phi[t]$  is a rotation,

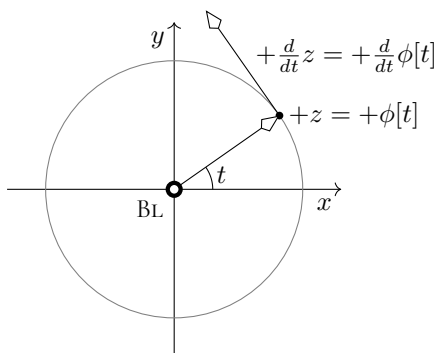
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<sup>1</sup>A limit  $\lim_{a \rightarrow 0}$  is “The value *approached* as  $a$  heads for zero”, not, as is commonly misconceived, “The value you *get* when  $a$  becomes zero.” Often, the latter sentence has no meaning.

any particular value of  $z$ , such as  $1$  or  $i$ , can be thought of here as a position vector, or a movement from BASELINE, or a translation arrow:

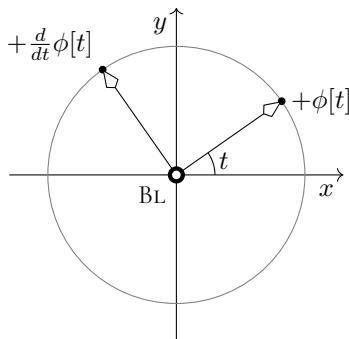


We can draw the velocity (rate of change of  $z$  position) explicitly, because we know its *speed*, which is 1 unit per second by definition, and we know its *direction*, which must be tangential to the circle at  $z$ :



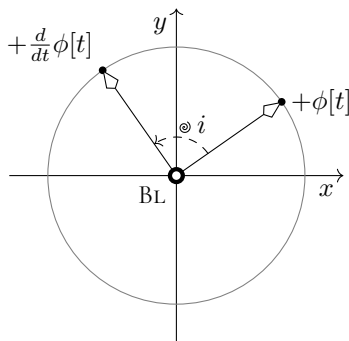
We now proceed as in our work on the negative numbers. On the number line  $\mathbb{R}$ , the difference  $+1 - 3$  is taken to be a number in its own right, namely  $-2$ . This number can be thought of either as the translation from  $+3$  to  $+1$ , or the translation between  $0$  and  $-2$ . There is no difference between the two concepts, because every number is a *process*. In this case, the process is “Take two steps to the left.” This process is identical whether one considers the process beginning at  $3$  or  $0$ . In other words, as we explored in detail, (additive) BASELINE is represented at  $0$ , so every additive number process, whatever its source, should be represented as an arrow emerging from  $0$ . Hence, the next stage is to take our *rate of change* process, which is a depiction of the velocity of the point  $z$ , and to

turn it into a *complex number*  $\mathbb{C}$ , that is to say, have it represented as a translation from BASELINE at the origin to a location in the plane. This is how the original  $z \in \mathbb{C}$  can produce a rate of change  $\frac{dz}{dt} \in \mathbb{C}$ . Now as *two* actions on BASELINE, we have



The last piece of the puzzle, then, is to consider the *relationship* between the two complex numbers  $z$  and  $\frac{dz}{dt}$ . In other words, not “What does each arrow do?”, but “How do we *convert* the arrow representing  $z$  into the arrow representing  $\frac{dz}{dt}$ ”? This conversion is the higher-level operation of DIFFERENTIATION, which maps a process onto its own rate of change.

This is where we see the boon of  $\mathbb{C}$ , with its innate encoding of rotations. We are working with *translations*, i.e. ADDITION of complex numbers, but, with regard to phase rotations, the *relationship* between a translation and its rate of change is a *rotation*. This is described by MULTIPLICATION of complex numbers. And the particular rotation is the most elementary one: circle geometry (the fact that the tangent is perpendicular to the radius), along with our sensible choice of input units (radians/units of arc), dictates that the relevant rotation is multiplication by the complex unit:  $\odot i$ .





So, the effect of differentiating  $\phi$  is to rotate it by  $\odot i$ :

$$\frac{d}{dt}\phi[t] = \phi[t] \odot i.$$

This is put more succinctly with simple Juxtaposition. Leaving out the spiral and reversing the order, as will be useful later on, we have:

$$\frac{d}{dt}\phi[t] = i\phi[t].$$

In its most succinct and final form, then, we leave out the input trays and express the derivative with generic function notation  $\phi'$ , which means “the rate of change of the function  $\phi$  with respect to its input variable, whatever that input variable may be”:

$$\phi' = i\phi.$$

## Rules of Calculus

In this section, I’ll explain a couple of elementary rules of calculus, which describe the ways in which rates of change *combine*. These are the CHAIN RULE, which governs functions *chained* together as  $* \xrightarrow{a_1} * \xrightarrow{a_2} *$ , and the PRODUCT RULE, which governs functions multiplied as *products*  $f_1 \times f_2$  or  $\psi_1 \odot \psi_2$ . We need both rules to make any sense of the Schrödinger equation: here, I’ll derive them explicitly for purpose, in the context of complex-valued phase functions.

### The Chain Rule

The chain rule is simple when said in words, but, as always in algebra, looks a little more complicated when made precise. It is a crucial tool in all of calculus. It describes the manner in which rates of change combine when two functions are enacted *one after the other*, i.e. when an INPUT is put into one function to produce a THROUGHPUT, then that THROUGHPUT is put into a subsequent function to produce an OUTPUT:

$$\text{INPUT} \xrightarrow{f_1} \text{THROUGHPUT} \xrightarrow{f_2} \text{OUTPUT}$$

Using an input variable  $x$ , the above is notated as follows. Note that the resulting expression  $f_2[f_1[x]]$  means that  $f_1$  is applied first:

$$x \xrightarrow{f_1} f_1[x] \xrightarrow{f_2} f_2[f_1[x]]$$

The functions  $f_1$  and  $f_2$  have *rates of change*  $f'_1$  or  $f'_2$  associated with them, and it is DIFFERENTIATION that finds this rate of change. The way the rates combine when differentiating daisy-chained functions couldn't be simpler. When the combined process “ $f_1$  followed by  $f_2$ ” is applied, whatever rate of change  $f'_1$  you get from  $f_1$  is then throughput into  $f_2$ . The rate of change  $f'_2$  then has its say. And, since  $f'_1$  dictates the rate of change of *throughput*, whatever rates of change are encoded in  $f'_2$  are automatically pre-scaled by  $f'_1$ . Hence, the two rates of change multiply. That's all the CHAIN RULE is: a multiplication of scale factors. An example will bring out the idea, before we then formalise it. Consider two scaling functions:  $f_1[x] = 3x$  and  $f_2[x] = 5x$ . These are the tripling and quintupling processes, also known as  $\times 3$  and  $\times 5$ :

$$\text{INPUT} \xrightarrow{\times 3} \text{THROUGHPUT} \xrightarrow{\times 5} \text{OUTPUT}$$

The CHAIN RULE simply states that multiplying by 3 and then 5 is equivalent to multiplying by 15. The individual rates of change of the functions are  $f'_1 = 3$  and  $f'_2 = 5$ , and the overall rate of change is then given by the product of these:  $f'_1 \times f'_2$ . The chain rule is nothing more than a multiplication of scale factors. It is simple. Things becomes slightly less transparent when written in practical algebra, but the overall idea remains the same. For algebraic expression, there is one more consideration. Where the functions are not merely scalings, there are *two* effects involving  $f_2$ . Alongside its rate-of-change function  $f'_2$ , we must also encode the fact that the inputs of  $f_2$  are *throughputs*, hence so must the inputs of  $f'_2$  be. So, while the first scale factor is simply  $f'_1[x]$ , the second scale factor is  $f'_2[f_1[x]]$ . While this may look a little more complicated, there is no asymmetry. Each function is differentiated with respect to its inputs:  $f_1$  with respect to INPUT  $x$ ,  $f_2$  with respect to THROUGHPUT  $f_1[x]$ .

The full form of the chain rule, then, is

$$\frac{d}{dx} f_2[f_1[x]] = f'_1[x] \times f'_2[f_1[x]].$$

## The Chain Rule in Phase Rotation

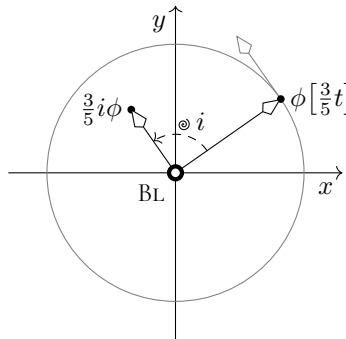
Let's see how this works in the context of the phase function  $\phi$ , which is where we are going to need it. We have already established that  $\phi' = i\phi$ , i.e. that the velocity of a point rotating at unit speed around the unit circle is the original position vector rotated by  $90^\circ$ . We now need to investigate the differentiation of functions such as  $\phi \left[ \frac{3}{5}t \right]$ . Broken apart, this function is

$$t \mapsto \frac{3}{5}t \mapsto \phi \left[ \frac{3}{5}t \right].$$

The time input is scaled by  $\frac{3}{5}$ , then that throughput is fed into the phase function. The chain rule tells us that, to find the overall rate of change, we differentiate each function and, taking care to maintain the correct throughput, multiply the rates:

$$\frac{d}{dt} \phi \left[ \frac{3}{5}t \right] = \frac{3}{5} \times i\phi \left[ \frac{3}{5}t \right].$$

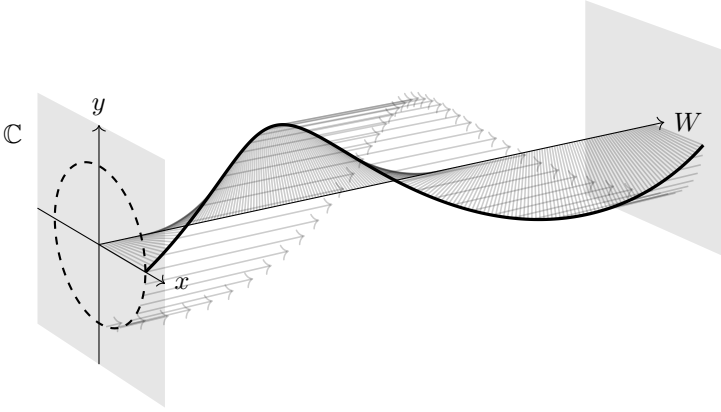
To visualise this, picture the rotation. Scaling  $t$  by  $\frac{3}{5}$  has the effect of slowing the rotation to 60% of its original version. What does this do to the velocity of a point on the unit circle? Well, the rotation still goes in the same direction, perpendicular to its position vector, so the same complex rotation  $i$  is produced, but the *speed* has been reduced. So, the velocity arrow is rotated by  $i$ , exactly as before, but it is now shorter, by a factor of  $\frac{3}{5}$ .



The above calculation, in which, when differentiating  $\phi[kt]$ , factors of  $k$  (speed) and  $i$  (direction) appear in front of the phase function, is ubiquitous in QM and Unity theory. Understanding it is key. So much so, it's worth seeing another example, in which more than one input variable is involved. The procedure is the same, but the algebra looks more complicated.

## Differentiating a Wavefunction

Consider a helical wave  $\phi[\mu(W - ct)]$ , as discussed earlier. The complex plane of outputs represents the plane of polarisation of such a helix. So, our earlier generic  $p_1$  and  $p_2$  axes of polarisation can be replaced with the number line  $x$  and rotating axis  $y$  of the complex plane  $\mathbb{C}$ . In the substrate, the polarisation plane is two arbitrary and symmetrical<sup>2</sup> dimensions of space. The sense of handedness is left-handed in this picture, as the positive sense of rotation in  $\mathbb{C}$  is *anticlockwise*.



Helical wave  $\phi[\mu(W - ct)]$  with polarisation in  $\mathbb{C}$ .

Because this wave has two input variables  $W$  and  $t$ , we must use *partial derivatives*  $\partial$ . Firstly, the  $W$  derivative. We fix  $t$ , which is equivalent to taking the snapshot above. Algebraically, since  $W$  is scaled to  $\mu W$  in the throughput, we get factors of  $i$  for the *direction* and  $\mu$  for the *speed*:

$$\frac{\partial}{\partial W} \phi[\mu(W - ct)] = \mu i \phi[\mu(W - ct)].$$

Explicitly notating the processes:

$$+ \frac{\partial}{\partial W} \phi[\mu(W - ct)] = +\mu \times i \odot \phi[\mu(W - ct)].$$

---

<sup>2</sup>The asymmetry of the  $x$  and  $y$  dimensions is a feature only of the *mathematics* of  $\mathbb{C}$ , not of the *physics* of the spatial substrate planes we are describing with  $\mathbb{C}$ . In fact, when generalising to the Dirac equation and quantum spin, the axes of  $\mathbb{C}$  are not the two axes of the relevant substrate plane. Instead,  $x$  is “non-rotation” and  $y$  is “rotation around the axis modelled with  $y$ ”. This is not a straightforward point to get one’s head around, but important for any understanding of spin.

Finding the  $W$  derivative is equivalent to running one's finger rightwards along the  $W$  axis of the above time snapshot, and clocking the rotations that occur as you do so.

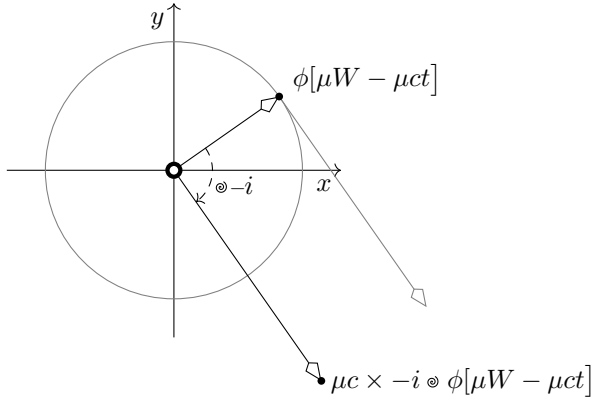
Next, the  $t$  derivative. To calculate this, we first multiply out the input tray. This is  $[\mu(W - ct)] = [\mu W - \mu ct]$ . So, since the time input  $t$  is scaled by  $-\mu c$ , that same factor scales the speed. And the “tangent perpendicular to radius” idea is, as before, encoded in the complex unit  $i$ . Hence, the derivative is

$$\frac{\partial}{\partial t} \phi[\mu W - \mu ct] = -\mu ci \phi[\mu W - \mu ct].$$

Showing the processes, and bringing the negative sign into the rotation:

$$+\frac{\partial}{\partial t} \phi[\mu W - \mu ct] = +\mu c \times -i \otimes \phi[\mu W - \mu ct].$$

Visually, then, the partial-derivative fixing of  $W$  as constant (signified by the presence of  $\partial$  as opposed to  $d$ ), is equivalent to taking a *cross-section* of the wave at a specific (albeit unknown) value of  $W$ . In other words, fixing  $W$  means looking at a specific (albeit unknown) polarisation plane. We can draw this flat on the paper. Depicting the value of  $\mu c$  as 2, which is far from scale,<sup>3</sup> we have



It's worth taking sufficient time, switching between this picture and the previous one, to become very clear about the fact that, if the helix moves *forwards* in  $W$ , then a *negative* i.e. clockwise rotation occurs for any given cross-section in  $W$ .

---

<sup>3</sup>For a matter wave which generates an electron-image, the numerical value of  $\mu c$ , as determined by experiment, is actually  $1.2367 \times 10^{20}$ . As ever, this won't fit on the page!

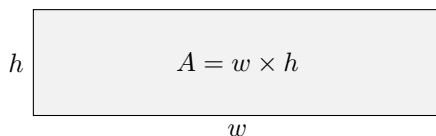
## The Product Rule

The PRODUCT RULE is just as simple. However, in exactly the same way, its simplicity gets hidden once one starts working in abstract algebra. This is exactly how mathematics is hard, and exactly why it is worthwhile. It's *training for life*.<sup>4</sup> In mathematics, as just about everywhere, the trick is working out how, when dealing with complexity, not to lose sight of the underlying simplicity. In the end, life is a simple thing: follow your heart; the rest is just noise. And so it is with mathematical rules. When explained in isolation, they are obvious, almost facile. But do not be fooled into thinking "I am an intelligent person; simple mathematics is beneath me." Only the very best mathematicians can understand the depth of meaning in a statement like  $2 + 2 = 4$ . Fools say "Well, it's obvious", because they are fools. As Laozi said:

*"Understand the ordinary; mind opens.  
Fail to understand the ordinary; blindness creates evil."*

## Real-Valued Functions

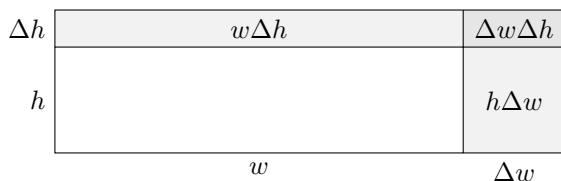
The PRODUCT RULE, when applied to real functions, can be seen easily in terms of *areas*, which are products of lengths. I'll derive it in that context, then see how the idea generalises to the  $\otimes$  "multiplication" of phase functions. We want to differentiate products of functions  $f[t] \times g[t]$ . Any such product of real-valued functions can be thought of as an *area function*  $A[t]$  for a rectangle. Defining width  $w$  and height  $h$ , we have a flexible rectangle, whose dimensions change over time. Since everything depends on  $t$ , we can leave  $[t]$  dependence implicit. This gives


$$\begin{array}{c} h \\ \boxed{A = w \times h} \\ w \end{array}$$

---

<sup>4</sup>Incidentally, while I'm on the topic of training for life, let me give you a hard Commandment: IGNORE THE ADVERTS. One should never, *ever* under any circumstances whatsoever, watch or look at ads without seeing their appearance as an opportunity to train oneself in the ignoring and ridiculing of ads. They are lies by assholes. If there is one piece of practical advice which I reckon would have been on Moses's tablet had he been alive today, it is **Do Not Be A Consumerist Sucker**. One who watches adverts lazily, regarding them as anything less than an attempt at theft, is buggered.

Now, picture a (small) time interval  $\Delta t$ , during which (small) changes in width and height  $\Delta w$  and  $\Delta h$  occur.



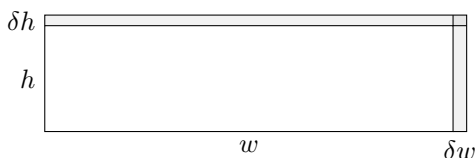
The area has changed by an amount  $\Delta A$ , shaded, and the three rectangles which make up this overall change  $\Delta A$  have areas as shown. Algebraically, this is

$$\Delta A = h\Delta w + w\Delta h + \Delta w\Delta h.$$

We then divide the entire equation by  $\Delta t$ , to form an equation in *rates* of change rather than absolute changes. This gives

$$\frac{\Delta A}{\Delta t} = \frac{\Delta w}{\Delta t}h + w\frac{\Delta h}{\Delta t} + \frac{\Delta w\Delta h}{\Delta t}.$$

We now let the time interval get vanishingly short. This turns all three of the  $\Delta$ \* amounts into *d\* infinitesimals*. Visually (still shown with a “finite but small”  $\delta$ \*, but heading for vanishing  $d$ \*), this gives:



All three rectangles head for zero size, but the top-right one heads for zero size *twice over*, because *both* of its dimensions are scaled down with time, rather than just one. Hence, it vanishes completely compared to everything else. We are left with the PRODUCT RULE:

$$\frac{dA}{dt} = \frac{dw}{dt}h + w\frac{dh}{dt}.$$

We can restate it in terms of functions:

$$\frac{d}{dt}(f[t] \times g[t]) = f'[t] \times g[t] + f[t] \times g'[t],$$

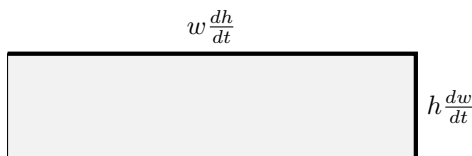
or, rather more succinctly,

$$(f \times g)' = f' \times g + f \times g',$$

or, even more succinctly,

$$(fg)' = f'g + fg'.$$

Visually, then, once we have taken the infinitesimal limit, i.e. now considering an *instantaneous* rate of change, the PRODUCT RULE is simply a summary of the fact that, if a rectangle changes dimensions, new area is generated in two ways, one proportional to the height and one proportional to the width, which add:



A simple practical example would be an *energy bill*, total amount  $B$  pounds, which depends on *usage*  $U$  and *cost*  $C$  of electricity:

$$B = U \times C.$$

The rate at which bills increase is  $\frac{dB}{dt}$ . It has two elements:

- ① If *usage*  $U$  increases, then that rate of increase  $U'$  is scaled up by the *cost*  $C$ , to give  $U' \times C$ .
- ② If the *cost*  $C$  increases, then that rate of increase  $C'$  is scaled up by the *usage*  $U$ , to give  $U \times C'$ .

The total rate of increase  $\frac{dB}{dt}$  is the sum of these:

$$\frac{dB}{dt} = \underbrace{\frac{dU}{dt} \times C}_{\text{due to } \nearrow \text{ usage}} + \underbrace{U \times \frac{dC}{dt}}_{\text{due to } \nearrow \text{ cost}}$$



## Complex-Valued Functions

The PRODUCT RULE carries over to complex-valued functions, which is why we call  $\psi_1 \otimes \psi_2$  “multiplication”. It is called so because all of the rules which apply to regular  $\times$  multiplication of two counting numbers apply to  $\otimes$  “multiplication” of two rotations of the plane. Here, I’ll run the argument with reference to a pair of phase functions, so as to gain a feel for the way the thing works in that context. Consider a pair of phase functions  $\psi_1 = \phi[\omega_1 t]$  and  $\psi_2 = \phi[\omega_2 t]$ . Acting on the unit circle, these describe rotations at angular speeds<sup>5</sup>  $\omega_1$  and  $\omega_2$  units per second respectively. Defining their product as capital  $\Psi$ , we have

$$\Psi = \psi_1 \psi_2 = \phi[\omega_1 t] \otimes \phi[\omega_2 t].$$

This is the collective effect of both rotations, which is, by definition, rotation at speed  $\omega_1 + \omega_2$  units per second. This addition is what gives the “two-element” nature of the PRODUCT RULE, making combined rotation act like multiplication. First, we find the *individual* rates of change. For  $\psi_1$ , this is

$$\frac{d}{dt}\psi_1 = \frac{d}{dt}\phi[\omega_1 t] = \omega_1 i \phi[\omega t] = \omega_1 i \psi_1,$$

and likewise for  $\psi_2$ . In each case, the angular speed  $\omega$  emerges as a scale factor, alongside an  $i$  encoding the change from radial position to tangential velocity. According to the product rule, then, which is  $(fg)' = f'g + fg'$ , each of the rates of change is then combined with the other rotation. This gives

$$\frac{d}{dt}\Psi = \omega_1 i \psi_1 \otimes \psi_2 + \psi_1 \otimes \omega_2 i \psi_2.$$

Since the order of multiplication, whether real or complex, doesn’t matter, we can reorder this and take out a common factor, yielding

$$\frac{d}{dt}\Psi = (\omega_1 + \omega_2) i \psi_1 \otimes \psi_2.$$

This is precisely the statement that the  $\Psi$  rotation, which is the product  $\psi_1 \psi_2$  of the two individual rotations, is rotation at speed  $\omega_1 + \omega_2$ :

$$\frac{d}{dt}\Psi = (\omega_1 + \omega_2) i \Psi.$$

---

<sup>5</sup>Greek omega is the standard algebraic expression for ANGULAR SPEED, in *radians* per second, or, equivalently, *arc length on the unit circle* per second.

So, the PRODUCT RULE works with phase rotations. In the next chapter, we move on to differentiation of the wavefunctions of Unity theory; the work of this last section tells us that we are fully justified in uniting the  $\times$  and  $\otimes$  symbols of real and complex multiplication into regular JUXTAPOSITION. I'll need to do this for the sake of brevity, otherwise the notation will literally spiral out of control. While it's very useful to look under the bonnet of algebra, one doesn't then hit the road with the thing wide open! In the next chapter, we'll get the motor running, in the words of Steppenwolf, head out on the highway.

# 10

## WAVEFUNCTION

The eternal hereafter never figures in the mind of the undiscerning, fooled as he is by the delusion of wealth. “This is the world,” he thinks, “there is no other.” Thus he falls again and again under the sway of death.

---

*Katha Upanishad*

At this point, we depart once again from the mainstream. While the content of the last three chapters was (barring a few forays into the *logos* of the psyche) well known mathematics, this content of this chapter is not. It is Unity theory proper: final construction, on the  $(x, W)$  cylinder, of the WAVEFUNCTION of a slow-moving electron, which we will then use to derive the Schrödinger equation. The task remaining, an algebraic one specific to Unity,<sup>1</sup> is to analyse *combinations* of wavefunctions. We need to describe waves in perceptible and imperceptible components, which are at right-angles to one another. So, the technique required is analogous to the classical *resolving* of particle motion into spatial components. In Unity theory, however, we must resolve *waves*.

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<sup>1</sup>I'm sure others have found the same mathematics, but I had to invent the procedure for myself. Don't underestimate the work required to think simple thoughts! If they're new, it's hard.

The technique is elementary, but likely unfamiliar to you. It is standard, in applied mathematics, to split a wave into *polarisation* components, but not into *propagation* components. And especially not when the medium through which the wave is travelling is locally identical (isotropic) in all directions. Unlike in Newtonian mechanics, where gravity naturally suggests splitting e.g. projectile motion into horizontal and vertical components, there is nothing, until you look behind the veil of space, to suggest that one should consider *wave components*. Physics has not, therefore, demanded such thinking of mathematicians. But, since we are lifting the veil of space, such thinking is demanded of us.

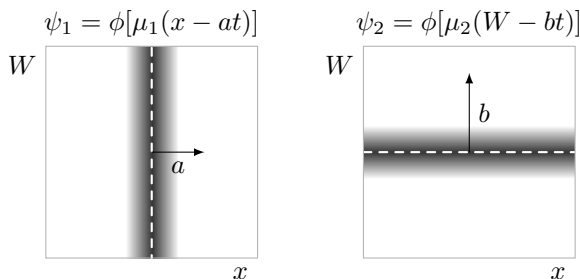
## Combination

Consider two helical waves  $\psi_1$  and  $\psi_2$ :<sup>2</sup>

$$\psi_1 = \phi[x, t] = \phi[\mu_1(x - at)]$$

$$\psi_2 = \phi[W, t] = \phi[\mu_2(W - bt)]$$

The wavefunction  $\psi_1$  travels in the  $x$  direction at speed  $a$ , with no variation in  $W$ , while  $\psi_2$  travels in the  $W$  direction at speed  $b$ , with no variation in  $x$ .<sup>3</sup> The wavenumbers  $\mu_1$  and  $\mu_2$  encode the frequencies of the component waves.



These waves have perpendicular WAVEVECTORS (black arrows) and perpendicular WAVEFRONTS (dashed white lines). There are two obvious ways of combining such perpendicular waves: *superposition* and *juxtaposition*.

<sup>2</sup>Greek lower-case psi is the standard quantum-mechanical symbol for a wavefunction.

<sup>3</sup>Since I am now using  $x$  as a spatial direction of propagation (necessary in the next chapter to model the lab), note that  $x$  is no longer representing an axis of the polarisation plane. Here, the polarisation plane  $\mathbb{C}$  is best thought of as either  $(y, z)$  or simply as  $\mathbb{C}$ .

## Superposition

Firstly, consider the *sum*, or SUPERPOSITION  $\Phi = \psi_1 + \psi_2$ . Physically, this is “layering on top of each other”. It produces no behaviour beyond that of the individual waves. Any calculus, as performed on one of the constituent waves, is automatically independent of the other. So, for example, the time derivative would be

$$\begin{aligned}\frac{\partial}{\partial t}\Phi &= \frac{\partial}{\partial t}\psi_1 + \frac{\partial}{\partial t}\psi_2 \\ &= -\mu_1 a i \psi_1 - \mu_2 b i \psi_2.\end{aligned}$$

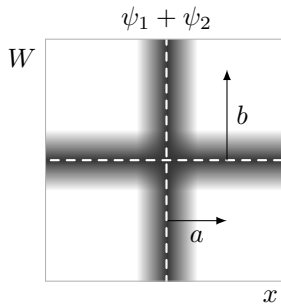
Or, using Newton’s efficient notation of a dot for a time derivative:

$$\begin{aligned}\dot{\Phi} &= \dot{\psi}_1 + \dot{\psi}_2 \\ &= -\mu_1 a i \psi_1 - \mu_2 b i \psi_2.\end{aligned}$$

Effectively, there has been no *combination* of the  $\psi_1, \psi_2$  waves: each component derivative depends only on its own wavefunction. Neither component affects the other. The upshot is that SUPERPOSITION of waves doesn’t describe perpendicular components of one wave; rather, it describes *two separate waves*, propagating in perpendicular directions. The superposition  $\Phi$  does **not** satisfy the law<sup>4</sup> satisfied by individual helical waves, which is

$$\dot{\Phi} = k i \Phi,$$

because each of the derivatives  $\dot{\psi}_1$  and  $\dot{\psi}_2$  is written solely in terms of its parent wave  $\psi_1$  or  $\psi_2$ . Physically, such a SUPERPOSITION is nothing more than “two waves being in the same place and passing through one another”:



<sup>4</sup>In technical terms, such laws are *differential equations*: equations governing rates of change.

## Juxtaposition

Consider now the *product*, or JUXTAPOSITION  $\Psi = \psi_1\psi_2$ . This is a different kettle of fish. Unlike for superposition, we require, for calculating the rates of change, the product rule. Upon differentiation, the two components  $\psi_1$  and  $\psi_2$  are linked; each rate of change combines with the other phase function. Taking the time derivative, we get

$$\begin{aligned}\dot{\Psi} &= \dot{\psi}_1\psi_2 + \psi_1\dot{\psi}_2 \\ &= -\mu_1 a i \psi_1\psi_2 - \mu_2 b i \psi_1\psi_2.\end{aligned}$$

This time, we can *factorise*. Since  $\Psi = \psi_1\psi_2$ , this gives

$$\dot{\Psi} = -(\mu_1 a + \mu_2 b) i \Psi.$$

This is the differential equation satisfied by single rotations; it is of the form  $\dot{\Psi} = k i \Psi$ . In other words, JUXTAPOSITION genuinely *combines* wave components: a wave such as  $\psi_1\psi_2$  isn't just "two waves together", as with superposition. Rather, it is *one wave*, whose wavefunction  $\Psi$  can be factorised into two components  $\Psi = \psi_1\psi_2$ . So, to resolve waves, we *factorise*; to combine them, we *multiply* out. Now, since  $a$  and  $b$  are the speeds of the individual wave components in  $x$  and  $W$ , which are perpendicular,  $a^2 + b^2 = c^2$  is a Pythagorean sum, with  $c$  as the overall wave speed. The waves then combine easily if  $\mu_1$  and  $\mu_2$  are also set in proportion. In terms of an overall wavenumber  $\mu$ , these are given, using trigonometric ratios, as  $\mu_1 = \frac{a}{c}\mu$  and  $\mu_2 = \frac{b}{c}\mu$ . Our derivative is now

$$\begin{aligned}\dot{\Psi} &= -\left(\mu \frac{a^2}{c} + \mu \frac{b^2}{c}\right) i \Psi \\ &= -\mu \frac{a^2+b^2}{c} i \Psi \\ &= -\mu \frac{c^2}{c} i \Psi \\ &= -\mu c i \Psi.\end{aligned}$$

This is the equation satisfied by a wave  $\Psi$ , with wavenumber  $\mu$ , travelling at speed  $c$ . Furthermore, we know the direction: the wave travels in the direction defined by the  $(a, b, c)$  triangle. The component waves have unit wavevectors  $\hat{x}$  and  $\hat{W}$ ;<sup>5</sup> the combined wave has a unit wavevector  $\frac{a}{c}\hat{x} + \frac{b}{c}\hat{W}$ .

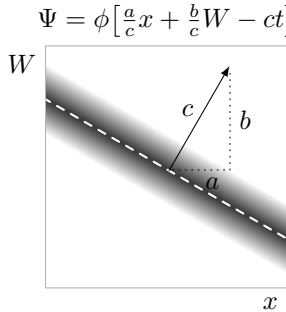
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<sup>5</sup>A *hatted* substantial variable  $\hat{x}$  or  $\hat{W}$  means "A unit (length 1) vector along this substance axis." Such hats have a *different* meaning when applied to non-substantial variables such as energy  $\hat{E}$ .

So, we can construct our wave  $\Psi = \psi_1\psi_2$  explicitly. Below, on the left, the wave  $\Psi$  is given as a single phase function taking input variables  $[x, W, t]$ . On the right, the same wave  $\psi_1\psi_2$  is given as a juxtaposed pair of component waves, taking input variables  $[x, t]$  and  $[W, t]$ :

SINGLE WAVE	JUXTAPOSED COMPONENTS
$\Psi$	$\psi_1\psi_2$
$= \phi[x, W, t]$	$= \phi[x, t]\phi[W, t]$
$= \phi\left[\mu\left(\frac{a}{c}x + \frac{b}{c}W - ct\right)\right]$	$= \phi[\mu_1(x - at)]\phi[\mu_2(W - bt)]$

This decomposition lies at the heart of Unity’s wave theory. Since human beings and labs are three-dimensional  $(x, y, z)$  images in perception, a wave with input-tray  $[x, t]$  is by definition PERCEPTIBLE, while a wave with input tray  $[W, t]$  is by definition IMPERCEPTIBLE. So, just as in Newtonian mechanics one resolves the flight of a ball into its horizontal and vertical components, in Unity theory one resolves the wavefunction into its perceptible and imperceptible components. Visually, we have a wave travelling at speed  $c$  in the direction of  $\frac{a}{c}\hat{x} + \frac{b}{c}\hat{W}$ . In an  $(x, W)$  plane, once again in plan view, this is motion along the hypotenuse of the  $(a, b, c)$  triangle formed by the individual component speeds.



Showing the *algebraic* equivalence of the combined  $\Psi$  or resolved  $\psi_1\psi_2$  forms isn’t difficult. One only has to combine the phase rotations together in the way defined by  $\mathbb{C}$  juxtaposition. When two rotations are juxtaposed, the amounts of phase rotation (the input trays) *add*. Hence, with some algebraic manipulation, the components can be recombined in elementary fashion as follows.

## Multiplying Out Wave Factors

$\psi_1\psi_2 = \phi\left[\mu_1(x-at)\right]\phi\left[\mu_2(W-bt)\right]$	Juxtaposing components.
$= \phi\left[\frac{a}{c}\mu(x-at)\right]\phi\left[\frac{b}{c}\mu(W-bt)\right]$	Setting the wavenumbers.
$= \phi\left[\frac{a}{c}\mu(x-at) + \frac{b}{c}\mu(W-bt)\right]$	Adding the phases.
$= \phi\left[\mu\left(\frac{a}{c}x - \frac{a^2}{c}t\right) + \mu\left(\frac{b}{c}W - \frac{b^2}{c}t\right)\right]$	Multiplying out.
$= \phi\left[\mu\left(\frac{a}{c}x - \frac{a^2}{c}t + \frac{b}{c}W - \frac{b^2}{c}t\right)\right]$	Taking out $\mu$ .
$= \phi\left[\mu\left(\frac{a}{c}x + \frac{b}{c}W - \frac{a^2}{c}t - \frac{b^2}{c}t\right)\right]$	Regrouping the terms.
$= \phi\left[\mu\left(\frac{a}{c}x + \frac{b}{c}W - \frac{a^2+b^2}{c}t\right)\right]$	Adding fractions.
$= \phi\left[\mu\left(\frac{a}{c}x + \frac{b}{c}W - \frac{c^2}{c}t\right)\right]$	Using Pythagoras.
$= \phi\left[\mu\left(\frac{a}{c}x + \frac{b}{c}W - ct\right)\right]$	Cancelling a factor of $c$ .
$= \Psi.$	

Et voilà!

## The Electron Wavefunction

We now have all the tools we need to put together the full WAVEFUNCTION of an electron moving slowly through space. We'll do this by juxtaposing our earlier static matter wave propagating precisely in  $W$ , now to be viewed as the imperceptible *component* of a broader wave, with a wave component propagating precisely in  $x$ . This latter factor, being the perceptible aspect of the overall wave, is what will come to be described in quantum mechanics as “the wavefunction”. It is a reasonable translation into English to say that the component in  $W$  is the particle, and the component in  $x$  is the *behaviour* of the particle.<sup>6</sup>

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<sup>6</sup>I say *reasonable* translation, because the word “particle” has meanings numerous and diverse. It has mathematical meaning at the classical, quantum and sub-quantum levels, physical meaning at the classical, quantum and sub-quantum levels, and everyday meaning at the level of the street.



There is a profound result on its way. We now have the tools with which to model the physical ELECTRON; concerning this particle, there is a vast amount of empirical data. This, therefore, is where my hypotheses regarding the  $(x, W)$  cylinder start to change from being mystical speculation by a wild-eyed loon into rigorous empirical physics. We will soon derive the Schrödinger equation, which has stood inexplicable for a century. It is my view that, in light of the rigour of this derivation, any scientific theory (such as the old paradigm) which cannot derive and thus justify the Schrödinger equation in an equally rigorous fashion should be viewed as obsolete.<sup>7</sup> Again, I say this not for the purpose of angling for a Nobel prize; I don't give a crap about Nobel prizes. What I care about, and care about deeply, is *people*, life, the joy of humanity, and the glory of the Infinite Everlasting. If the Establishment can provide an alternative to my derivations, then woop-la-di-da, *fantastic*! Honestly, I'm all ears; I like being taught things. If not, I believe a lot of grand people have humble homework to do.

## Static Electron

We don't need to consider all three dimensions of space here; one will do. Unlike with the broader Dirac equation, whose mathematics is beyond the scope of this book, the full structure of the Schrödinger equation appears in 1D. To apply the equation to e.g. hydrogen atoms, one must then reconstruct the 3D version, but it has no new structure: each of the three  $(x, y, z)$  dimensions acts exactly like  $x$ . Hence, we can safely ignore  $y$  and  $z$  for now.<sup>8</sup>

Consider a static ELECTRON, whose underlying wave is circling the  $(x, W)$  cylinder at the speed of light. The wavevector of such a static electron is in  $W$ , its wavefront is in  $x$ . In algebra, it is given by the helical wave we built earlier. Following the work on juxtaposition, I now re-notate this wavefunction  $\psi_{\text{hidden}}$ , implying that it is the hidden (imperceptible) component of an electron wave.

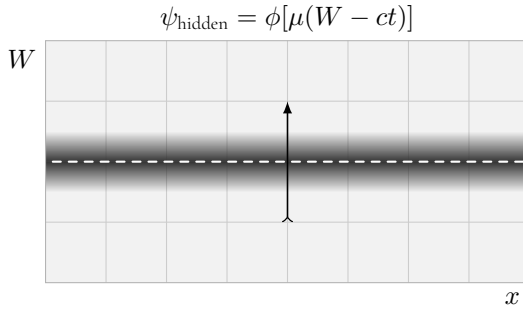
$$\psi_{\text{hidden}} = \phi[\mu(W - ct)]$$

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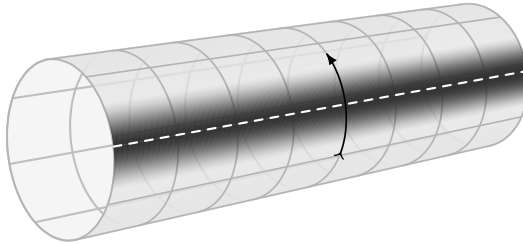
Component of an electron wave circumnavigating the  $(x, W)$  cylinder.

<sup>7</sup>Empiricists would do well to remember that, according to their own creed, they don't get to choose about which things they are empirical. And *simple* things should always come first.

<sup>8</sup>The complex plane  $\mathbb{C}$  of polarisation models substrate expansion/contraction in  $(y, z)$ .



As before, I'm representing this wave with a single shaded swell, but note that there is no sense in which the wave is “here rather than there” around  $W$ . It *varies* around  $W$ , yes, but it is *circular* variation; no location in  $W$  is picked out as special. The wavefronts lie in  $x$ : I am merely highlighting one so you can see it. On the  $(x, W)$  cylinder, then, our wave component  $\psi_{\text{hidden}}$  is:



## Mobile Electron

The wavefunction  $\psi_{\text{hidden}}$  has no specific location in  $x$ ; indeed, it has no variation in  $x$  at all. Viewed in perception, then, once the variation in  $W$  has been projected out, no point in  $x$  is any different from any other. Such a static “electron” could not be perceived as such, hence the inverted commas: the image in perception would be a featureless  $x$  number line. An experimental physicist couldn't observe such a particle in measurement, because it doesn't *do* anything. To produce behaviour that could be seen in the lab, then, we juxtapose a *spatially* varying component  $\psi_{\text{seen}} = \phi[x, t]$  with  $\psi_{\text{hidden}} = \phi[\mu(W - ct)]$ . These two components, which vary in  $x$  and  $W$  respectively, form, as previously discussed, a *single wave*, part-perceptible, part-imperceptible, depending on  $[x, W, t]$ .

We notate this overall wavefunction capital  $\Psi$  as before:

$$\Psi = \psi_{\text{seen}} \psi_{\text{hidden}}$$

Slowing-moving electron wave given in components.

The function  $\psi_{\text{seen}}$  is a phase function of the same mathematical family as  $\psi_{\text{hidden}}$ , i.e.  $\psi_{\text{seen}} = \phi[x, t]$ , but, unlike with  $\psi_{\text{hidden}}$ , I'll notate it as  $\psi_{\text{seen}}$  throughout, without reference to its inputs. That's because its dependence on its inputs  $[x, t]$  is exactly what we are heading for. We *already* know theoretically about the form of  $\psi_{\text{hidden}}$  in  $W$ , but we don't *yet* know about the form of  $\psi_{\text{seen}}$  in  $x$ ; the whole idea of the Schrödinger equation is to see what types of wave  $\psi_{\text{seen}}$  are permitted juxtapositions with the component  $\psi_{\text{hidden}} = \phi[\mu(W - ct)]$ . So, we have

$$\Psi = \psi_{\text{seen}} \phi[\mu(W - ct)]$$

Slow-moving electron wave with generic  $\psi_{\text{seen}}$  and explicit  $\psi_{\text{hidden}}$ .

## An Approximation

I've made an approximating assumption in the above: I'm still claiming that our  $\psi_{\text{hidden}}$  component is travelling at precisely the speed of light  $c$ . In fact, this is very slightly inaccurate. If  $\psi_{\text{seen}}$  is to do anything at all, then there must be a component of wave speed in  $x$ . Combined with a speed  $c$  in  $W$ , this would take the overall wave speed, calculated by Pythagoras, over  $c$ . Obviously that isn't what is going on. But this approximation isn't a problem; it is exactly what defines the *domain of applicability* of the Schrödinger equation, and predicts that it should break down for fast-moving particles. And so it does. The Schrödinger equation is not compatible with special relativity; for fast-moving matter, its big brother, the Dirac equation, is required. What we are doing here is making an approximating simplification which will be very nearly true for matter moving slowly compared to the speed of light. The whole lab is, by definition, made of such slow stuff. Therefore, this approximation will yield a very tiny error term in the derivation, which we will then neglect (set to zero). Far from being an "error", however, this error term matches what is observed in the laboratory: the

law we are deriving has a limited domain. To get a handle on the scale of the approximation (thus to see that this approximation is no kind of fudge) consider a laboratory electron moving “slowly” at  $a = 10$  kilometres per second, ten times faster than a bullet from a gun. Using  $c = 300,000,000$  metres per second, the Pythagorean triangle of component wave speeds gives the speed in  $W$ , viz. the true wave speed  $b$  of  $\psi_{\text{hidden}}$ , as follows. The error is less than one part in a billion.

$$\begin{aligned} b &= \sqrt{c^2 - a^2} \\ &= \sqrt{300,000,000^2 - 10,000^2} \\ &= 299,999,999.8 \text{ metres per second.} \end{aligned}$$

## The Wave Equation

Our task then, is to see which specific  $\psi_{\text{seen}}$  waves may be juxtaposed with  $\psi_{\text{hidden}}$  waves. For this, we must hark back to the overarching law of waves, the WAVE EQUATION. As long as we are simply playing around with wavefunctions, we could juxtapose any wavefunctions  $\psi_{\text{seen}}$  and  $\psi_{\text{hidden}}$  we choose. But, if these wavefunctions are to represent *physical* waves travelling through the substrate, the combined  $\Psi = \psi_{\text{seen}}\psi_{\text{hidden}}$  wavefunctions must obey the law obeyed by all waves, that is to say, constant speed of propagation. The WAVE EQUATION in two dimensions  $x$  and  $W$  is:

$$\frac{\partial^2 \Psi}{\partial t^2} = c^2 \left( \frac{\partial^2 \Psi}{\partial x^2} + \frac{\partial^2 \Psi}{\partial W^2} \right)$$

It is a strict law. And we have now set up our  $\psi_{\text{hidden}}$  precisely, to travel at (ever so slightly less than)  $c$  in exactly the  $W$  direction. This greatly restricts the possible behaviours of  $\psi_{\text{seen}}$ . Not only must *speed* in  $x$  be tiny compared to  $c$ , but the spatial *wavenumber* is also restricted, according to the trigonometric ratios relating wave speeds. So, while we *propose* nothing regarding  $\psi_{\text{seen}}$ , our proposition of  $\psi_{\text{hidden}}$  places very strict conditions on what is permitted in  $\psi_{\text{seen}}$ . The relevant law will be the Schrödinger equation.

Our task now is a purely mathematical one. We need to calculate the second derivatives of our proposed wave  $\Psi$  with respect to each of  $[x, W, t]$ . Each of these derivatives will have a  $\psi_{\text{seen}}$  part and a  $\psi_{\text{hidden}}$  part. Ironically, we know

nothing about the  $\psi_{\text{seen}}$  part, which is a generic phase function  $\phi[x, t]$  depending on  $[x, t]$  in some unknown way, but we know, by hypothesis, all about the  $\psi_{\text{hidden}}$  part, whose dependence on its input variables  $[W, t]$  is tied down fully, up to one constant  $\mu$  to be chosen to match experiment. Hence, the  $\psi_{\text{seen}}$  derivatives will remain as *questions*, e.g.  $\frac{\partial}{\partial t}\psi_{\text{seen}}$ , while the  $\psi_{\text{hidden}}$  derivatives will give us *answers*, in terms of the phase function  $\phi[\mu(W - ct)]$  and the factors relating to speed and direction which emerge from it.

## Exercise: Derive the Schrödinger equation.

If you're feeling mathematically bold, have a go yourself from this point. You have all the tools you need. The path, which I will follow myself in the next chapter, is

- ① Find the second derivatives of  $\Psi$ :

$$\frac{\partial^2 \Psi}{\partial x^2} \text{ and } \frac{\partial^2 \Psi}{\partial W^2} \text{ are straightforward,}$$

$$\frac{\partial^2 \Psi}{\partial t^2} \text{ is trickier, as } \psi_{\text{seen}} \text{ and } \psi_{\text{hidden}} \text{ both depend on time } t.$$

- ② Substitute the second derivatives into the WAVE EQUATION.
- ③ Simplify the algebra, so as to eliminate all mention of  $\psi_{\text{hidden}}$  and end up with a laboratory equation only in the perceptible  $\psi_{\text{seen}}$ .
- ④ Set the one-part-in-a-billion approximation term to zero.
- ⑤ Search all of known physics, i.e. Wikipedia, for the relevant empirically verified quantity—"a quantum-mechanical property of particles"—to sub in as the constant  $\mu$ .
- ⑥ Rearrange to the FREE SCHRÖDINGER EQUATION:

$$i\hbar \frac{\partial}{\partial t} \psi_{\text{seen}} = -\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} \psi_{\text{seen}}.$$

# 11

## THE BIG DERIVATION

Where did we get that [the Schrödinger equation] from? It's not possible to derive it from anything you know. It came out of the mind of Schrödinger.

---

*Richard Feynman*

### Calculating the Partial Derivatives

We begin by differentiating with respect to  $x$ . This is almost too easy. Since  $\psi_{\text{hidden}}$  has no dependence on  $x$ , it is a constant for partial differentiation; so, because we don't yet know anything about  $\psi_{\text{seen}}$ , the rate of change is elementary, almost trite. It hardly says anything at all:

$$\begin{aligned}\frac{\partial^2}{\partial x^2} \Psi &= \frac{\partial^2}{\partial x^2} (\psi_{\text{seen}} \psi_{\text{hidden}}) \\ &= \frac{\partial^2}{\partial x^2} (\psi_{\text{seen}}) \psi_{\text{hidden}}.\end{aligned}$$

## The $W$ rate

Here, we end up with an explicit calculation to do. The calculation is easy, however, since  $\psi_{\text{seen}}$  doesn't depend on  $W$ . Hence,  $\psi_{\text{seen}}$  can be treated as a constant. We are left with  $\psi_{\text{hidden}}$ , whose dependence on  $W$  we know to be  $\psi_{\text{hidden}} = \phi[\mu(W - ct)]$ . So, we can calculate its rate of change with respect to  $W$ . The *first derivative* (rate at which the helix changes as you run your finger around the cylinder) is:

$$\begin{aligned}\frac{\partial}{\partial W}\Psi &= \frac{\partial}{\partial W}(\psi_{\text{seen}}\psi_{\text{hidden}}) \\ &= \frac{\partial}{\partial W}(\psi_{\text{seen}}\phi[\mu(W - ct)]) \\ &= \psi_{\text{seen}}\frac{\partial}{\partial W}(\phi[\mu(W - ct)]) \\ &= \psi_{\text{seen}}\mu i\phi[\mu(W - ct)] \\ &= \mu i\psi_{\text{seen}}\psi_{\text{hidden}}.\end{aligned}$$

As is standard with a phase function, we get a factor of  $\mu$  for rate of rotation and a factor of  $i$  for the tangential direction. The *second derivative*, then, follows the same procedure. The  $\psi_{\text{seen}}$  component is taken to be constant as before, and a second factor of  $\mu i$  emerges: we get  $(\mu i)(\mu i) = \mu^2 i^2$ . This gives

$$\begin{aligned}\frac{\partial^2}{\partial W^2}\Psi &= \mu^2 i^2 \psi_{\text{seen}}\psi_{\text{hidden}}, \\ &= -\mu^2 \psi_{\text{seen}}\psi_{\text{hidden}}.\end{aligned}$$

## The $t$ rate

This derivative gives us a little more work to do. What follows is, indeed, the toughest mathematics in this book. Since both juxtaposed factors  $\psi_{\text{seen}}$  and  $\psi_{\text{hidden}}$  depend on  $t$ , we must use the *product rule* as well as the chain rule. The product rule, with a prime' representing differentiation, is

$$(\psi_1\psi_2)' = \psi_1'\psi_2 + \psi_1\psi_2'.$$

Applying this to  $\psi_{\text{seen}}\psi_{\text{hidden}}$ , we get

$$\begin{aligned}
\frac{\partial}{\partial t}\Psi &= \frac{\partial}{\partial t}\left(\psi_{\text{seen}}\psi_{\text{hidden}}\right) \\
&= \frac{\partial}{\partial t}\left(\psi_{\text{seen}}\phi[\mu(W - ct)]\right) \\
&= \frac{\partial}{\partial t}\left(\psi_{\text{seen}}\right)\phi[\mu(W - ct)] + \psi_{\text{seen}}\frac{\partial}{\partial t}\left(\phi[\mu(W - ct)]\right) \\
&= \underbrace{\frac{\partial}{\partial t}\left(\psi_{\text{seen}}\right)\phi[\mu(W - ct)]}_{\text{term A}} + \underbrace{-\mu ci\psi_{\text{seen}}\phi[\mu(W - ct)]}_{\text{term B}}
\end{aligned}$$

We now differentiate again, term by term. Both terms are similar to the original  $\Psi$ . Differentiating term A by the product rule gives

$$\begin{aligned}
\frac{\partial}{\partial t}(\text{term A}) &= \frac{\partial}{\partial t}\left(\frac{\partial}{\partial t}\left(\psi_{\text{seen}}\right)\phi[\mu(W - ct)]\right) \\
&= \frac{\partial^2}{\partial t^2}\left(\psi_{\text{seen}}\right)\phi[\mu(W - ct)] - \underbrace{\mu ci\frac{\partial}{\partial t}\left(\psi_{\text{seen}}\right)\phi[\mu(W - ct)]}_{*}
\end{aligned}$$

Differentiating term B, again by the product rule, gives

$$\begin{aligned}
\frac{\partial}{\partial t}(\text{term B}) &= \frac{\partial}{\partial t}\left(-\mu ci\psi_{\text{seen}}\phi[\mu(W - ct)]\right) \\
&= -\underbrace{\mu ci\frac{\partial}{\partial t}\left(\psi_{\text{seen}}\right)\phi[\mu(W - ct)]}_{*} + \mu^2 c^2 i^2 \psi_{\text{seen}}\phi[\mu(W - ct)]
\end{aligned}$$

Notice that the two terms marked  $*$  are the same. So, when we sum it all up, we get three terms, with the middle one doubled.<sup>1</sup> Furthermore, the factor of  $i^2$  in the latter term can be simplified to  $i^2 = -1$ . This gives the *second time derivative* (reinstating  $\psi_{\text{hidden}}$  so as to have manageable expression) as:

$$\frac{\partial^2}{\partial t^2}\left(\psi_{\text{seen}}\right)\psi_{\text{hidden}} - \underbrace{2\mu ci\frac{\partial}{\partial t}\left(\psi_{\text{seen}}\right)\psi_{\text{hidden}}}_{2*} - \mu^2 c^2 \psi_{\text{seen}}\psi_{\text{hidden}}$$

---

<sup>1</sup>This is exactly analogous to the “doubling of the cross term” when multiplying out a quadratic bracket  $(x + 1)^2 = x^2 + 2x + 1$ . Differentiation of  $\phi$  acts like multiplication.



In summary, simplifying a little, the SECOND DERIVATIVES are:

$$\begin{aligned}\frac{\partial^2}{\partial x^2} \Psi &= \frac{\partial^2}{\partial x^2} (\psi_{\text{seen}}) \psi_{\text{hidden}} \\ \frac{\partial^2}{\partial W^2} \Psi &= -\mu^2 \psi_{\text{seen}} \psi_{\text{hidden}} \\ \frac{\partial^2}{\partial t^2} \Psi &= \left( \frac{\partial^2}{\partial t^2} \psi_{\text{seen}} - 2\mu ci \frac{\partial}{\partial t} \psi_{\text{seen}} - \mu^2 c^2 \psi_{\text{seen}} \right) \psi_{\text{hidden}}\end{aligned}$$

For the less mathematical reader, the expressions above are as heavy as it gets in this book. We have reached the summit, and it's downhill from here! The first simplification comes with the fact that, in the above, each of the derivatives has a common factor of  $\psi_{\text{hidden}}$ . This is an automatic yet vital consequence of phase function juxtaposition.

## Substituting into the Wave Equation

The wavefunctions  $\psi_{\text{seen}}$  and  $\psi_{\text{hidden}}$  are helical components of a single wave on the  $(x, W)$  cylinder. The presence of a common factor of  $\psi_{\text{hidden}}$  means that, while the *law* that governs  $\psi_{\text{seen}}$  behaviour depends on the underlying  $\psi_{\text{hidden}}$ , the individual wave components can be separated out *entirely*. This is what allows humans to do physics. Indeed, it isn't going too far to say that this is the fact that allows a perceived *cosmos* to exist. If the  $x$  and  $W$  aspects of substrate waves were not separable in this way, then there would be no way of anything ending up  $\psi_{\text{seen}}$ . In any conceivable reality, described by Unity theory or otherwise, the world-image can only *ever* be built of VARIATION data, never of ABSOLUTE data. Just as with the real numbers, which only exist as processes, there is no absolute data. "Absolute data" is a contradiction in terms. *A priori*, all data is variation data. And, as can be seen from the above calculation, the variations of a helical wave circling an (Inner, Outer) cylinder have an aspect in which they all vary *identically*. That aspect is  $\psi_{\text{hidden}}$ , which encodes their variations around hidden inner dimensions. And the very *ubiquity* of  $\psi_{\text{hidden}}$ , as above, is what means it can't and could never be seen. We cannot see  $\psi_{\text{hidden}}$ , no. But we can still *measure* it by its residual effects. Specifically, we can find  $\mu$ . The constant wavenumber  $\mu$ , which appears **non**-ubiquitously in the above derivatives, is determined by the circumference of the  $(x, W)$  cylinder. It is the clue, the vital link with the

inner dimensions that *survives* the elimination of what is hidden. This fact will reemerge shortly, when we consult the lab. For now we continue algebraically. Since the phase factor  $\psi_{\text{hidden}}$ , being a description of rotation with BASELINE 1, is necessarily non-zero everywhere, we can cancel it throughout as we substitute into the WAVE EQUATION, which, as already derived, is

$$\frac{\partial^2 \Psi}{\partial t^2} = c^2 \left( \frac{\partial^2 \Psi}{\partial x^2} + \frac{\partial^2 \Psi}{\partial W^2} \right).$$

Performing this substitution and cancellation, we get

$$\frac{\partial^2}{\partial t^2} \psi_{\text{seen}} - 2\mu ci \frac{\partial}{\partial t} \psi_{\text{seen}} - \mu^2 c^2 \psi_{\text{seen}} = c^2 \left( \frac{\partial^2}{\partial x^2} \psi_{\text{seen}} - \mu^2 \psi_{\text{seen}} \right)$$

## Simplifying the Algebra

Multiplying out the brackets, we have

$$\frac{\partial^2}{\partial t^2} \psi_{\text{seen}} - 2\mu ci \frac{\partial}{\partial t} \psi_{\text{seen}} - \underbrace{\mu^2 c^2 \psi_{\text{seen}}}_{\star} = c^2 \frac{\partial^2}{\partial x^2} \psi_{\text{seen}} - \underbrace{\mu^2 c^2 \psi_{\text{seen}}}_{\star}.$$

This is another significant moment, both mathematically and in terms of the physics. The two terms marked  $\star$  are identical, and can therefore be cancelled. We are clearly on the downwards slope of the problem: things are going ping!

$$\frac{\partial^2}{\partial t^2} \psi_{\text{seen}} - 2\mu ci \frac{\partial}{\partial t} \psi_{\text{seen}} = c^2 \frac{\partial^2}{\partial x^2} \psi_{\text{seen}}.$$

What is the physical meaning of the previous step? Well, the  $\mu^2 c^2$  term was produced by the  $W$  derivative, and cancelled by the  $t$  derivative. It had nothing to do with the  $x$  derivative. And why did it cancel? It did so by design. We *engineered* this very cancellation, by ensuring that  $\psi_{\text{hidden}}$  was a wave component moving at precisely  $c$ . And the WAVE EQUATION, remember, is satisfied by waves that move at  $c$ . So, this cancellation is exactly as expected. Physically, it represents the removal of the *energy* contained in  $\psi_{\text{hidden}}$ . Notice that the cancelled  $\mu^2 c^2$  terms were far bigger than the others. Both  $\mu$  and  $c$  are huge. Those terms contain the energy  $E = mc^2$ , such as is released in nuclear reactions. But the two terms, while huge, are nevertheless precisely *equal*, which allows us to eliminate them.

This is equivalent to setting the energy baseline to  $E_0 = mc^2$ , and working only with what is classically observable. This step is made throughout classical physics and *non-relativistic quantum mechanics*, of which field Schrödinger’s is the central equation.

## The Approximation Term

We can now eliminate the approximation term. Compare the relative sizes of the three remaining terms:

$$\underbrace{\frac{\partial^2}{\partial t^2}\psi_{\text{seen}}}_{\text{No factor of } c} \underbrace{-2\mu ci \frac{\partial}{\partial t}\psi_{\text{seen}}}_{\text{Factors of } c} = c^2 \frac{\partial^2}{\partial x^2}\psi_{\text{seen}}$$

Both of the right-hand two terms contain (non-reciprocal) factors of  $c$ . But the left-hand term doesn’t. Hence, irrespective of the details, if you crank the value of  $c$  up, the right-hand terms increase, but the left-hand one doesn’t. Therefore, for large enough values of  $c$ , the left-hand term cannot fail but become negligible next to the other two. This is the one-part-in-a-billion error term we were expecting. Eliminating it<sup>2</sup> gives

$$-2\mu ci \frac{\partial}{\partial t}\psi_{\text{seen}} = c^2 \frac{\partial^2}{\partial x^2}\psi_{\text{seen}}.$$

## Consulting the Lab

Our last task is to find the empirical value of  $\mu$ . Its units are determined automatically: the phase function  $\phi$  has inputs of radians (or, equivalently,  $\frac{1}{2\pi}$  circumferences of a unit circle), which are dimensionless quantities. In other words, units of rotation are “fractions of a circle”, which are unit-free, all circles being the same. So, we know that the input tray  $[\mu(W - ct)]$  must have no units.

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<sup>2</sup>You might be pondering the fact that one term now has a factor of  $c$  and the other a factor of  $c^2$ . This might suggest that, as  $c$  gets big, the whole thing should break. But not so. In fact, as we will see in the next section, the constant  $\mu$ , whose value is determined by experiment, *itself* contains a factor of  $c$ . The faster the speed of light, the larger the value of  $\mu$  needed to have the helical  $\psi_{\text{hidden}}$  wave join up with itself around  $W$ . So, in fact, there is a *matching*  $c^2$  factor on both sides. This factor is duly eliminated once we have our value of  $\mu$ , leaving no mention of  $c$  in the Schrödinger equation.

Now, both  $W$  and  $ct$  have units of metres. Therefore, the quantity  $\mu$  has units of (rotation) *per metre*. We should expect, then, to find a quantity, with units  $\text{m}^{-1}$ , ubiquitous for a century in QM, which has no physical interpretation in the lab yet shows up again and again in experiments of all descriptions; Unity theory dictates that such a value, a fundamental “quantum-mechanical property”, should be attached to *every* particle. After all,  $\mu$  sits at the heart of  $\psi_{\text{hidden}}$ , dictating the frequency of the matter waves that generate particle-images. This quantity should be abstract in laboratory physics, describing as it does a rate of rotation in a hidden inner dimension. One doesn’t have to look very hard. Sitting fatly in the middle of QM is the INVERSE REDUCED COMPTON WAVELENGTH.<sup>3</sup>

- ① The *Compton wavelength*  $\lambda$  of a particle is defined as

$$\lambda = \frac{h}{mc},$$

where  $m$  is the MASS of the particle,  $c$  is the SPEED OF LIGHT, and  $h$  is the PLANCK CONSTANT. I’ll analyse both  $m$  and  $h$  in detail later. For an electron, the Compton wavelength is  $\lambda_e = \frac{h}{m_e c} = 2.42 \times 10^{-12}$  metres. This is the  $W$  distance, in metres, over which for a full helical cycle takes place.

- ② The *reduced Compton wavelength*  $\lambda$ , “lambda-bar”, then, is  $\lambda$  divided by  $2\pi$ , to convert between full circles and radians, converting the Planck constant  $h$  into the *reduced* Planck constant  $\hbar$  “h-bar” (the bar denotes division by  $2\pi$ ):

$$\lambda = \frac{\lambda}{2\pi} = \frac{\hbar}{mc}.$$

I never use  $h$ , and so refer to  $\hbar$  as *the* Planck constant.  $\lambda$  is the  $W$  distance, in metres, over which one unit of helical arc takes place.

- ③ The *inverse reduced Compton wavelength* is the reciprocal of this quantity. Units of  $\text{m}$  are converted into units of  $\text{m}^{-1}$ . The quantity becomes the spatial frequency in  $W$ , or angular WAVENUMBER. It is the  $W$ -rate at which  $\psi_{\text{hidden}}$  rotates as one runs one’s finger around  $W$ . In other words, it is *precisely* the quantity we are looking for:

$$\mu = \frac{mc}{\hbar}.$$

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<sup>3</sup>Compton introduced  $\lambda$  in 1923, exactly a hundred years ago as I write. It can be interpreted (up to a factor of 2 to be discussed later) as the circumference, in metres, of the  $W$  dimension.

# The Last Piece of the Puzzle

We can now finish the derivation, by substituting  $\mu = \frac{mc}{\hbar}$  into our wave law. This is the vital step in which we marry up our theoretical work with experimental physics. We get

$$-2\frac{mc}{\hbar}ci\frac{\partial}{\partial t}\psi_{\text{seen}} = c^2\frac{\partial^2}{\partial x^2}\psi_{\text{seen}}.$$

We now have a common factor of  $c^2$  on both sides. These cancel, leaving the equation with no mention of the speed of light:

$$-2\frac{m}{\hbar}i\frac{\partial}{\partial t}\psi_{\text{seen}} = \frac{\partial^2}{\partial x^2}\psi_{\text{seen}}.$$

Lastly, we multiply by  $-\frac{\hbar^2}{2m}$ , which gives

$$i\hbar\frac{\partial}{\partial t}\psi_{\text{seen}} = -\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2}\psi_{\text{seen}}.$$

And this is the Schrödinger equation! In order to bring up its fullest version, we can extend, again using Pythagoras, to three dimensions of space. We summarise the  $(x, y, z)$  second rates with  $\nabla$ , funky old nabla<sup>4</sup>, whose square is

$$\nabla^2\psi = \frac{\partial^2\psi}{\partial x^2} + \frac{\partial^2\psi}{\partial y^2} + \frac{\partial^2\psi}{\partial z^2}.$$

This gives the FREE SCHRÖDINGER EQUATION:

$$i\hbar\frac{\partial\psi}{\partial t} = -\frac{\hbar^2}{2m}\nabla^2\psi$$

“Permitted  $\psi_{\text{seen}}$  behaviour of  $\psi_{\text{hidden}}$  waves”

In the end, the thing is a simple result of wave mechanics. Despite the wishes of the old paradigmgers, there can be no doubt about it: the mathematics doesn't lie.

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<sup>4</sup>The translation of the symbol  $\nabla$  is “differentiate with respect to all three spatial variables, each in their respective directions”. In other words, differentiate vectorially. The word “nabla” means *harp*.

The Schrödinger equation, long verified as describing the matter we see, governs, in fact, just the perceptible  $\psi_{\text{seen}}$  components of waves with  $\psi_{\text{hidden}}$  parts. And those hidden parts circumnavigate inner dimensions. This tells us something of paramount importance to Life in the World. It tells us, not as hypothesis but as (at least until someone comes up with something better) hard empirical fact, that the perceived world, the *lab-image* which the Schrödinger equation so reliably describes, is emphatically **not** the full extent of Reality. The data only make sense if there is a dimension of the Universe that *does not appear in the world-image*. For the shallow Westerner, doomed to die badly, this is such a crucial result. There is nothing mystical, far-out or hippyish in it; there is only a great and wonderful truth: *la Vie est toute profonde*.

In its very fullest form, then, the equation takes up a last term representing any *external influence*. This is trivial, in fact: the equation takes its particular form (with that uncanceled factor of  $\hbar$ ) precisely so that it has units of ENERGY, as do POTENTIAL ENERGY terms of the form  $V\psi$ . Hence, any macroscopic bendings of the substrate which mess with the motion of our free particle can be modelled with the addition of a potential term  $V\psi$ . In QM, these are most often taken as *electromagnetic potentials*, encoding, for example, the field around a proton in a hydrogen atom. This was Schrödinger's original triumph. Set up  $V$  to model the electromagnetic field around a proton, and, to a good approximation, the correct hydrogen emission spectrum (the original object of quantum-mechanical study) emerges from

$$i\hbar \frac{\partial \psi}{\partial t} = -\frac{\hbar^2}{2m} \nabla^2 \psi + V\psi$$

“Predicted  $\psi_{\text{seen}}$  behaviour of an electron orbiting a proton”

And that's the central equation of quantum mechanics. Right there is the Mystery. How strangely beautiful Reality is! How simple it is in understanding! And how vital, if one wishes to understand the life in  $\psi_{\text{seen}}$ , to pay *most* attention to the Life in  $\psi_{\text{hidden}}$ . Admit that there is more than the objects of perception, admit one's unknowing, admit one's *courage*, and all the world unfolds. Try it for a decade; you'll see what I mean. Feynman used to say, in his typically honest (and typically correct) manner, that nobody understands quantum physics. But that really isn't true any more. The list is now non-zero in length, and you're on it.

# 12

## PERCEPTION CALCULUS

They took from me the Robe of Glory, which they had made for me, and made a covenant with me, and they wrote it in my heart that I might not forget it: “You will go down into Egypt, to find the One Pearl which lies in the middle of the sea, encircled by the snorting serpent. When you do this, you shall wear once again the Robe of Glory.”

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*Gnostic “Hymn of the Pearl”*

This short chapter, which is for the more conceptually adventurous reader, is somewhat self-contained, and a full understanding of it is not required for what follows. It can be read, at a first visit, as deeply or shallowly as suits. It concerns the PERCEPTION CALCULUS, a new branch of mathematics which I have been developing and am continuing to develop. I include it here because I find it very interesting, and because its development is tied in with the writing of this book. I use some of its algebraic language, sparingly, in later chapters.

I have come to realise that mathematical truths are, in fact, dictated by what is physically possible. So that, when one “invents” mathematics, which happens to match Reality well, one is, in fact, finding oneself guided and bound by Reality.

Elegant mathematics, for instance  $\mathbb{C}$ , *only exists* where it describes processes that occur in the substrate. The Gnostics had a tradition of the same:

*“You never invent things, you only remember.”*

The relationship between the Universe and the perceived cosmos, although it seems mystical to the unenlightened, is undoubtedly a *mathematical* one. There are, as I have now proved, mathematically describable processes which occur in both the Universe and its perceived image, the cosmos. The PROJECTION by which the one becomes (is mapped to) the other must, therefore, also be describable in rigorous mathematics. Logically, perception itself, far from being a nebulous process, *must be* expressible as mathematical OPERATION. This is a very deep fact. Now, while the necessary mathematics does to some extent already exist, it does so in a wide variety of algebraic dialects. There is no *unified* algebraic notation with which to approach the production of the world-image. But, as has become clearer to me during the construction of Unity theory, there is joy to be had in this new/old field of mathematics. The algebraic operations work elegantly, in the manner that  $\mathbb{R}$  and  $\mathbb{C}$  themselves do, because those algebraic operations *describe Reality*. And Reality is the definition of elegance and consistency.

What other definition could there be?

There is work to be done here. The post-Hellenic Western error has left us lacking the tools with which to discuss the relationship between perception and Reality, between cosmos and Universe, between  $\psi_{\text{seen}}$  and  $\Psi = \psi_{\text{seen}}\psi_{\text{hidden}}$ . The task of a culture, and thus the responsible folk within it, is exactly to provide such tools, because people, young and old, girls and boys, men and women, are permanently in need of help. As long as there is life, this will always be true. That's what *teaching* is, in the end: using mind-order, vigour and soulish courage to create future mind-order, vigour and soulish courage.

“Pass it on,” they say.

Consider the teaching of mathematics at school, which has been a part of my work for many years now. I have taught, broadly, what others have: algebra, trigonometry, calculus. And nothing wrong with those things, of course! But I also see *other* possibilities. As we begin to recognise the overbearing gravity of the ecological, cultural and personal situation we each face, we must consider whether the things we teach, not only in mathematics but in every other subject too, are helping us in our quest to the extent that they could. Emphatically, they are not. Mostly, teaching has become an attempt to give pupils the tools they need for *problem-solving*, with which they can analyse, control and predict the



behaviour of the world-image around them. The Establishment, indeed, actively promotes this as forward-thinking. We read questions such as “Is our education system giving pupils the skills they need for life in the 21st century?” And the government is keen to appear progressive. But such questions, when considered with perspective, show up a catastrophic bias. The point is, the *real* skill of life has absolutely nothing to do with technology. It is the same in each and every century, the same as it always has been and always will be. It is the question of the HUMAN CONDITION:

*How to carry the burden of being conscious?*

In my own mathematical and philosophical teaching, as the powers that be have continued their unchecked slide into tick-box characterlessness, I have found myself departing, with increasing vigour, from the mainstream view (not that I believed it much to begin with), which posits *cleverness* as the goal of education. What shit. That goal, measured in GDP and teenage suicide, is further worship at the Shrine of Economic Growth, the members of whose insidious cult stand poised to destroy us all. We should, in large part, be teaching our children that which is *not* clever, that which brings *less* certainty, that which is *not* economically useful, that which offers the *least* possibility of material dominance of the world. We should be giving our children the tools with which to face themselves, to live openly, to love, to enjoy the HUMAN CONDITION, to marvel at and revel in the relationship between seen and unseen. This, in the past, would have been called *theology*, but it has nothing to do with religion. I’m not suggesting more religious studies. On the contrary. What I am suggesting is that the subjects and fields that currently exist, all of which have their merits, are shifted away from description, management and manipulation of the material world and are shifted towards understanding of the *relationship* between that image and what lies beyond. There is nothing mystical in this. It’s about realigning education in the light of new facts. In mathematics, which many see, with a degree of justification, as the very height of rationality, one can spend time working on perception-level manipulation and prediction, e.g. statistics (yawn) and Newtonian mechanics, or one can spend time working on deeper things. Those deeper things exist to exactly the same degree as the world-image does, can be addressed in terms just as rational and empirical, and are infinitely more important for mental health, happiness, and the continued existence of the human race. All of the many ills of the world can be traced back to the Error, that is to say, to the overvaluing of what is seen, and the undervaluing of what is not.

The point is, a student's mind, unless he or she is exceptionally courageous, only ends up as deep as the material, in whatever field, he or she is presented with. If a pupil is only ever given tasks and problems on the level of the world-image, he or she is *never* forced to stretch downwards, *never* prompted to work on both levels of perception, *never* encouraged to conceptualise Reality, as categorically different from the world-image. And, duly, he or she ends up shallow or worse, without the tools to live a meaningful life. Lessons are dry and arid, devoid of the twinkle of genuine magic, and everyone suffers as a result. You, as a future teacher of the young, have a pressing responsibility here, as do I.

So, this short chapter is an attempt to lay cornerstones, upon which may be built (I myself hope to continue in this building) a new field of thought, in which mathematical rigour is brought to bear on the human condition. We must think boldly! What joy there is in doing so! Now, I will use some of these concepts in the second half of the book, further to elucidate the ideas I've introduced. But don't imagine these ideas to be *fixed*. There is a Brave New World out there, and it is people exactly like you who will be its custodians in the future. Don't imagine that the failures of the Establishment are fixed. All is flux, as Heraclitus said. The errors of the Establishment are only perpetuated by implicit permission of the next generation. So, let none of us shirk the duty of courage!<sup>1</sup> I will do my part; you know I will; you can read it in my words. I will stand before anyone, be he President or Pope, and call him to account with the Truth of Reality. I have thrown myself into the flow of the Universe, and I ride now under the wings of God. Nothing scares me. So, you who are brave and fledgling, do not let them scare *You*, young and full of hope, into tacit submission before the dread Machine. You are a thousandfold mightier than the Machine. Inside you, as yet untapped but waiting diligently for your offer of service, dwells a power greater than any possessed by the Money Men. That power is the Infinite, the Dao, *brahman*, the Genius inside you that speaks no words.

You, with a capital Y.

Be that part, wanting nothing, and all the world will be yours.

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<sup>1</sup>It requires no call to bloody (foolish) revolution to suggest that things can change. I mean, I'm a teacher of mathematics at old Westminster, ex of Eton and Oxford, from a family not short of Sirs, Lords and Ladies. For God's sake, how much less of a raving Marxist can you get? I'm talking about changes in schools, changes in the classroom, changes to what we *study*. Why should this not happen? Why should we not change the world for the better? Why should we not stand tall, unbowed before the grinding might of the corporate world and say: "Fuck you, with your suits and GDP mill-wheels." Why not? Only for lack of *courage*. So be bold! Be brave! Dare greatly!

# Differentiation

All perception is perception of *variation*. There is, a priori, no such thing as perception of the Absolute. And the mathematical tool for addressing variation is CALCULUS, as formulated by Newton and Leibniz. It is natural, therefore, that the overarching *idea* of projection in perception be encoded mathematically in the language of calculus. This is the “Reducing Valve”, which enacts a mapping

$$\text{REALITY} \longmapsto \text{world-image}.$$

What I am saying—and this idea is the very crux of Unity theory—is that there is a mathematically rigorous sense in which the *cosmos* itself, as we perceive it, is a set of *rates of change*. This can be seen, for instance, in the momentum operator  $\hat{p} = -i\hbar \frac{\partial}{\partial x}$ , in which an observable quantity  $p$  is *equated* with a rate. Such an idea seems curious to us, with our long and erroneous training in Western ways of thinking, because we tend to believe, with Newton, momentum to be a quantity things *have*. But that’s the whole idea behind Unity theory: the perceived reality of the cosmos simply isn’t a physical *thing*; rather, it is a set of variation data. This is not a nebulous idea; it is logically true in exactly the ways, those of mathematics and empiricism, most respected in the rational West. Consider a matter wave:

$$\Psi_{\text{matter}} = \psi_{\text{seen}}\psi_{\text{hidden}}.$$

By looking carefully at  $\mathbb{C}$ , we have seen that such Juxtaposition obeys the rules of multiplication. Furthermore, we have established that the juxtaposed factors in  $\psi_{\text{seen}}\psi_{\text{hidden}}$  act as perpendicular *components*, where  $\psi_{\text{seen}} = \phi[x, t]$  is a wave propagating in the *perceptible* dimensions of space, and  $\psi_{\text{hidden}} = \phi[W, t]$  is a wave propagating in an *imperceptible* dimension. The PERCEPTION CALCULUS depends on and is an algebraic description of this crucial fact. The relevant mapping, expressed three different ways, is:

$$\begin{aligned} \Psi_{\text{matter}} &\longmapsto \psi_{\text{seen}} \\ \text{REALITY} &\longmapsto \text{world-image} \\ \psi_{\text{seen}}\psi_{\text{hidden}} &\longmapsto \psi_{\text{seen}} \end{aligned}$$

What operation is represented by  $\longmapsto$  above? Differentiation. Here, I refer to it as a PERCEPTION DERIVATIVE; note, however, that it’s the exact same process

as mainstream, straight-up, regular differentiation, albeit applied to unfamiliar objects. The process of moving from Reality to the world-image is the finding of a rate of change. With respect to what? Now, there's a question! Differentiation *with respect to what entity* maps  $\psi_{\text{seen}}\psi_{\text{hidden}} \mapsto \psi_{\text{seen}}$ ? There is only one answer to this, which, once we have dissected it, should end up making sense to you both physically and algebraically.<sup>2</sup> The operation is

$$\frac{\partial}{\partial\psi_{\text{hidden}}}(\psi_{\text{seen}}\psi_{\text{hidden}}) = \psi_{\text{seen}}.$$

Again, don't be scared by the algebra. The above statement looks more obvious if we replace the  $\psi$  wavefunctions with real numbers  $m$  and  $x$ . I am simply saying

$$\frac{\partial}{\partial x}(mx) = m.$$

which, at the simplest level, is “the gradient of the line  $y = mx$  is  $m$ ”. We can phrase the original differentiation statement in a most poetic form. The idea for this algebraic form was suggested to me by Teddy Liu:

$$\frac{\partial\Psi_{\text{matter}}}{\partial\psi_{\text{hidden}}} = \psi_{\text{seen}}$$

We can view this elegant statement, obvious on one level and most engaging on another, as an expression of a central concept of the PERCEPTION CALCULUS. It tells us how variations  $\partial\Psi_{\text{matter}}$  of waves, *as perceived by* (read “with respect to”) variations in their hidden aspects  $\partial\psi_{\text{hidden}}$  produce a world-image, in  $\psi_{\text{seen}}$ .<sup>3</sup>

## Example 1

Consider the line  $y = 2x + 3$ . The derivative  $\frac{dy}{dx} = 2$  says “Put yourself in the shoes of a vanishingly small change  $dx$ , and consider, from your vanishingly small perspective, what change in  $y$  you see.” The idea of the infinitesimal limit

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<sup>2</sup>These are, at root, the same thing.

<sup>3</sup>The point is, relative to, i.e. with respect to, the  $\psi_{\text{mass}}$  parts of a wave, there is a logically rigorous, i.e. *mathematically describable* process whereby matter waves yield perceived amplitudes in perception. These are *exactly* the  $\psi_{\text{seen}}$  Schrödinger amplitudes predicted theoretically by the axiom of Unity, and duly observed, for almost exactly a century, in the lab. This puts Unity theory on a new footing; even its “mystical” reference to unseen dimensions, as a schizophrenic physicist would have it, is mathematically rigorous. There are *theorems of perception* to be found.

is: when you, as a small but still finite  $\delta x$ , get smaller,  $\delta y$  also gets smaller, but relative to you, i.e. with respect to you, i.e. as perceived by you, it always has size 2. You shrink like Alice, but so does what you are measuring. So, “the derivative of  $y$  with respect to  $x$ ” means: “describe  $dy$  from the point of view of  $dx$ ”.

## Example 2

Consider the complex-valued function  $z = t \times \phi[t]$ , where  $t \geq 0$  is time. This is the standard phase rotation  $\phi[t]$ , combined with an enlargement: time  $t$  is a real scalar, so multiplication by  $t$  scales away from the origin. The complex number  $z$  *spirals* away from the origin. Our derivative statement is

$$\frac{\partial(t\phi[t])}{\partial\phi[t]} = t.$$

This is trivial in a turn-the-handle algebraic sense, but we are looking for deeper understanding. In English, “*spiralling*, as perceived by its *rotation*, is *enlargement*.” In Mathemanglo-Saxon:

$$\frac{\partial(\text{Spiralling})}{\partial(\text{Rotation})} = \text{Enlargement}.$$

## Example 3

Consider the matter wave with which we derived the Schrödinger equation, factorised into its mass-energy ( $W$ ) and kinetic-energy ( $x$ ) components:

$$\Psi_{\text{matter}} = \psi_{\text{mass}}\psi_{\text{kinetic}}.$$

Differentiating both sides with respect to the component  $\psi_{\text{mass}}$  is equivalent to saying “put yourself in the shoes of the changes in the substrate represented by  $\psi_{\text{mass}}$ , and tell me what you see of  $\Psi_{\text{matter}}$ .” Now, you don’t have to work very hard here, as *those are your shoes!* Your body, as an element of the cosmos, is literally a collection of inner variation-data, i.e. MASS. You, as a set of static particles, are exactly a collection of changes in  $\psi_{\text{mass}}$ , because that symbol summarises the wave processes that go, by their variations, into generating the mass and thus the “matterness” of you, the classical, space-based person reading these pages. And what do you see of your underlying matter waves?

$$\frac{\partial\Psi_{\text{matter}}}{\partial\psi_{\text{mass}}} = \psi_{\text{kinetic}}.$$

# Integration

The PERCEPTION INTEGRAL is defined, as elsewhere in mathematics, as the inverse of differentiation. We can obviously rewrite the *differentiation* statements given in the examples above as *integration* statements, without changing their meaning. Let's run through the same examples, rephrasing the derivatives in terms of integrals. Again, this will yield unfamiliar, almost mystical notation. The concepts, however, remain precise, pointing to strict mathematical content.

## Example 1

So,  $\frac{d}{dx}(2x + 3) = 2$  can be rewritten as

$$\int 2 \, dx = 2x + c, \text{ where } c \in \mathbb{R}.$$

The only difference between the statements is that, since Absolute information is *destroyed* by the process of finding a rate of change, the  $+3$  cannot be recreated by integration. All integration statements have this  $+c$  (here,  $c$  stands for English “constant”, not Latin *celeritas*) in common. Visually, all lines  $y = 2x + c$  have the same gradients at the same  $x$  values.

## Example 2

Reversing the statement  $\frac{\partial(t\phi[t])}{\partial\phi[t]} = t$  gives

$$\int t \, d\phi[t] = t\phi[t] + c, \text{ where } c \in \mathbb{C}.$$

The real constant of Example 1 has now become complex. The overall *meaning*, however, is the same. Adding a complex number to proceedings, i.e. shifting the coordinate axes, doesn't make any difference to the relationship between spirals and rotations.

### Example 3

The integral version of  $\frac{\partial \Psi_{\text{matter}}}{\psi_{\text{mass}}} = \psi_{\text{kinetic}}$  is as follows:

$$\int \psi_{\text{kinetic}} \partial \psi_{\text{mass}} = \Psi_{\text{matter}} + c, \text{ where } c \in \mathbb{C}.$$

This represents the process of *regenerating* substrate waves from their observed  $\psi_{\text{kinetic}}$  behaviour and their underlying phase rotations  $\psi_{\text{mass}}$ , as described by Unity theory. Redundancy via a constant in the Absolute remains, of course, as it is never possible, under any circumstances, to determine the Absolute state of the substrate from its variations.

## Production

A *production*, in the arts, is a finished *product* which is *produced* from a set of raw ingredients by a *producer*. With the same etymology, a mathematical *product* is the multiplication or juxtaposition of two numbers, so as to yield their combined effect. A projector *produces* an image on a cinema screen; a 3D cloud *produces* a 2D image in perception; the fire in Plato's cave *produces* shadows on its wall. In each case, an activity (verb) leads to a thing (noun). The mathematical distinction is between

- ① Reality, in which there are activities,
- ② the *world-image*, which consists of set objects, and
- ③ the way the one PRODUCES the other.

A PRODUCTION, as I define it, enacts the mapping from the motion of a sparkler on Bonfire Night to the long bright path left seared in one's vision. In that case, with a child enacting phase rotation in the complex plane, the time variable  $t$  is projected out in perception, and what was phase rotation  $\phi[t]$  in time becomes the entire *unit circle* in the complex plane, also known as  $\mathbb{T} = \{z \in \mathbb{C} : |z| = 1\}$ . Over time  $t$ ,  $\phi[t]$  PRODUCES  $\mathbb{T}$ . I notate this

$$\mathbb{T} = \mathcal{P}_t \phi[t].$$

The PRODUCTION is a specific type of mathematical process, mapping a function, such as  $\phi[t]$ , to its *range* over  $t$ , which is the SET—take a moment to consider the etymology of the word—of its outputs. But PRODUCTION is not, itself, a *range*. The range of a function  $f$  is a set or a group  $R_f$  (such as the unit circle  $\mathbb{T}$  in the example above), whereas the PRODUCTION is the *mapping* from a function  $f$  to the set or group  $R_f$ . It's the same distinction as between a song set down as audio (range) and the production of a song (recording sessions etc.). In general, with  $x$  representing any variable,

$$R_f = \mathcal{P}_x f[x].$$

PRODUCTION is a form of information distillation. It distils down, reducing the amount of information. As an operation, it is, like differentiation, many-to-one. This can be seen by the following equation of PRODUCTIONS:

$$\mathcal{P}_t \phi[t] = \mathcal{P}_t i\phi[t] = \mathbb{T}.$$

The above is equivalent to saying “If two children twirl their sparklers in circles, one starting at the right (1) and one starting at the top ( $i$ ), then the final image PRODUCED on the retina and hence perceived, namely the circle  $\mathbb{T}$ , will be the same.”

### Example 1

If one takes the function  $f(x) = 2x + 3$  and PRODUCES it over  $x$ , then the output of this PRODUCTION will be the *range* of the function  $f$ , which is the set of all real numbers:

$$\mathcal{P}_x 2x + 3 = \mathbb{R}.$$

### Example 2

The rotation and enlargement  $t\phi[t]$ , when PRODUCED over all positive values  $t \geq 0$ , generates a *spiral*. The important thing to recognise is that, while the original function may be thought of as “spiralling”, the result of a PRODUCTION of the function is “a spiral”. This is a different kind of entity: a mathematical noun as opposed to verb, a Cartesian graph as opposed to a set of parametric equations, or a photograph of sparkler-light as opposed to the motion of sparklers.

$$\mathcal{P}_t t\phi[t] = \text{The Spiral Set.}$$



### Example 3

How is the *world-image* actually PRODUCED? This is where we forge our link between PRODUCTION and calculus. Consider the standard Unity factorisation

$$\Psi_{\text{matter}} = \psi_{\text{kinetic}} \psi_{\text{mass}}.$$

Now, PRODUCE both sides of it over the inner dimension  $W$ . Since the kinetic factor  $\psi_{\text{kinetic}} = \phi[x, t]$  is constant with respect to  $W$ , the PRODUCTION can be distributed over the RHS, giving (the  $e$  subscript refers to the electron):

$$\mathcal{P}_W \Psi_{\text{matter}} = \psi_{\text{kinetic}} \circ \mathbb{T}_e,$$

We can simplify. A complex *rotation*, as opposed to a real *scaling*, which is encoded in the amplitude  $\psi_{\text{kinetic}}$  has no effect on  $\mathbb{T}_e$ . The complex unit  $i$ , for instance, rotates every individual complex number  $z \in \mathbb{T}_e$ , but doesn't change the unit circle  $\mathbb{T}_e$  itself, i.e.  $i \circ \mathbb{T}_e = \mathbb{T}_e$ . Hence, only the *magnitude* of the quantum-mechanical amplitude, which is a real number, survives into observability:

$$\mathcal{P}_W \Psi_{\text{matter}} = |\psi_{\text{kinetic}}| \times \mathbb{T}_e.$$

The above is a statement of the mathematics underlying the *Born interpretation* of the wavefunctions of QM. In that interpretation, valid only in a narrow sense, the physical reality of a wavefunction  $\psi$  is *defined* by the fact that  $|\psi|^2$  can be read as a probability density. It was as good an interpretation as could have existed at the time. But that isn't saying much. Having lifted the bonnet of the world-image, we can see the probabilistic interpretations of QM as the Western error all over again. The reason for the emergence of probabilistic behaviour, as puzzled over by many, is that the *world-image*, which is, by necessity, produced in perception-by-electrons, is bound to contain, always and everywhere, a ubiquitous factor of  $\mathbb{T}_e$ , which appears in PRODUCTION over the electron-mass dimension  $W$ .<sup>4</sup> There's nothing spooky going on.

To close the chapter, let's put the algebra together. Combining production with our earlier derivative gives an equation of a type central to the perception

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<sup>4</sup>An electron is better thought of not as a particle, but a ring. As such, in our equations, the SET  $\mathbb{T}_e$  can be taken as a direct representation of the classical ELECTRON.  $\mathbb{T}_e$  represents "an electron in the world-image", i.e. not the *mass* of an electron, nor the *kinetic energy* of an electron, which are both rates of change, but rather the very *materiality* of the electron, as it appears (gaining "absolute" nature as Stuff) in the world-image. I believe that all classical experience-data partakes of this form.

calculus and to Unity theory more broadly. This equation isn't, unlike others in this book, to be understood immediately, but rather, like a Zen koan, to be considered slowly. It's tough, and that's the whole point. Try and get your head around it. A version of it will cast significant light on the quantum, which we will consider in a later chapter. Replacing  $\psi_{\text{kinetic}}$  in the above with its perception derivative equivalent, we reach the FUNDAMENTAL THEOREM OF PERCEPTION, in its quantum-mechanical guise:

$$\mathcal{P}_W \Psi_{\text{matter}} = \left| \frac{\partial \Psi_{\text{matter}}}{\partial \psi_{\text{mass}}} \right| \times \mathbb{T}_e.$$

# 13

## MASS AND MEANING

The harmony beyond knowing  
resonates more deeply than the known.

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*Heraclitus*

Einstein's MASS-ENERGY EQUIVALENCE,  $E = mc^2$ , has long been the most famous equation in physics. Myriad are the jokes, films and stories in which it has played the role of "Ah, there goes genius!" In *The Far Side*, Einstein's blackboard is covered with failed equations:  ~~$E = mc^3$~~ ,  ~~$E = mc^5$~~ , and so forth. Having tidied, the cleaning lady says "Now that desk looks better. Everything's squared away, yessir, squaaaaaaared away." And Einstein's eyes widen. It's an equation that is part of *everyday* culture. And it's not that  $E = mc^2$  is a grand "Theory of Everything" or some such. There are many things it doesn't describe, and doesn't attempt to describe. In fact, the equation is a fairly limited one, a special case of Dirac's later relation  $E^2 = p^2c^2 + m^2c^4$ , in which the momentum  $p$  has been set to zero. And that relation is itself a special case of the quantum-mechanical Klein-Gordon and Dirac equations.<sup>1</sup> So why, then, is  $E = mc^2$  so... *special*?

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<sup>1</sup>In Unity theory, *all* of these are special cases of the WAVE EQUATION, in which the waves have precise eigenvalues of mass. For matter, this is the *sine qua non* of observability.

The reason behind the equation's mystique, and hence its popularity beyond the physics community, is that it brings together, in a seemingly straightforward manner, three disparate concepts: ENERGY  $E$ , MASS  $m$  and the SPEED OF LIGHT  $c$ . In Newtonian physics, these had no common ground. Mass was (as it remains in the old paradigm) a number to do with “heaviness” that matter just *has*, energy was an amount of “fizz-bang”, and the speed of light was, well... the speed of light. These were chalk and cheese and something else entirely. Ushering in the bloody 20th century, during which physics would grapple with, or rather, excepting only a few, *skirt around* the falsehood of the Paradigm of Infants, Einstein stepped up to propose that chalk and cheese and something else weren't, in fact, the island concepts they had always been taken for. It was a grand unification. What a significant step it was (and yet remains) to see that MASS, the essential feature of lumpy Newtonian matter, is, in fact, *energetic*. How important to realise that matter is a *process*.  $E = mc^2$  was a warning claxon,<sup>2</sup> which blared out to science:

“ALL IS NOT AS IT SEEMS!”

The energy in  $E = mc^2$  is liberated from matter in nuclear power plants and plutonium bombs. In those *fission* reactions, controlled or uncontrolled, MASS is destroyed as heavy atoms break apart; that mass is converted, according to the equation  $E = mc^2$ , into heat, light and motion. And, as  $c^2 \approx 9 \times 10^{16} \text{ m}^2\text{s}^{-2}$ , a little mass goes a long way. The Sun's heat derives from a related process. In solar *fusion*, the nuclei of hydrogen atoms fuse together to form helium, and the masses of the nuclei so formed are slightly less than the sum of their ingredients. The difference is known as the MASS DEFECT,  $\Delta m$ , and the energy liberated, which shines as sunlight, is given by

$$E_{\text{released}} = \Delta mc^2.$$

Note, incidentally, that the formula isn't *true*; those symbols hide *infinite* detail. It's true on average. The inner workings of the substrate described by  $E = \Delta mc^2$  are limitlessly complex. Within the Sun's core, the substrate is a broiling mass of waves and wavelets, a sea of shufflings and reshufflings of unknowable shades of substance-wobble. No two reactions are ever the same, whatever the Priests of the

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<sup>2</sup>Stockholm syndrome is a bitch. People have grown to *like* the claxon sounds. I agree with Russell on this. The great problem with our undervaluing of the Deep is that it has deprived us of our trust in *ourselves*, that is, it has hobbled our natural ability to *hope*. That's why there are so many people addicted to cynicism, and why many young people have lost faith in adults.

Particle say. In every interaction, the dance is different; the original *ingredients*, indeed, were different. Substrate waves are like snowflakes. To claim, as we in the West implicitly do, that fusion  ${}^2_1\text{D} + {}^3_1\text{T} \longrightarrow {}^4_2\text{He} + \text{n}^0$  represents an Exact Process is nonsense; it's like claiming that love follows a formula, or that Led Zeppelin's *Kashmir* is "just rock'n'roll". There are formulae, yes, but Life doesn't follow them. Only fools and Policy Writers do.

Why, then, do we love a formula? A formula lets us *approach* complexity, to simplify, to work the divided flocks of the mind, to touch the hem of the soul bride's dress without being overwhelmed. Most pertinently for us, who think only with our heads (what tools!), a formula allows a cerebral, egoic being, fearful of God and the Doors of Perception, to describe heavy ideas, ideas of the Ghost, ideas that give the lie to the very notion that life can be described in concepts... in *concepts*.<sup>3</sup> Roll with the contradictions! Einstein's  $E = mc^2$  was absorbed into the mainstream because it expresses a profound truth, "The Mystery Yet Lives", a truth long yearned for by God and the people, in algebraic ingredients, ENERGY, MASS, and the SPEED OF LIGHT, which are easily visualisable by the non-specialist. Regular folk both want to get on board, and are able to. That's what Heraclitus was driving at: if you want to heal yourself, listen to the voices that sing in the Deep, the ones you *don't* really understand.

By way of comparison, consider Newton's Second Law,  $F = ma$ . That law is simpler than Einstein's, has been of greater practical importance to science, and its algebraic ingredients, FORCE, MASS, and ACCELERATION, are every bit as visualisable by the mathematical layperson. It's much more relevant to everyday life. Why isn't  $F = ma$  a trope, then, other than in school syllabuses and exam revision? Why does no one really care? For good reason. Newton's Second Law is, at least in some sense, rather *obvious*. If you push something (apply a force) it accelerates; if the mass is bigger, it doesn't accelerate as much. Big deal. The equation expresses a truth, yes, but that truth is a long way towards a truism. It's an equation of *only* the world-image. That's why  $F = ma$  holds no magic.

Truth, in the end, is an *activity*: what speaks to mind and heart is that which unifies (verb), that which heals (verb), that which speaks (verb) to the forgotten wells and raises (verb) their water to consciousness. But what is raised to the

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<sup>3</sup>To *understand* (and this is the only true goal of science) the nature of Reality, one must appreciate that *every* attempt, such as  $E_{\text{released}} = \Delta mc^2$ , to render truth in transmissible language, whether that language be mathematics or music, is not just imperfect but nowhere near. No "correct" equation of physics has ever been written down. There will never be a Theory of Everything, and anyone who claims to have produced one is an ignoramus. Unity isn't such; it is a *Contratheory of Everything*.

light is then brightly lit, and hence loses its lustre. Things only scintillate *in the dark*. This is why all those who claim to Have The Answer, and subsequently speak without self-contradiction, are peddlers of balls. The Absolute cannot be known, and what is known ceases to be the Absolute.<sup>4</sup> So the trite truths of consciousness, of which Newton II is one, are, once absorbed, children's toys.

$E = mc^2$ , however, is packed full of *mystery*. It has remained piquant for a long century because, despite the claims of many Professorial shallow-pates, *its truth has not yet been absorbed*. Its meaning, which is most profound, remains on the To-Do List of Culture. That's why the Zeitgeist wanted it. Everybody knows, deep down, what medicine they need; they only need find the courage to take it. The same is true of civilisations and epochs.  $E = mc^2$  combines together, in paradoxical fashion,<sup>5</sup> three readily visualisable concepts that should, according to the Western paradigm, have nothing to do with each other. Einstein's equation is like a little scientific haiku: a poetic juxtaposition of three ideas, mundane and aethereal, into something that glitters. Generations on, it *still* points to the deep.

MASS, as far as the White Man is concerned, is an "amount of stuff." Mass is "how heavy something is". And we measure and experience this idea of *heaviness* by how difficult it is to accelerate something, either upwards against gravity, or along a road for an object like a push-bike. These concepts are formalised in  $F = ma$ . We think of mass as the quality an object has, quantified to a number in kilograms, that makes it resist being pushed around. To determine something's mass, in a classical sense, one simply pushes it, and calculates its acceleration. Divide the one by the other,  $m = F \div a$ , and there you have it. The point is: MASS, as we understand the thing, is a *classical* concept through and through. Why was Newton's system, laid down in the *Philosophiæ Naturalis Principia Mathematica* in 1687, so successful? Why did it take over the White Man's world? It is not that it was new. No. New truths don't take quickly; only old desires do. Rather, it encapsulated exactly the mode of thinking that was *already* in situ, to which the Western mind was *already* addicted. Newton didn't invent the shallow scientific way of thinking. Rather, his (very significant) talent was mathematical: he found a way of encoding the memes already present in the post-Hellenic psyche into a rigorous system built on algebraic symbols.

The system took like wildfire.

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<sup>4</sup>In attaining enlightenment, knowledge of one's mind undergoes an *enantiodromia*, from total self-knowledge to none. The mind's self-concept evanesces, leaving only Mind. One is aware, however.

<sup>5</sup>With characteristic quality, Niels Bohr said: "How wonderful that we have met with a paradox. Now we have some hope of making progress."

Note, however, that science didn't take in the East. China, despite its highly cultivated society which has, at many stages of history, been more advanced than that of the West, has produced comparatively little original science, and next to none before the last few decades. The White Man assumes, of course, that this is due to his rapacious intellect. And that's true, but it isn't a compliment. Science didn't take in the East because they weren't stupid enough to buy into it *wholesale*; science, which is one way of thinking among many, didn't chime there. Classical physics, encapsulated in the person of Sir Isaac Newton, was a brilliant encoding of the *Western* error, which the East didn't make, or at least not until recently. Only Europe, and particularly the Anglo-Germanic peoples of the North-West, made the terrible mistake of *Gegenstand* reification, of full Conceptualisation, of hypostatising MATTER, the word.<sup>6</sup>

ENERGY, from the Greek *en-ergon*, literally "inner work", is another everyday word. We use it liberally to refer to people, to books, to music, to parties, to nations, to anything and everything that moves or doesn't. It refers to the Level of Activity, the buzz, the heat, the propensity to create or change or destroy; it's the amount of get-up-and-go, the quantity of "fizz-bang". If you refer to a child, a city, a people as "energetic", the idea is universally understood. At one degree of abstraction, then, ENERGY is also the *potential* to generate such fizz-bang. Despite its meta nature, this idea is every bit as familiar as its visible parent. We pay our "energy bills", buying the stored possibility of future warmth. A stick of dynamite has energy, whether the fuse is lit or not. Energy is parcelled up and sold; huge empires are built trading in it and its derivatives.

*Perceptible* energy is KINETIC, to be seen in the coherent  $\psi_{\text{seen}}$  velocities of cars or the incoherent temperature of lava. It is energy on the stage of the world: the motion of the actors themselves, as they perform in the theatre of perception. *Imperceptible* energy is POTENTIAL, then: the chemical energy in  $\psi_{\text{hidden}}$  batteries, the elasticity of coiled springs, the gravitational menace of a sword of Damocles.

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<sup>6</sup>As I write, even with the power of God behind me, it is impossible for me to convey, nor you to read, nor anyone to understand in English, the sheer depth of misunderstanding inherent in the idea (if read naively at the level of science) that *There are Things with Mass*. "Things" is a word, and "Mass" is a word. Neither is what is alluded to; what is alluded to, indeed, is not a Thing. There are no Things. Of all the concepts of physics, classical MASS, which, alone among the Great Leaps Outward of that world-worshipping thus world-destroying era, still retains its aristocratic fiefdom, is at once the most erroneous and the most illuminating. It is concretisation concretised: a glib assumption, without basis other than in naive perception, that there is some magical (there's the schizophrenia again) ticker matter has, with MASS and a number printed on the front, which allows it, by the design of the god Mathematics, to hog the stage. And we wonder why our sickness is *Material*-ism.

It is the energy *behind the scenes* of the world-image, the trapeze artist readying for a swing, the bucket of water above the door. And in *both* senses, perceptible or not, the classical concept of mathematical physics, ENERGY, expressed in the algebraic value  $E$ , fits our everyday concept. That is why we understand it.

- ① KINETIC ENERGY, as a pre-quantum concept, is calculated from mass and velocity as  $\frac{1}{2}mv^2$ . The *heavier* something is and the *faster* it is moving, the more energetic it is. Well, obviously! Just ask a boxer or a rugby player.
- ② GRAVITATIONAL POTENTIAL ENERGY is  $mgh$ . Heavier objects in stronger gravity stored higher up contain more potential energy. Well, obviously! This is so well understood, it has its own proverbs: “What goes up must come down.” “The bigger they are, the harder they fall.”

According to these classical concepts, the proportionality  $E \propto m$  isn't all that strange. Physicists and laypeople alike are accustomed to energy being stored in something as a POTENTIAL. Put a heavy object on a high shelf, and you've packed a lot of GPE into it; stretch the wood of a bow, and you've given it the chance to fire an arrow; charge up an electronic device's battery, and you've stored, in its chemicals, the ability to power the electronics. So, it is a natural idea to imagine that MASS itself could be a store of ENERGY, and hence that MASS and ENERGY might be related by  $E \propto m$ , or equivalently  $E = km$  for some constant of proportionality  $k$ . Where it gets curious, however, is in the SPEED OF LIGHT.

The speed of... *whaaaaaat*?

Remember that  $E = mc^2$  refers to *massive* objects, i.e. MATERIAL, things like cars and people. These do not, as the White Man's Tale goes, move at the speed of light. Indeed, as far as the Western mindset likes to imagine, the very *definition* of these things is that they do not move at the speed of light. The speed of light is reserved for LIGHT and other forms of RADIATION. So, it is entirely extraordinary, if one views Reality, as the materialistically misguided do, as a three-dimensional box with stuff in it, to see the speed of light appearing in an equation of *resting* matter. Literally,  $E = mc^2$  says: “the amount of fizz-bang stored in a resting car is given by the amount of car multiplied by the square of the speed of light.” It is most revealing, when analysing the psychology of *Homo Occidentis*, to ponder how so many generations of intellectuals could have avoided the truth of this fact.<sup>7</sup>

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<sup>7</sup>A theory-bound mind resists, with the utmost ferocity, any attempt to bounce it out of its ways, because to have one's theories swept aside is to come face-to-face with the Godhead, the Clear Light, *Mind In The Raw*. Make no mistake; if one has spent years blockading the bridge, this is terrifying.



The power of groupthink cannot be overstated. And I'm not talking about the groupthink of a small clan of echo-chambered physicists, nor of rationalists, nor old Europeans, nor new Americans, nor any set of people. I'm talking about groupthink on a hitherto unimagined scale: the scale of civilisations and epochs. I'm talking about a systemic, endemic groupthink that has existed in the West, unchallenged in the mainstream, barely even mentioned as a possibility, since the Hellenic and pre-Hellenic days *when we began to conceptualise*. I'm talking about an error of thought, a delusion about what Reality is, that has literally *never* been addressed in the culture of the White Man: a continuum of delusion from the unconscious days when we worshipped Eostre. This is what I mean about this book, and Unity theory more generally, being an instance of what Nietzsche referred to as the "conscience of the age".

What mighty work is laid before us all.

Einstein's MASS-ENERGY EQUIVALENCE sparkles, because, when it is looked at with sufficient simplicity (only a clear mind can do this), it blows the old paradigm to smithereens. Its sparkle is that quiet voice which whispers, in all the deep places of life, "It's here, my friend, the cure you need." So, the old timers of Dull Dull Dull want to view matter as a "stuff," something that sits in space fatly, doing nothing; what absolute twaddle!  $E = mc^2$  states that the massive energy stored in a "motionless" particle such as an electron is calculated according to the *speed of light*. That's the *only* physical constant that enters into the equation; it's the only relevant fact. So, what is the only possible conclusion? Christ, how *obvious* can it be!? A PARTICLE is not, in fact, fat stuff. It is *evidently* moving at the speed of light. And, clearly, since the motion results in an effectively stationary *image*, that of a perceived particle, such motion at the speed of light must be constrained... to a circle or something like one. Sounds familiar, yes? And what do we have? Unity theory, again. This is precisely the (Inner, Outer) formulation that I set up in the first half of this book.<sup>8</sup>

For purposes of understanding  $E = mc^2$ , you've already done all of the heavy lifting; the Schrödinger derivation contains this book's toughest algebra. We need little that's new: we can use the same waves and wavefunctions, the same complex numbers. On the  $(x, W)$  cylinder, with its perpendicular  $(\psi_{\text{seen}}, \psi_{\text{hidden}})$  wave components, you'll be able to see what  $E = mc^2$  *means*. Once again, take courage; believe this possible.<sup>9</sup> Out spake brave Horatius, Captain of the Gate.

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<sup>8</sup>As the second major piece of evidence appears, take note: by this stage, the Unity model is no longer hypothetical. It deserves, until dethroned by something better, status as empirical Fact.

<sup>9</sup>Goethe wrote, beautifully, "Be bold, and mighty forces will come to your aid."

Why *not* understand it? Why *not* haul yourself out of the plastic morass? Why *not* cure yourself of the groupthink of chimps, to consider Reality as it actually is, in all its material majesty, in all its complexity, in all its *depth*, rather than as aeons of duff education (read “dogmatic brainwashing”) have taught us it is? It’s a choice. Existence as a deep, Infinite being, joyously present in all you do, loving freely, firmly, vigorously, is open to you, if you can only find the courage to step onto the soulbridge, go down within, and face your inner dragons.<sup>10</sup>

If you are a mathematical layperson, have no fear; the algebra here is easier than in the last part. And every symbol, as before, as ever, stands for something visualisable, even if that something isn’t directly perceptible. Every symbol stands for something REAL. That’s the beauty of the Higher Physics, the Deeper Physics that, if folk have the guts for it, will emerge in the new paradigm. Every piece of it has the *chance* of making sense. Naturally, you may not get it all at once, but you *can* get it, regardless of your level of mathematical training, because there is understanding to be had. Physics (language: abstruse mathematics) went the way of theology (language: archaic Latin), but it doesn’t have to be so; mathematics isn’t some clandestine gobbledegook only comprehensible to the select few; like Latin, it’s just another language. Learn what the symbols actually *mean*—this is outright impossible in the old paradigm—and you’ll feel right at home.

All you need do is open your mind.

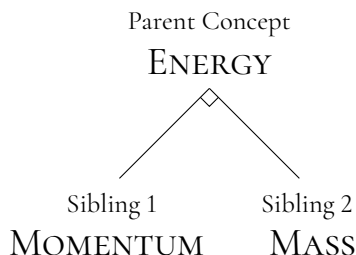
## Energy Seen and Unseen

To understand ENERGY and MASS fully, one more concept is needed. This concept forges a link with the perceived reality of the lab or the street. Such a link is, of course, essential. There’s no point wittering on in mystical fashion about  $\psi_{\text{hidden}}$  and the Higher Dimensionality of God if one can’t back it up with data. Yes, *data*. Just because I am possessed of the Fury, bound to lambast the wieners of materialism, doesn’t mean I don’t use data of the material world to do that very lambasting. I’m a fan of matter; *je vois Dieu dans les sourires des filles aux cils doux*. My lambasting of Big Science isn’t an instruction to use less information. On the contrary. I suggest being a hyper-rational empiricist, a philosopher and thinker, a lover with an eye for mathematical proof. I’m not arguing against using data; I’m suggesting that we should *actually* do so.

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<sup>10</sup>They won’t kill you. Far from it. In the end, as in every story ever, you’ll *ride* them.

The concept MASS, whose previously unexpected “rest” energy Einstein described in  $E = mc^2$ , is united with perception by its sister concept MOMENTUM.



The energy in momentum is *kinetic* (from Greek *kinein*, to move). MOMENTUM, like its parent ENERGY, is a familiar, classical idea. The original pre-Newtonian definition of MOMENTUM (from Latin *movimentum*, movement) is uncomplicated:

$$p = m \times v$$

“Quantity of movement is heaviness times velocity”

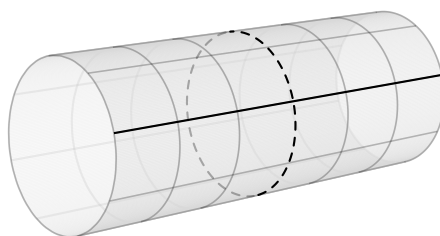
Beyond its original, classical definition, MOMENTUM also has a rigorous definition in quantum mechanics, which I’ll lay out shortly. That newer definition, which has been around for a century, broadens the classical one from particles to their underlying waves. The classical and quantum definitions are consistent with each other, the latter being a generalisation of the former.

To physics, MOMENTUM and ENERGY are old and trusted friends. Our task is to *extend this trust*, this transparency of concept, to momentum’s sibling, the somewhat tangible, yet still opaque, MASS. Unity is the first theory of which I am aware to give rigorous and empirically verifiable meaning to the word “mass”. The reason for this is fundamental; it is the paradigm shift in microcosm: ENERGY is a measure of the rate at which a wave is undulating; MOMENTUM is a measure of the rate of undulation in the *outer* dimensions; MASS is a measure of the rate of undulation in the *inner* dimensions. The meanings of the three fundamental concepts of physics, as they pertain to the  $(x, W)$  cylinder, are as follows.<sup>11</sup>

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<sup>11</sup>Note that, as per our earlier discussion regarding variation-data (the fact that a horse is picked out of a photograph by “gradient of horseness”, not “amount of horseness”) each concept is necessarily defined, below the level of perception, as a VARIATION.

- ① ENERGY is *variation* in time  $t$ . This is the overarching concept. It is involved in *all* variation, perceptible or imperceptible, and has an explicit definition in the old paradigm.
- ② MOMENTUM is *variation* in  $x$ . This is *perceptible* variation along the solid axis (space) depicted below. Being perceptible, momentum has an explicit definition in the old paradigm.
- ③ MASS is *variation* in  $W$ . This is *imperceptible* variation along the dashed axis (a closed, circular dimension) depicted below. Being imperceptible, mass has *no* definition in the old paradigm.



Momentum and mass axes in  $(x, W)$

In QM, as everywhere in physics, ENERGY and MOMENTUM can be calculated in meaningful mathematical operations, whereas MASS must be simply be plugged in by a human at some point, as an abstracted quantity. There is no mathematical link with deep Reality; MASS is a magical token that matter somehow just *gets*. Real physicists have long noted that this is a sorry state of affairs. Feynman said:

“Throughout this entire story there remains one especially unsatisfactory feature: the observed masses of the particles,  $m$ . There is no theory that adequately explains these numbers. We use these numbers in all our theories, but we do not understand them – what they are, or where they come from. I believe that from a fundamental point of view, this is a very interesting and serious problem.”

In Unity theory, MASS is as visualisable as MOMENTUM. Indeed, according to the axiom of Unity, they are, *mutatis mutandis*, the same concept. The only difference, as so often in Unity theory, is between variation in the *inner* and *outer* dimensions. MOMENTUM is change in  $x$ ; MASS is change in  $W$ . The former is perceptible as

motion through space; the latter is not, and manifests as the opaque idea MASS. Both require change in  $t$ , which is the overarching concept, ENERGY. Putting them together, then, is as elementary as Pythagoras, because, while the world-image consists of the three perceptible dimensions ( $x, y, z,$ ) of space, the  $W$  dimension is at right angles to all of them.

Don't shy away from this fact; embrace it with courage.

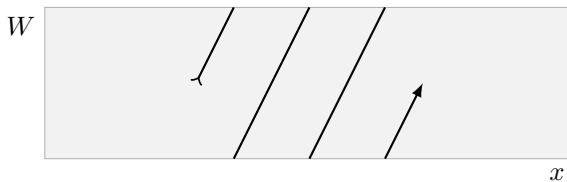
Consider the book in your hands. Move it left and right, and, in doing so, you give it perceptible MOMENTUM. The movement of the book-image is, behind the scenes, a slight *tilting* of the inner wavevectors producing the Book in the first place; this leads to a slow propagation in space. MASS is at right angles to all that. Now, you can't move the book *perpendicularly* to the world, since, as an object in perception, its very domain of existence is the world. However, I'm sure you *can* appreciate that, according to  $E = mc^2$  and the Schrödinger equation (and much more besides!), every bit of matter that makes up the book *consists of* motion in a circle. You can appreciate that the book is a projection of circles, and that those circles are, therefore, at right angles to the world-image.

If the world-image is playing on a cinema screen, then MASS is the energy produced by the projector. When the Millenium Falcon zips across the screen, that's MOMENTUM; MASS, then, is more fundamental. Cinematography might be energetic or not, but it only gets to be cinematography in the first place by dint of the energy produced by the projector. What *makes* the Falcon-image is at right angles to whatever the Falcon *does*. This is a hard idea, because one can't place it in space. But we human beings have such powers of imagination. Even imagining the process of imagining something is enough to bring about one's first steps. All you have to do is take on the idea that "The book's MASS consists of wave motion around a circle at right angles to the world-image", and your mind starts working on ways to see it. It won't happen all at once; it might take years, but it *will happen*. Think in this mode for a while, and it will seem natural. Keep thinking in this way, and the old paradigm will seem flat. Do it for long enough, honestly, always listening for the voice of your soul, and, cured of the Western error, you will attain enlightenment.<sup>12</sup>

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<sup>12</sup>By enlightenment, I'm talking about eternal liberation from the bondage of pain, heart bliss, meaning, the enjoyment of everything, love and the fabled Happily Ever After. Sound good? Haha. Thought so. It exists, simple as that. Enlightenment isn't some voodoo, some nebulous Eastern shamanism, no. It is a Real thing, a fact backed up with data, empiricism of the soul owed to God. It is emancipation all the way to the heart. I know, because I have been lucky, strange and brave enough to attain it. Trust me. About some things, you just know. And how do you get there? You just look at

Undaunted, picture once again the  $(x, W)$  cylinder:



We know that the above represents a *fast-moving* electron.<sup>13</sup> In the diagram, the perceived speed rightwards is around half the speed of light. Such a particle is usually referred to as *relativistic*, since Einstein’s SPECIAL THEORY (of relativity), of which the equation  $E = mc^2$  is a key element, governs behaviour. We’ll look at the rest of that theory in the next chapter, seeing *why* the classically curious phenomena (stretchy spacecraft and slow-running clocks) occur. Before we can do that, however, we need a clear understanding of the mathematical meaning of the words “energy”, “mass”, and “momentum”. Only with such understanding can we fully process the *implications*<sup>14</sup> of the equation  $E = mc^2$ . So, before we go the Full Algebraic Monty, let’s make our qualitative rate-of-change ideas a little more precise, in proportionality.<sup>15</sup> Heading for the orphan  $m$ , we begin with the old and trusted friends  $E$  and  $p$ .

## Energy $E \propto \frac{\partial}{\partial t}$

The first quantity, the  $t$ -rate, is a measure of how *violently* you would be shaken about if you were a substrate duck floating on the  $(x, W)$  cylinder. With the partial  $\frac{\partial}{\partial t}$ , we fix  $x$  and  $W$ , which implies that you (if you picture yourself as a substrate duck) aren’t surfing with the waves like a dolphin, but rather are letting the swells pass beneath you, bobbing around in one place. The “rate of bobbing about” is encoded in  $\frac{\partial}{\partial t}$ . Visualising the cylinder, in this manner, as a stormy sea is almost entirely accurate, except for the fact that our waves oscillate

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Reality in the right way, recognise what’s important, and live with unrelenting honesty and courage. Bigger it up enough times on the way, and you’ll begin to see.

<sup>13</sup>In the above, where propagation is angled significantly away from  $W$ , the Schrödinger equation breaks down. Here, the one part in a billion error term would be more like one part in ten.

<sup>14</sup>That’s all I’m trying to do here. I’m not trying to persuade you that Unity is best. My commitment to the Deep is greater than that. I’m trying to give you the eyes with which to see for yourself.

<sup>15</sup>The symbol  $\propto$  means “is proportional to”, so  $a \propto b$  means  $a = kb$  for some constant  $k$ .

(the substrate expands and contracts) in two dimensions rather than one: our substrate duck has both  $\updownarrow$  and  $\leftrightarrow$  to contend with. The water wobbles like this:



ENERGY, which is the  $t$ -rate, viz. “how quickly things are changing”, is just the local violence, at an  $(x, W)$  point, of the substrate sea. Where and when there is *high* energy, a hypothetical substrate duck is thrown around with *high* frequency (many oscillations per second), while at a point with *low* energy, it is rocked gently with *low* frequency (few oscillations per second).<sup>16</sup> Because this quantity depends only on time, it has no sense of direction. This is what gives ENERGY the umbrella role at the top of the hierarchy of concepts: whatever undulation there is, it involves change over *time*  $t$ . At a location with high energy, there is rapid undulation; at a location with low energy, there is slow undulation. Taking the slow-undulation limit of this equivalence: at a location with *zero* energy, there is no undulation. This is blank, featureless substrate, such as creates an image of the spatial vacuum; a state of zero energy is empty space in which nothing changes; the substrate stretches out flat like a mill-pond.

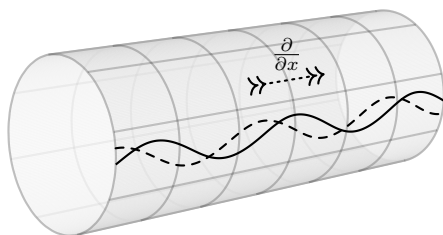
## Momentum $p \propto \frac{\partial}{\partial x}$

The  $x$ -rate, then, as another partial derivative, treats  $t$  and  $W$  as constants. We look at what would happen under changes in  $x$ , if nothing else were allowed to change. The idea can be pictured, then, in a static (time-frozen) snapshot of the same  $(x, W)$  cylinder. *Pause* the film of the stormy sea. This time around, move (as the hypothetical substrate duck)  $x$ -wards along the snapshot, and consider the rate of undulation per metre of  $x$ . That’s MOMENTUM, at a wave level. Now, this can seem curious, since CLASSICAL MOMENTUM is about *quantity* of movement. After all, a gradient in a frozen snapshot isn’t movement; it is a stationary slope. But, in the physical medium of the substrate,  $x$ -variation is not independent of

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<sup>16</sup>Note that the *height* of the waves isn’t relevant to our calculations here; we are only thinking about *rapidity*. The same is true with momentum and mass. This isn’t to say that the absolute size of substrate waves is irrelevant in a physical sense; indeed, wave size must certainly have a major effect on the likelihood of interaction with other waves. But the *absolute* magnitude of a substrate wave is not observable, because it isn’t a variation. Hence, magnitude is only observable in a probabilistic sense. This is why the wavefunctions of quantum mechanics are generally *normalised* to unit size.

$t$ -undulation. If there is  $x$ -variation (wave slope) in a *paused* snapshot of the sea, then one can be sure that, when the film is *unpaused*, any floating substrate ducks will be thrown about vigorously.<sup>17</sup> That's equivalent to saying that WAVE momentum *generates* PARTICLE momentum at the level of the lab. The same word “momentum” has two (linked) meanings.



Momentum as an  $x$ -rate in a  $(W, t)$ -snapshot

Nevertheless, despite its subsequent generation of classically observable motion, the substrate-level momentum is calculated *solely* from the individual snapshots, not from the film. This is the quantum definition of  $p$ : a partial derivative with respect to  $x$ . It boils down to this: take a *snapshot* of the stormy sea on the  $(x, W)$  cylinder—this is depicted above with two dimensions of polarisation as out-of-phase sinusoids—and run your finger across it rightwards in  $x$ . Count the rate (this is  $\frac{\partial}{\partial x}$ ) at which you pass crests and troughs, and you have the definition, prior to scaling into appropriate units, of MOMENTUM at the substrate level.

$$\text{Mass } m \propto \frac{\partial}{\partial W}$$

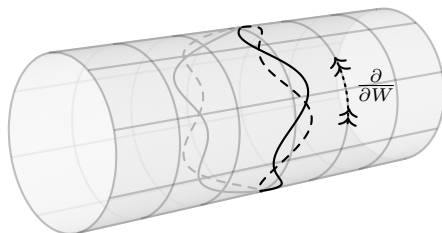
The two definitions already given—ENERGY as a rate with respect to time  $t$ , and MOMENTUM as a rate with respect to space  $x$ —are standard in QM. It isn't at all clear, in the old paradigm, what on Earth<sup>18</sup> is waving in  $\psi_{\text{seen}}$  in the first place, but the mathematical relationship of energy and momentum to the  $t$ - and  $x$ -rates of  $\psi_{\text{seen}}$  is, in the old view, well understood. So far, so world-image ordinary... Into the Great Beyond we go! Consider MASS, an orphan no longer. MASS is just the  $W$ -rate. While MASS, in kg, and MOMENTUM, in kg m/s, have different

<sup>17</sup>Kinetic energy and momentum are two ways of looking at the same  $[x, t]$  motion: the former from the point of view of  $t$  changes, the latter from the point of view of  $x$  changes.

<sup>18</sup>What is waving is not on Earth; rather, the Earth is the very waving of the waves!



units, the two concepts are, *mutatis mutandis*, the same. The MASS  $m$  of a wave on the substrate-level cylinder, subsequently seen as the MASS  $m$  of a classical particle in perceived reality, is just the rate of undulation in the  $W$  direction. It is momentum, albeit in a different direction and expressed in different units. But neither of these are fundamental differences, in a physical sense at the level of Reality. While the mathematical description may be different, while the concepts as they present to the Western mind may be different, the physical substrate is doing *exactly* the same thing in both cases.



Mass as a  $W$ -rate in an  $(x, t)$ -snapshot

To picture the substrate-level MASS, pause a snapshot of a stormy sea on the  $(x, W)$  cylinder, exactly as before. According to partial differentiation, treat both  $x$  and  $t$  as fixed. So, this time run your finger (or imagine a hypothetical substrate duck swimming Matrix-style through a frozen picture) around the  $W$  circle. Count the rate at which you pass crests and troughs, convert the units, you have the quantum-level MASS. It's as simple as that. Mass is just momentum orthogonal to perception. Where momentum is the movimentum of matter, mass is the movimentum that *makes* matter.

## Eigenvalues and Operators

We can now translate into fully-fledged algebra. Defining our three variation concepts formally as OPERATIONS allows us to open the bonnet of  $E = mc^2$ . The understanding we gain in doing so is, pleasingly, independent of the confusing, empirically unjustified, and, in the end, plain fallacious, *principle of relativity*.<sup>19</sup>

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<sup>19</sup>This return is long overdue in social philosophy as well as in physics. In the 19th century the old (incorrect) religious *absolute* gave way to the human *relative*. The only problem being, the human

Einstein, I am sure, as a most admirable thinker and man, would have welcomed an empirically justified dethroning of his adopted principle.

Consider now, in our frozen snapshot, the rates of change with respect to both  $x$  and  $W$ . These are the perpendicular MOMENTUM-values and MASS-values, wave-slope values which are as variable, from location to location, as the waves are themselves. In combination, taken over all  $(x, W)$  locations, they describe the full state of the sea, and determine what happens when you press... PLAY. Waves charge about like mad things! Now, if the stormy sea were an arbitrary chaos of choppy waves and wavelets, then some very complicated mathematics would ensue. We, along with our pet substrate duck, would end up rather queasy. However, such chaotic seas aren't relevant to us here; they don't yield *perceptible* behaviour. They only feature in physics at many degrees of abstraction.<sup>20</sup> Their rates  $\frac{\partial}{\partial x}$  and  $\frac{\partial}{\partial W}$  are choppy, that is to say, all over the shop: they don't have their "own-values", or *eigenvalues*, of MOMENTUM and MASS, such as could be extracted as empirical data by a piece of lab equipment.<sup>21</sup>

PARTICLES, on the other hand, as opposed to any old imperceptible substrate wavelets, are regions of the  $(x, W)$  cylinder hosting *coherent* substrate waves, i.e. waves with well-defined (at least somewhat) directions of motion. An electron isn't a feverish chop of white water rushing helter-skelter, but rather an elegant rolling break. PARTICLES are waves a dolphin could surf. In particular, while the momentum of an electron-wave can vary somewhat,<sup>22</sup> the rate of change around the  $W$  dimension, i.e. the MASS, must instead be *very precisely* defined. While the  $x$  dimension of space is effectively open and oceanic, the closure of  $W$  dictates that, physically, substrate waves travelling in  $W$  have to loop back on themselves over a very small distance (around 1 picometre). This dictates precise coherence. In other words, a matter particle must have an exact (or very close to exact) MASS

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*relative* is not only incorrect but also chickenshit. It produces hordes of mumbling gimps with nothing to say for themselves but "Waaaaaah." With a deepening of Reality, however, we can return to the new (imperceptible) *Absolute*, and set aside all that snowflakery. All is in flux, yes, but *nothing* is relative.

<sup>20</sup>They are so-called "virtual" particles. These appear throughout the mathematics of quantum field theory. They should, of course, therefore be considered every bit as real as so-called "real" particles. I have identified them, by the name *incomplete* or *sub-quantum* particles, as making up *dark matter*.

<sup>21</sup>This is like the drunk searching for his keys in pools of streetlight. It's not that he *dropped* them where there was light, but that there is no hope of *finding* them elsewhere. Likewise, there are infinitely many substrate configurations which do not produce eigenvalues of mass and momentum; but they cannot be observed, since observation, down at this level, is precisely extraction of an eigenvalue.

<sup>22</sup>This variation is the content of the famous *uncertainty principle*, in which a particle (because it's really a wave) cannot be tied down to a specific location and momentum. In Unity theory, the *uncertainty principle* is trivial: you obviously can't pin a wave down.

EIGENVALUE  $m$ . That's the definition of MATTER, indeed. Hence, electrons and protons, despite not having any fundamental stuff to them, despite not having specific • locations, nevertheless have apparently “fixed” values for mass-energy. These values are not, in fact, truly fixed, since, in the substrate, *nothing* ever is (rest energy changes in a gravitational field, for instance), but they remain, in the world-image, as fixed as something can be. That's why  $m_e$ , “**the** mass of **the** electron”, is a fundamental constant in old-paradigm physics, as it remains in the quantum-mechanical aspects of Unity theory.

## Energy in the Schrödinger Equation

Consider, once again, the free Schrödinger equation in 1D:

$$i\hbar \frac{\partial}{\partial t} \psi_{\text{seen}} = -\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} \psi_{\text{seen}}$$

This equation, as we now know, governs the visible  $\psi_{\text{seen}}$  components of low- $v$  waves, with inner components  $\psi_{\text{hidden}} = \phi[\mu(W - ct)]$ . We can now begin to interpret the thing not just mathematically but in terms of *physical* quantities. Consider the left-hand side. It is proportional to the  $t$ -rate, i.e. the ENERGY of  $\psi_{\text{seen}}$ , with (rotation and scaling) constant of proportionality  $i\hbar$ . Indeed, as we will see, the constant of proportionality  $i\hbar$  is there so that the left-hand side is *exactly* the ENERGY of the wave.<sup>23</sup> By Schrödinger's design, his equation is an ENERGY EQUATION. The left-hand side says: “The energy of the wave  $\psi_{\text{seen}}$  is...” And the  $i$  and the  $\hbar$  are there precisely because we *don't* want  $\otimes i$ , which is complex rotation by  $90^\circ$  in  $\mathbb{C}$ , or  $\times \hbar$ , which is scaling by Planck's more modern quantum constant, to figure in the classical, perceived energy. The concepts ENERGY  $E$ ,

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<sup>23</sup>The Planck constant  $\hbar$ , the quantum, also has precise physical meaning. I'll postpone discussion of that meaning for a while longer, however. For now, we can continue to treat  $\hbar$ , which appears throughout this chapter, as simply as a converter between the *units* of Reality and perceived reality. The transition from substrate-level wave to perception-level particle involves a certain fixed scale factor: the QUANTUM. This is ubiquitous. The Planck constant  $\hbar$ , the QUANTUM, is the scale factor that turns wave rates, which have units of *cycles per second* for ENERGY and *cycles per metre* for MASS and MOMENTUM, into perception-level particle quantities, which have units of Joules for energy, kilograms for mass, and kilogram metres per second for momentum. For now, you can think of  $\hbar$  as simply the exchange rate between wave currency at the imperceptible substrate level and particle currency at the perceptible laboratory level.

MOMENTUM  $p$  and MASS  $m$  were defined to match classical experiment centuries before the quantum and wavefunctions such as  $\psi_{\text{seen}}$  came along, and, therefore, the relationships between them were defined without any reference to helical  $i$  rotations and the Planck constant  $\hbar$ . Hence, our new definitions require explicit reference to these factors, in order to *eliminate* them. Let's see how this works.

## The Quantum Energy Operator

By finding the rate of change with respect to  $t$ , we are calculating (albeit not yet in the correct units) the ENERGY. Now, we don't yet know anything firm about  $\psi_{\text{seen}}$ , so let's leave that aside for the moment. As before, we'll return to it once we've got our bearings. What we do know about, however, is the precise form of  $\psi_{\text{hidden}}$ , because it was this form that gave us the Schrödinger equation. We know that  $\psi_{\text{hidden}} = \phi[\mu(W - ct)]$ , where  $\mu$  is given by the inverse reduced Compton wavelength  $\mu = \frac{mc}{\hbar}$ , and where the  $\phi$  function rotates at 1 unit of unit-radius arc per second. Let's consider the ENERGY stored in  $\psi_{\text{hidden}}$ , which is the energy stored in the very materiality of a Schrödinger electron. To extract this information, we calculate the  $t$ -rate of the wave  $\psi_{\text{hidden}}$ :

$$\frac{\partial}{\partial t} \phi \left[ \frac{mc}{\hbar} (W - ct) \right]$$

This is equivalent to asking “How quickly is the substrate sea modelled by  $\psi_{\text{hidden}}$  undulating?” This question, if the wave is *very* well-behaved, thus perceptible in the laboratory, will have a single answer, namely the particle's “own-value” of energy. Laying the eigenvalue extraction out with explicit subtitles:

$$\left. \begin{array}{l} \text{Rate of change is the ratio} \\ \text{Vanishingly tiny change in the output of [the phase function } \phi \text{]. The limit of...} \end{array} \right\} \frac{\partial}{\partial t} \phi \left[ \begin{array}{l} \text{Mass in units of momentum: the fixed twist-rate in } W \\ \frac{mc}{\hbar} \left( W - ct \right) \\ \text{Propagation around } (x, W) \text{ at } c \\ \text{Planck's constant, which converts to classical energies} \end{array} \right] \left. \begin{array}{l} \text{Vanishingly tiny time interval with respect to which } \partial\phi \text{ is seen. The limit of...} \end{array} \right\}$$

We already have the tools for this: the calculation of the  $t$  derivative is the same as in the Schrödinger derivation. The only difference is that we now have a value, empirically verified, for the wavenumber  $\mu = \frac{mc}{\hbar}$ . Remembering that the phase function differentiates as  $\dot{\phi} = i\phi$ , an application of the operator  $\frac{\partial}{\partial t}$  gives the original wavefunction  $\psi_{\text{hidden}}$ , with factors of  $i$  and  $\frac{mc}{\hbar} \times -c$ . Simplifying this, we get the  $t$ -rate of  $\psi_{\text{hidden}}$  in terms of  $\psi_{\text{hidden}}$ :

$$\frac{\partial}{\partial t} \psi_{\text{hidden}} = -i \frac{mc^2}{\hbar} \psi_{\text{hidden}}.$$

In English, the operator  $\frac{\partial}{\partial t}$  *extracts* the quantity  $-i \frac{mc^2}{\hbar}$  from the wavefunction  $\psi_{\text{hidden}}$  (the component which contains the “materiality” of the particle), and produces it as an EIGENVALUE multiplying the original wave. Now, as Einstein discovered and has been measured empirically a billion times, the ENERGY in the MASS of a resting particle, i.e. the energy in  $\psi_{\text{hidden}}$ , is given by the unit conversion  $E = mc^2$ . This was discovered by Einstein in 1905, but already fixed, implicitly, in Newton’s day. Even at that stage, the words “mass” and “energy” had already crystallised, in the dens of Western Europe, to their currently accepted meanings. So, if we are to define an ENERGY OPERATOR consistent with the lab, we need to produce not the scaled rotation  $-i \frac{mc^2}{\hbar}$ , which appeared above, but rather the real-numeric  $mc^2$ . This is easily done. All we have to do is multiply by  $i\hbar$ . This is a simple unit conversion, combined with a translation back from  $\mathbb{C}$  to  $\mathbb{R}$ . Enacting the relevant multiplication, we get

$$i\hbar \frac{\partial}{\partial t} \phi = i\hbar \times -i \frac{mc^2}{\hbar} \phi.$$

Two algebraic facts ensue. Firstly, the factors of  $\hbar$  cancel on the RHS. Secondly, the factors of  $i$  on the RHS combine to give  $i^2 = -1$  (two right-angle rotations gives full reversal), which cancels with the minus sign. So, we see that *this specific combination* of  $i$ ,  $\hbar$  and the  $t$ -rate extracts the quantity  $mc^2$  from  $\psi_{\text{hidden}}$ .

$$i\hbar \frac{\partial}{\partial t} \psi_{\text{hidden}} = mc^2 \psi_{\text{hidden}}$$

This tells us that, to find out the CLASSICAL ENERGY  $E$  of a particle from its underlying wavefunction, we must not only use the  $t$ -rate, but we must multiply it by  $i\hbar$ . Those (curious at first glance) factors are simply there to ensure that there are *no* factors of  $i$  and  $\hbar$  in the resulting energies. The  $i$  is there because

ENERGY, at the level of waves, is a rate of corkscrewing *rotation*, and we want to turn that rotation back into a lab value  $E \in \mathbb{R}$ . This involves re-rotating by another  $90^\circ$ , so as to yield classical numbers. And  $\hbar$  is simply the scale factor required to match up the units. So, we *define* the process that finds out energy as:

$$\hat{E} = i\hbar \frac{\partial}{\partial t}$$

“Particle energy is extracted by a scaled  $t$ -rate of change.”

The hat signifies that  $\hat{E}$  *does* something beyond mere multiplication. The ENERGY OPERATOR, as it is known in QM, *extracts* the classical, perceptible energy of the particle-image produced by a wave. The manner in which it extracts and presents said energy is as an “own-value” multiplying the original wave, or, in technical speak, its ENERGY EIGENVALUE  $E$ . When we apply the operator  $\hat{E}$ , we get, in the form of a question and answer, an EIGENVALUE EQUATION.

$$\underbrace{i\hbar \frac{\partial}{\partial t}}_{\text{Question}} \psi_{\text{hidden}} = \underbrace{mc^2}_{\text{Answer}} \psi_{\text{hidden}}$$

On the left, we ask: “What is the energy of  $\psi_{\text{hidden}}$ ?” On the right, a wave  $\psi_{\text{hidden}}$  that is well-behaved enough to qualify as a matter PARTICLE can answer crisply: “My  $t$ -rate, at all  $(x, W)$  locations, is a consistent  $mc^2$ .” That is, indeed, the sole question on the *Particle Qualifying Exam*.

## The Quantum Momentum Operator

Having established the form of our ENERGY OPERATOR  $\hat{E}$  with reference to (the ironically known)  $\psi_{\text{hidden}}$ , we can return to (the ironically as-yet-unknown)  $\psi_{\text{seen}}$ . Applying our newly defined ENERGY OPERATOR  $\hat{E} = i\hbar \frac{\partial}{\partial t}$  now to  $\psi_{\text{seen}}$  rather than  $\psi_{\text{hidden}}$ , we get the LHS of the Schrödinger equation. This brings the meaning of the SE into full relief. It describes the perceptible energy contained in  $\psi_{\text{seen}}$ , looked at *in two different ways*, once as a  $t$ -rate, once as an  $x$ -rate.

$$i\hbar \frac{\partial}{\partial t} \psi_{\text{seen}} = -\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} \psi_{\text{seen}}$$

As discussed previously, the  $t$ - and  $x$ -rates are closely linked. And, as is now clear, the Schrödinger equation is that link, at least for slow-moving particles. The LHS tells us about the  $t$ -rate of undulation that is *associated with* the  $x$ -rate of variation of the RHS. Both sides have units of energy. The LHS is the question “What is the ENERGY of the wave  $\psi_{\text{seen}}$ ?”, while the RHS is the answer “The energy of the wave  $\psi_{\text{seen}}$  is KINETIC ENERGY due to momentum/variation (and hence travel) in  $x$ , and you calculate it from the  $x$ -rate like this...” A little algebraic manipulation is needed. We rewrite the RHS as follows, using the fact that  $i^2 = -1$ :

$$i\hbar \frac{\partial}{\partial t} \psi_{\text{seen}} = \frac{1}{2m} \left( i\hbar \frac{\partial}{\partial x} \right)^2 \psi_{\text{seen}}$$

The term in the brackets now has the same form as the *energy operator*, but with an  $x$ -rate, rather than a  $t$ -rate. This gives us our **MOMENTUM OPERATOR**, notated  $\hat{p}$ . As a rate of change in  $x$ , it needs precisely the same factors of  $i\hbar$  to ensure that the quantum and classical meanings of the word “momentum” are consistent with each other. It also requires an extra *minus sign*, to cope with the fact that, in wave inputs such as  $[x - vt]$ , the  $x$  and  $t$  variables come equipped with opposite signs. This minus sign makes no difference here, as we are squaring the relevant quantity, but we need to include it for consistency. The **MOMENTUM OPERATOR**, then, is:

$$\hat{p} = -i\hbar \frac{\partial}{\partial x}$$

“Particle momentum is extracted by a scaled  $x$ -rate of change.”

So, the Schrödinger equation now reads as: “The energy of the wave  $\psi$  is given by the squared momentum of  $\psi$  divided by twice the mass.” If we assume that our operator question  $\hat{p}$ , viz. “What is the momentum?” has a nice eigenvalue answer, namely “The momentum as a classical number”  $p$ , then the Schrödinger equation can be seen as a pair of answered questions,<sup>24</sup> equated:

$$E\psi_{\text{seen}} = \frac{p^2}{2m} \psi_{\text{seen}}.$$

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<sup>24</sup>This explains why the classical *kinetic energy*  $T = \frac{1}{2}mv^2$  takes the form it does. Momentum was defined, pre-Newton, in terms of classical mass  $m$  and classical velocity  $v$ , as  $p = mv$ . Substitute this into the above, and, for slow-moving classical particles, you get  $E\psi_{\text{seen}} = \frac{1}{2}mv^2\psi_{\text{seen}}$ . With the operator questions  $\hat{E}$  and  $\hat{p}$  answered with real numbers  $E$  and  $\frac{1}{2}mv^2$ , we can divide both sides by the wavefunction  $\psi_{\text{seen}}$ . This gives  $E_{\text{kin}} = \frac{1}{2}mv^2$ .

## The Unity Mass Operator

Now, to new ground! We know that MOMENTUM, which translates to kinetic energy, and MASS, which translates to rest energy, are symmetrical, perpendicular siblings, equivalent offspring of the parent concept ENERGY. The energy in the wave component  $\psi_{\text{seen}}$  is *perceptible* KINETIC ENERGY moving along the cinema screen of the world-image, while the energy in the wave component  $\psi_{\text{hidden}}$  is *imperceptible* REST ENERGY moving at right angles to the world-image, flowing screenwards to *make* the world-image in the first place. And this equivalence tells us immediately exactly how, in Unity theory, mass must be *defined*. So, let's build the MASS OPERATOR.

Given science's five-century long infancy as The Study of the World-Image, mass and momentum have different units. So we must first convert mass into appropriate units, those of momentum. This involves multiplying by a speed. Obviously, we choose the speed of light. The quantity  $mc$ , then, still represents the idea MASS (only the units have changed, not the Reality), but it is now, at the substrate level, "momentum-like". The same concept of *inner fizz-bang*, that is, what makes matter matter, can be expressed three ways:

$m$	wave-level MASS in units of classical <i>mass</i> .
$mc$	wave-level MASS in units of classical <i>momentum</i> .
$mc^2$	wave-level MASS in units of classical <i>energy</i> .

While  $p$ , regular old-fashioned momentum, is *momentum* in  $x$ , the quantity  $mc$ , given new meaning in Unity theory, is *momentum* in  $W$ . The classical  $p$  is "quantity of motion in space", which is the familiar meaning of momentum, and  $mc$  is simply "quantity of motion in  $W$ ", remembering, of course, that "motion" in  $W$  isn't perceived as such. Having set up this equivalence, there can, according to Unity theory, be only one meaning of MASS. In Unity theory, I define the MASS OPERATOR  $\hat{m}$  as follows:

$$\hat{m}c = -i\hbar \frac{\partial}{\partial W}$$

"Particle mass is extracted by a scaled  $W$ -rate of change."



The minus sign appears again, because  $x$  and  $W$ , being substantial dimensions, sit equivalently across from  $t$  in wavefunctions. Whether in  $[W - ct]$ , which makes  $\psi_{\text{hidden}}$  propagate in  $W$ , or  $[x - vt]$ , which makes  $\psi_{\text{seen}}$  propagate in  $x$ , the space-like variables  $W$  and  $x$ , both in units of metres, have the opposite sign, in the input trays, to time  $t$ , in units of seconds. Hence the *mass* and *momentum* operators, in their appropriate units, are symmetrical, while the *energy* operator has the opposite sign. We can verify—we already know it’s right!—that this mass operator has the correct form, by applying it to  $\psi_{\text{hidden}}$ , the engine of a stationary particle. We ask “What is the mass of the wave  $\psi_{\text{hidden}} = \phi[\mu(W - ct)]$ ?” with

$$\hat{m}\phi\left[\frac{mc}{\hbar}(W - ct)\right].$$

I’m not including the factor of  $c$  here, because I want a straight answer  $m$  in units of MASS proper, rather than  $mc$ . Hence, when we replace  $\hat{m}$  with its  $\frac{\partial}{\partial W}$  operator equivalent, we need a factor of  $\frac{1}{c}$ :

$$\frac{1}{c} \times -i\hbar \frac{\partial}{\partial W} \phi\left[\frac{mc}{\hbar}(W - ct)\right].$$

The derivative calculation is now familiar to us. A factor of  $i$  emerges from the phase function, and a factor of  $\frac{mc}{\hbar}$  from its input tray. Combined (here using  $\times$  for all multiplications<sup>25</sup>), this gives

$$\frac{1}{c} \times -i\hbar \times i \times \frac{mc}{\hbar} \times \phi\left[\frac{mc}{\hbar}(W - ct)\right].$$

And, lo and behold, the factors of  $c$  cancel, the factors of  $\hbar$  cancel, the factors of  $i$  cancel with the minus sign, and the whole thing boils down exactly as it should. It answers the  $\hat{m}\psi_{\text{hidden}}$  question “What is the mass of the  $\psi_{\text{hidden}}$  wave?” with the correct (and obvious!) answer: “The mass of the  $\psi_{\text{hidden}}$  wave is  $m$ .”

$$\hat{m}\psi_{\text{hidden}} = m\psi_{\text{hidden}}$$

The above line can seem tautological: “What is the mass? The mass!” But, in fact, it’s only as tautological as “What is your age?” being answered with your age. The question and its answer correspond to the same word, but they aren’t the same

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<sup>25</sup>I am consciously not *too* consistent in my use of notation. In maths, as elsewhere, it is important to be *somewhat* consistent, otherwise you lose people, but too much consistency leads to the Western error of reification. In the end, symbols are just symbols; what matters is *the idea symbolised*.

thing: one is a *question*  $\hat{A}$ , the other is a *number*  $A$ . And such questions are only obvious if they have an obvious answer. Ask a multi-storey car park or a family of dormice “What is your age?” and you get no answer. The point is, the question  $\hat{m}\psi = m\psi$  is obvious exactly when a PARTICLE can step up and say “Yes, I’m a *particle* and this is my mass.” Ask the same question of a chaotic substrate sea, with waves going every which way, and you get only garbage back.

We can now answer Feynman’s “serious problem”: what **is** mass?

#### MASS IS ENERGY AT RIGHT ANGLES TO THE WORLD.

To dyed-in-the-wool materialists, such statements read like mystical poppycock. A shallow World-Imageite is incapable of engaging with an idea of such elegance. That’s because the Staunch Materialist is, truth be told, a grubby little fuckpig. Take the world as a physical object-in-itself, slave to the White Man’s hubris, and one is forced to say “What on Earth does it mean to say that something occurs at right angles to the world?” And yes, it takes some visualising to get a firm grip of the idea. But just because an idea is challenging does not, in *any* kind of Reality, mean that it is *incorrect*. In future years, once the old guard fade, once we have expunged the Western error, this misreading will seem every bit as ludicrous as (indeed a thousand times more ludicrous than) believing the Earth to be flat. How preposterous the old paradigm will seem! People thought *Reality* was flat. Students will laugh, or perhaps cry: “They *what*? Are you saying that, back then, they believed the world of perception to be... the full extent of Reality? But *how*? What did they think *matter* was? How did they define *mass*? Where did they put it all?” And the historian of civilisations will nod sagely and say: “It’s hard to believe, I know. But they just crammed it in.”

## The Energy-Momentum-Mass Relation

It never ceases to amaze me quite how beautiful things are beyond the old paradigm, yet how hard the White Man has worked to remain bound by it. Don’t underestimate man’s fear of himself. I’ll close this chapter with an example, the formula that broadens Einstein’s mass-energy equivalence. This is a result that, with hindsight, seems almost staggeringly obvious. Indeed, it *is* obvious, to one not hobbled by an incorrect paradigm. Nature, after all, is natural; in some senses,

it is obvious.<sup>26</sup> Let's have a look at Dirac's ENERGY-MOMENTUM-MASS RELATION. This one blows my mind.

$$E^2 = p^2 c^2 + m^2 c^4$$

Pythagoras's theorem predates Jesus; it is the best known theorem in all of mathematics. It is everywhere:  $a^2 + b^2 = c^2$ , where  $a$ ,  $b$  and  $c$  are the three sides of a right-angled triangle. Now, take a look at Dirac's relation, which appeared a century ago, hot on the heels of Einstein's work, and has sat at the core of physics ever since. This is one of the key results of the special theory, giving the total energy of a particle in terms of its momentum and mass. In it, the momentum  $p$  is scaled into units of energy as the (post-Newtonian) *kinetic energy*  $pc$ , and the mass is scaled into units of *rest energy* via  $E = mc^2$ . Just to make it really explicit, let's write the TOTAL ENERGY  $E$  as  $E_{\text{total}}$ , the KINETIC ENERGY  $pc$  as  $E_{\text{kinetic}}$ , and the MASS-ENERGY  $mc^2$  as  $E_{\text{mass}}$ . This renders the relation as follows:

$$E_{\text{total}}^2 = E_{\text{kinetic}}^2 + E_{\text{mass}}^2$$

How can anyone look at that and not see Pythagoras's theorem? How can it not be clear that REST ENERGY, which is the energy stored in mass, is perpendicular to KINETIC ENERGY, which is the energy contained in motion? How can it also not be obvious, thereby, that there are unperceived dimensions of Reality which host the masses of particles? It's worth repeating my earlier oh-so-mystical statement:

MASS IS ENERGY AT RIGHT ANGLES TO THE WORLD.

Look with new eyes. That apparently "mystical statement", ridiculous to the hard rationalists of Planet Physics, is a *literal translation* of the DIRAC RELATION, an equation which has been empirically verified, in physics laboratories, beyond doubt, for a century. There's a Pythagorean, thus *right-angled* relationship between the PERCEPTIBLE energy in space and the IMPERCEPTIBLE energy in not-space:

$$E_{\text{total}}^2 = E_{\text{space}}^2 + E_{\text{not-space}}^2$$

We may well be incredulous. But there's a deadly serious point to be made here, which is crucial for those who want to understand the world's tragedy. This is

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<sup>26</sup>In another sense, the opposite is true. While nature's laws are obvious, there is no reason why the *behaviours* that emerge from those laws should be obvious. And they aren't. Nothing truly interesting, except the realisation stated in this sentence, will ever fall to analysis by physics.

the blindfold we're wearing as we hurtle towards the fork in the road. Or, more accurately in environmental terms, as we hurtle towards the edge of the cliff. Over the last centuries, the collective mind of the Western world, and particularly the collective mind of physics, has developed a CULTURAL SCHIZOPHRENIA. This deep malady is similar to, and stems from the same root as, the religious schizophrenia that had the West push first its gods, then its God away into a magical Narnia. In order to cling to the ancient delusion that the world is a physical object, we were forced to push anything that doesn't fit into the world-image away to "somewhere else". This is what exiled religious questions into Cloud Cuckoo Land. It is also what banished ideas like MASS into metaphysical realms of abstract mathematics. But let me be very clear, writing as an extremely good mathematician:

A MATHEMATICAL SPACE IS A CLOUD CUCKOO LAND.

Mathematics is currently in vogue, unlike Heavens and Hells, which is why no one (but a very few seekers) thinks it strange that quantities such as MASS can just exist, magically, with no domain of existence other than pure mathematics. But, to anyone with perspective—this is exactly what our civilisation lacks—to propose that MATHEMATICAL SPACES govern *physical behaviour* is just as absurd as proposing that OLYMPUS governs *human behaviour*. Modern Man is an unholy hypocrite. And his fervent claims of "rationality" and freedom from superstition would be laughable, if only they weren't so deeply destructive. Time and time again, I am struck how resistant (paid) workers in "fundamental" physics are to accepting that the algebraic symbols they have been working with for centuries, and of which they are so intellectually proud, actually *mean* something!<sup>27</sup> That they are REAL! Everywhere, you read the same story. Concepts such as mass  $m$  and wavefunctions such as  $\psi_{\text{seen}}$  are supposed, in a frankly bizarre mangling of logic, to influence the tangible reality of the laboratory from *mathematical* spaces, rather than *physical* ones. There is no acknowledgement anywhere that, in order to influence physical reality, things must be physically real. It's gibberish, basically. Yet this is *exactly* the kind of naive, contrarian attitude which is denigrated, by the self-proclaimed intelligentsia, in the science-denying "I ain't descended from a monkey!" crowd. Everywhere, spiritual "primitives" and hippies, i.e. Those With Souls, are looked down on as having not yet grown out of a sense of deep

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<sup>27</sup> You might think that this is exactly what they want. But that would be to misread human nature. The point is, the vast majority of people are not true seekers, and aren't interested in the truth. They want, quite understandably, to have tangible qualifications, a livelihood and to be respected. At the most conservative estimate, 99% of all academic work is done with this second goal in mind.

things. The ugliness of this is appalling. And, like all hypocrisy, its perpetrators are blind to it. Ivory tower intellectuals say one thing and do another, believing themselves to be operating at the highest levels of logical rigour. This is why I use the term *cultural schizophrenia*. Presented with the arguments in this chapter, a hardcore old paradigmmer will say: “Yes, *of course*, the Dirac relation is Pythagorean, but that merely reflects the perpendicularity of the mathematical spaces, nothing physical.” In other words, so the claim goes, a physical fact, “heaviness”, a tangible, measurable, practical thing, is generated by... *pure mathematics*. It’s nonsense and worse than that. Such is the tragedy of the clever old White Man. Materialism is exactly like alcoholism: it is a curse, a dread addiction whose primary weapon is denial. So many hoops have been jumped through, so many ingenious arguments have been concocted to avoid coming to the most basic and obvious conclusions: MASS is a *real* thing. WAVEFUNCTIONS are *real* things. Kinetic energy and rest energy are perpendicular in the mathematics because they are perpendicular to each in physical Reality. How in God’s name could anyone think otherwise?

Let’s derive the Dirac energy-momentum-mass relation directly, so you can see how simple it is. Think back to the WAVE EQUATION, such as governs all  $[x, W, t]$  waves on the  $(x, W)$  cylinder. Obeyed by small disturbances travelling at speed  $c$ , it is a relationship between the partial-derivative variations of  $\Psi$ :

$$\underbrace{\frac{\partial^2}{\partial t^2}}_{\text{Overall}} \Psi = c^2 \underbrace{\frac{\partial^2}{\partial x^2}}_{\text{Outer}} \Psi + c^2 \underbrace{\frac{\partial^2}{\partial W^2}}_{\text{Inner}} \Psi.$$

Now, multiply the left-hand side by  $(i\hbar)^2$ , and the right-hand side by  $(-i\hbar)^2$ , noting that, because of the squares, these quantities are equal. This yields

$$(i\hbar)^2 \frac{\partial^2}{\partial t^2} \Psi = c^2 (-i\hbar)^2 \frac{\partial^2}{\partial x^2} \Psi + c^2 (-i\hbar)^2 \frac{\partial^2}{\partial W^2} \Psi.$$

We can then take the OPERATORS inside the brackets. Note that juxtaposition of an operator  $\frac{\partial}{\partial t}$  means “perform this derivative”; therefore, the second derivative can be expressed as  $\frac{\partial}{\partial t} \times \frac{\partial}{\partial t}$ . This gives

$$\left(i\hbar \frac{\partial}{\partial t}\right) \Psi = c^2 \left(-i\hbar \frac{\partial}{\partial x}\right)^2 \Psi + c^2 \left(-i\hbar \frac{\partial}{\partial W}\right)^2 \Psi.$$

The brackets now contain *operator questions*: “What’s the energy,  $x$ -momentum,  $W$ -momentum?” And, since the Dirac relation is a *classical* equation (it mentions

no wavefunctions seen or unseen) governing fast-moving but fully eigenvalued MATTER, we can assume that our wave  $\Psi$  is a nice coherent classical one, which gives sensible EIGENVALUE answers to all three major questions. We can, then, replace the operator *questions* by their eigenvalue *answers*, which are the classical numbers  $E$ ,  $p$  and  $mc$ . This gives us

$$E^2\Psi = c^2p^2\Psi + c^2(mc)^2\Psi.$$

Now, the wavefunction  $\Psi$  must be non-zero, since it represents energetic matter rather than the flat substance that makes the vacuum, so we can divide by it. And we are left with

$$E^2 = p^2c^2 + m^2c^4$$

Oh my word it's so goddamn obvious!

## What Are We Made Of?

So, to recap, what exactly is MASS? Mass is the energy that makes MATTER *matter*. Mass is the energy that goes into the *construction* of the concept MATTER. The world we see, which is a world of matter, only exists in our perception, indeed, *we* only exist, as material bodies, because waves circumnavigating closed circular dimensions are able to give the appearance of sitting still. And since we are *built* of exactly such mass-energy, since we are *constructed* of waves circumnavigating the inner dimensions at  $c$ , the last thing we could ever perceive are those dimensions themselves. The *better* the camera, the *less* visible its lens. And the mass eigenvalue  $m_e$  of an electron is precise to one part in  $10^{10}$ .

That's a damn fine camera.

Let's put to bed, once and for all, the last quarter-empirical, although fully misguided, objection an old paradigmmer might have to the Unity idea. Many do. It's a classic, generally emerging from a chap with a face like a cheated scrotum: "If there are dimensions beyond the three of space, why haven't *I* seen them? Look around you. The world is *self-evidently* three-dimensional." And, yes, I agree, the WORLD *is* self-evidently three-dimensional. But the world isn't a physical object; it is only the *perceived image* of a physical object. It has a certain type of existence, yes, but only existence in perception. And that's exactly the type of existence that schizophrenic materialists denounce as "metaphysical speculation". Poor deluded fools. What pointless sorrows they endure, all for the sake of remaining shallow.

It is the *world-image* that is illusory, not love, not hope, not soul, not God. The thing that *truly* exists, 100% exists in the most fundamental physical sense, is the PROTEAN SUBSTRATE of the Universe, across whose face waves dance at *c*. Matter itself is not a stuff; it is an *image*.

So, how do we answer Old Scrotum? Why hasn't he, with all his *joie de vivre*, ever seen those inner dimensions? Why can no laboratory experiment ever show us these dimensions directly? Because, very simply, we are *made of matter*. Our bodies themselves, just like the space that "contains" them, are images, icons on a computer screen. To ask "Why have I never seen these other dimensions?" is to misunderstand, in the most basic sense, the way things are. It is a *category error*, like trying to shoot someone with a picture of a gun, or listening to a vinyl record by holding it up to your ear. It is the same as asking why an icon on a computer screen can't see the microchips, or why the Mona Lisa can't see the Louvre, despite the fact she's looking at it. The question itself is a nonsense: there is *self-evidently* no way for the relevant data to enter perception. MATTER permits no mirrors. Every piece of data is, by definition, data that must be absorbed by MATTER, whether that matter be biological, technological, whatever. To measure is to measure by MATTER. And the inner dimensions, the dimensions which host MASS, are inherent to *the making of the image*. They are the optic nerves of Reality. Matter waves circulate the inner dimensions, propagating with perfect symmetry, so there is no way for a piece of matter to distinguish between two locations in *W*, which would be necessary for perception of that dimension. If you take the world to be a physical object then yes, outrage at the existence of extra dimensions is reasonable. But *all of that logic*—"Surely, I'd be able to see them!"—rests on a fallacy of the most elementary kind.

Our world abounds with cheated hearts. Do not let yourself be diddled out of life by those who wish their own lives to be small. Those with narrow minds, strangled by the ropes of concept, always seek to narrow the minds of others, so that they may feel broad. Those with broad minds, on the other hand, who have become the Universe they serve, always seek to broaden the minds of others, so that others may experience bliss. And it is BLISS to exist in higher dimensions. Why? Because one's perspective contains everything the world contains, and so much more. One partakes daily of the Infinite, in a way that isn't possible for the materially bound. To bash the bishop becomes a sacred deed. What feels, in the old paradigm, like "mere matter", a tool to be manipulated to ends of status or power, becomes the poetic expression of wondrous truth. Oh, there is such joy to

be had! I know, because I used to be a materialist, or at least I was one as far as I was consciously aware. My hard-rational concepts were prison walls. Something soulish always drew me deeper, but I know what it feels like to see the world as a shell, as an empty husk without magic or meaning. It was that feeling, the feeling that my very *culture* was trying to cheat me out of Life, that drove me to seek the knowledge of the sages, the knowledge that breaks the Western mould. I shattered the walls of my prison of concepts. And the result?

Everything *shines*.

Laozi, the Old Master of the Dao, knew all about this. Beyond academia, beyond concepts, beyond words and ideas, one must take joy in the existence of the world itself, in the very *construction* of Reality. To be free, to be truly free, one must revel not in *descriptions* of mass and matter, algebra and suchlike, but in MASS and MATTER themselves. One must en-joy them, in the contra-consumerist sense, wanting no excellence, finery, gold. "Look at plain silk, hold uncarved wood." Laozi's enlightenment glows in this sentence. Such is the boon of the broad mind. Once one sees the depth of Reality in the world-image, all the material trinkets of the modern world, all the trite, the shite, the advertising blare, these fade away to irrelevant noise. And MATTER itself, in place of all that, rises up to become a *magical* thing. As on an acid trip, though perfectly lucid, one can sit and ponder a single leaf, fascinated by its details, by its existence, by its deep Reality. And then sit down and do a tax return. The world becomes a symbol, a working work of art. MASS becomes an effing *miracle*. And it needs no continual ingestion of drugs or religion. It is a state of pure calm, pure potency, pure nobility. Pure magisterial *ordinariness*. Unrestricted by the calamity of the Western narrows, one's mind experiences the world as it is, as it extends in all its fullness and beauty. Even loss becomes elegiac. Even decay, even *death*. A person who is full, brimming warm in the heart-space, has no need of toys, no need of fame or power. All of that crap burns away with knowledge, reduced to ash by the sheer depth of things. And what remains, when the dross and clutter of logic have settled to flesh-and-bone being, is only that which

*Really*

MATTERS.



# 14

## THE SPECIAL THEORY

One cannot speak of oceans with a turtle in a well, for he is bounded in space. One cannot speak of ice and snow with a mayfly, for he is bounded in time. And one cannot speak of Reality with a nook and corner scholar, for he is bounded by his theories.

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*Zhuangzi*

*With great respect, I dedicate this chapter to Einstein.*

The various ideas and concepts associated with the word “*relativity*”, both pre- and post-Einsteinian, are of particular interest to us as we seek solution of the Western error. For too long have physicists lazily taken Einstein’s word as gospel, sparing themselves the burden that he took on. It is time for us to shoulder the load, absorbing the mathematics associated with Einstein, while moving beyond the idea “*relativity*”. The word “*relativity*” is a historical artefact, and a future version of this work, written in a more enlightened time, wouldn’t even mention it. Perhaps you, dear reader, will write that. But we have much clearance to do before we can rebuild.

So, let’s swing the wrecking ball!

In Einstein's *annus mirabilis* of 1905, he published four papers, on:

- ① *the photoelectric effect*, establishing the quantum nature of light,
- ② *Brownian motion*, proving the existence of atoms,
- ③ *electromagnetism*, founding the special theory of relativity, and
- ④ *mass-energy equivalence*, from which would stem nuclear physics.

1905 marks the *beginning* of the end of the Western paradigm. It was not, however, the end of an era that some have imagined it to be. Indeed, as always happens when long-cherished ideas die, the terminal illness has involved a *firmer* clutching of the old ideal. In many ways, the theories of relativity represent a last hurrah, a final attempt to bend the truth to fit it to a falsehood. This is no criticism of Einstein. I have only the greatest respect for him as both a physicist and a man. He was a titan of science, and his theories are masterpieces, because they summarise and simplify. In this way, he stands above the Fools of Some Mathematical Talent who have, in recent years, so as to ward off attempts on the truth, rendered physics a forest of meaningless symbols. That wasn't Einstein; Einstein loved *beauty* and *simplicity*. And we're right to love him for that. Nevertheless, Einstein was the last prophet of an Old Testament. He spoke in the Old Tongue of SPACE, as physicists, in awe of his stature, still do. The quantum and general relativistic communities take pride in not being Newtonian, as being "cutting edge",<sup>1</sup> but the truth is quite the reverse. The physics of the 20th century—this includes the masterful work of Einstein, Schrödinger, Dirac and Feynman—represents the last doomed attempt to shoehorn the data of Reality into a box in which it will not fit.

## The Slow Death of Classical Physics

The SPECIAL THEORY of relativity deals with objects moving at significant fractions of the speed of light, where Newtonian behaviour ( $F = ma$  etc.) goes up the spout; the GENERAL THEORY of relativity deals with heavy objects making and moving in gravitational fields, where the very same Newtonian behaviour goes up the very same spout. Quantum mechanics addresses wave-particle duality and the physics of the very small, while Einstein's theories deal with the physics

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<sup>1</sup>This is not Unity theory. Unity theory is not a new theory; it is an old theory and an anti-theory. It is a return, in the philosophical HELIX, to *old* knowledge. The facts of Reality are timeless. Its language is, of course, bound to the present, but its soul isn't. To follow trends is to be a characterless nobody: what's important now is the same as always has been and always will be.

of the very fast/big. But note that not one of the above theories, brilliant as they may be, addresses the fundamental issue of the nature of Reality, bound up in the question of *perception*. It's all things, things, things in space, space, space.

Newton's Second Law,  $F = ma$ , which became the central equation of physics in 1687, permits matter to accelerate to indefinite speeds, provided force is continuously applied. It's basic:  $F$  generates  $a$ . Keep applying the  $F$ , and you keep getting  $a$ . Maintain any such acceleration for long enough, and, as the classical system predicts, you should be able to attain, at least theoretically, *any speed*. Makes a lot of sense, right? And, if you take the world as a physical thing, then this is indeed a reasonable view, which is, of course, why everyone agreed with it. In the 1700s, during the Age of Enlightenment Englooming, physics grew in leaps and bounds as Newton's system succeeded in explaining one facet after another of the world-image. It was in that age that the nascent Western error crystallised from an informal misunderstanding by isolated egotists, more or less kept in check by folk wisdom, to a formal constitutional catastrophe. MATTER, seemingly so well described by classical physics, officially *became*, according to the authorities, Stuff In A Box. As did we. The litany of destruction, mental illness, blood and hypocrisy that has been the last few centuries has stemmed from, represented, and still represents a prolonged failure to convalesce from this naive hypostatisation.<sup>2</sup>

## The Speed Limit

It all began to go haywire, from a classical point of view, towards the end of the 19th century, when technological advances permitted experiments not only with light but with *matter* accelerated towards the speed of light. At such speeds, nothing behaves like Stuff In A Box. Most pertinently, it emerged that matter has an *upper speed limit*, namely the speed of light,  $c$ . There are various other relativistic

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<sup>2</sup>To understand the Western psyche and its copious maladies, you have to recognise the depth of misunderstanding that was inculcated in the "glory years" of Europe. These were the years in which all the peoples of the world, except for the White Man himself, came to know, staring down the barrel of a gun, that Europe was *sick*. Everywhere, Europeans conquered, devoured, raped, ravaged, fought, consumed, took and destroyed, driven to a self-destructive obsession with material wealth and material dominance by a failure of culture, a continental bipolarity. Oh, but it gave such seeming *benefits*! Viewing the world as "matter in a space-box" makes it seem *controllable*, which is the dream of all tyrants and arseholes. Indeed, in some respects (though no important ones) physics does make life so. You can set up experiments, watch them do what you expect, and feel like a clever boy. Woop-de-woop! Until, of course... along comes REALITY.

high-velocity phenomena, which I will address in due course, but this fact is all you really need to know. It contains the Mystery. If you want to understand ~~relativity~~ the wave mathematics of matter, and by that I mean to understand it, not to “wield it with significant acumen” as self-aggrandising particle physicists and other second-rate mathematicians have chosen to redefine the term, then all you need do is wonder, with a clear mind, at the fact that matter cannot go as fast as it likes. The rest of the apparatus of the special theory—the Lorentz factors of electrodynamics, space contraction, time dilation, “relativity” the idea, the twin paradox, constancy of the measured speed of light—all draw from the same source, and have the same logical content. There is, at root, one fact:

MATTER HAS A SPEED LIMIT.

If you consider this fact alone, open to all paradigmatic possibilities, with a mind untarnished by doctoral study under some laureate Grandee, having found an Archimedean point from which entire civilisations can be seen, then you can’t fail to see through the veil, to a true Age of Enlightenment beyond.

## Logic for Six-Year Olds

Let’s think about this in the most elementary terms. Light is a WAVE. That is true in classical physics, quantum physics, Unity theory and common sense. Light travels at  $c$  through space. Now, consider, once again, the notion that this *wave* speed  $c$  is the speed limit which governs *matter*. What does this tell us about MATTER? Well, if you consider matter as a fundamental “stuff,” as the particle physicists do, then this result is nonsense. Why on Earth should stuff moving around inside a space-box be limited by a *wave* speed? For no reason at all. On the other hand, once you have taken a deep breath and summoned up the courage (yes, it *does* take courage) to see the world as a perceived image, once you have broadened your mind just that one step, the speed limit blares out loudly:

MATTER IS MADE OF WAVES MOVING AT THE SPEED OF LIGHT.

*Of course* it bloody is!

But this is not a mode of thinking that was available to the physicists of the late 19th and early 20th century, when the relevant facts became apparent. It was not available to Einstein, indeed. I am not aware of any evidence that Einstein looked into the possibility that the world described by physics was not, in fact,

a physical object, but was instead the perceived image of one. To my knowledge (I would gladly stand corrected on this), Einstein believed the world-*image* to be a world-*thing*. This is why I say that Einstein's theories, wonderful as they were, represent a last Fanfare of the Fallacy. Einstein made great leaps, but his theories were all still phrased in the language of SPACE; he took SPACE, the concept, to be a physical Thing. As we have seen, it is not; it is a dimensionally reduced *image*, a projection of a physical Thing.

Now, the standard explanation for the existence of a Material Speed Limit, which has been preached, without deep understanding, by disciples quoting the Gospel according to St Albert, is that SPACE (and TIME) warp as one accelerates. Sounds rather strange, no? *Why* should space warp at speed? *How* can it, indeed? *How* can my local speed here affect the SPACE through which I am travelling? In the old paradigm, it's a very confusing notion.<sup>3</sup> So, think again. Reread "matter in space" as "the perceived image of substrate waves". In this view, with MATTER as waves circumnavigating the inner dimensions at  $c$ , it is obvious that (spatial) acceleration towards the speed of light must affect the structure of matter. The Unity model demands rigour: since all waves travel at  $c$ , the concept *acceleration* isn't allowed the nebulous nature it has the Standard Model, in which particles just "go faster"; velocity isn't just a number matter "gets". Rather, acceleration must involve a *tilting* of the direction of wave travel away from the  $\uparrow$  in  $W$  of a resting particle to the  $\nearrow$  in  $W$  and  $x$  of a fast-moving particle.

So, fast-moving matter *differs* from slow-moving matter, and not merely, as implicitly claimed by Newton, because it is "going faster". Is it any wonder, then, that, when matter accelerates, requiring that its own internal structure changes, the *image it perceives* of the Universe around it changes? No! It's the most natural thing in the world! Does space warp? Yes! But that doesn't mean that anything *physical* is warping, beyond the matter itself. There are no curious bendings of the Universe that magically come about at ~~relativistic speeds~~ high velocity. It's simpler than that. MATTER itself, being a wave phenomenon, changes when it is travelling near  $c$ , and hence SPACE, as perceived, bends in response. When things travel fast, it is of course not the *object* of perception (the Universe beyond the fast-moving observer) that warps, but rather the *subject*.

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<sup>3</sup>The only understanding of SR, in the old paradigm, is mathematical. The theory gives no *physical* mechanisms. But, speaking as a mathematician, that cannot be seen as understanding. The concepts of mathematics (algebraic symbols) only gain meaning as visualisable physical processes. World-image physics is understood with mathematics *only* if that mathematics is understood with deeper Physics. Irrespective of the fantasies of the shallow, there's no way around this.

# The Unicyclist

Let's work with an analogy, before addressing the algebraic details. Suppose you have a person riding a unicycle. When stationary (assuming good balance!), the unicyclist is vertical; the saddle is directly above the wheel. Suppose then that the unicyclist is capable of attaining significant speeds. Against air resistance, the unicyclist is forced to lean forwards, to avoid being blown back off the saddle. So, for the unicyclist, there is a direct relationship between *speed*  $v$ , and *inclination*  $\theta$ . When pedalling furiously, at high velocity  $v$ , the unicyclist is tilted forwards, at  $\theta = 30^\circ$ , say, with the saddle a long way forward of the wheel. What does the unicyclist perceive of the world? With acceleration, the world *tilts*.

We are familiar with such phenomena, and our brains are equipped to cope. For instance, when you shake your head, it is remarkable that the world doesn't shake; rather, you feel your head shaking within the world. A moment's thought will reveal how impressive the neurobiological algorithms must be. Your world-generating apparatus spots that a head-shake is a motion of the *subject*, i.e. you, and tunes it out of the world-image. It's not that the visual *data* of the world doesn't shake—it does, try it!—but rather that you don't get the *idea*, from the data, that the actual world is moving. If you did, as happens with certain serious brain injuries, it would be most disorientating. The point is, your neural world-construction programs decide what is *you* changing and what is your *surroundings* changing, and the world perceived is different depending on the conclusion. For example, in a slow-moving train, the wrong conclusion can be drawn, and a little paradigm shift occurs when you realise that it is *you* moving, rather than the train outside the window. The brain duly readjusts.

When the unicyclist, going hell for leather, tilts forward at speed, there is no sense, either Absolute or perceived, in which the physical World Out There has tilted. The unicyclist filters out the *perceived* tilting of the world as being, in fact, a tilting of the self, and the world remains upright. But that doesn't change the fact that the *image-data* pouring into the unicyclist's brain points towards a tilted world. It is only *experience* that means that the unicyclist is able to avoid drawing the wrong conclusion, just as it is only experience that allows you to avoid having the world spin around you when you shake your head. What of the mathematics, then? Well, mathematics doesn't know about *experience*. The mathematics of the unicyclist is as follows: at high velocities, the world is tilted. Now, imagine this with a unicyclist who, having never thought carefully about how he gets from A

to B, has *no idea* that he rides a unicycle. Suppose he models himself as a *bicyclist*. A bicyclist undergoes no such tilting, of course. Hence, when such a wannabe-bicyclist tilts into the wind at high velocity, what does he conclude? He is forced, to maintain his self-image as a bicyclist, to assume that the world around him shifts in response to his speed.

“There is no way”, he theorises, “that I can be undergoing changes, because I am a bicyclist. As a bicyclist, my eye level is steady. Therefore, it is the horizon that is moving as I accelerate.” A ludicrous notion, you might think. Yet this is the content of the SPECIAL THEORY, when it is interpreted (as it has ever been) in the old paradigm. With a duff self-image, it is impossible to distinguish between *subject* changes and *object* changes.<sup>4</sup> A whole field of science has sprung up, in the Lorentz transformations of spacetime, describing the strange warpings of the horizon that occur in the presence of rapid motion. These are purported as the “true” transformations of space, “correcting” the simpler transformations of old classical physics, known as the Galilean transformations. In one sense that is true. Space (read the word with new eyes) does indeed warp when one travels at speed. But that is because matter doesn’t consist of *bicycle* particles, whose orientation is independent of their speed, it consists of *unicycle* waves, whose orientation on the  $(x, W)$  cylinder must adjust in order to achieve high velocity. The warping of space at high speed is the warping of a world-*image*. What a conceptual disaster was Newton’s space! What an appalling cul-de-sac!<sup>5</sup>

The history goes like this.

When the world was young in technology, we, as riders of unicycles, were  $\uparrow$  vertical. Having not yet discovered how to go fast, we rode around stuffily on our unicycles, perched  $\uparrow$  vertically in (almost) perfect posture. We did this as apes, children and “modern” folk. Indeed, we did it for so long that it became a fact of life that the unicycle is  $\uparrow$  vertical. Hence, because there was no variation in our unicycling angle, we never even noticed that we rode unicycles; the horizon always stayed steady. With nary a wobble to disturb “space”, we concluded that the world around us was a firm, absolute, concrete *thing*, reliable and undeviating. The genius-on-one-level Newton codified this, postulating the COSMOS as being backed by *absolute space*, with foreground MATTER consisting of *particles*. There

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<sup>4</sup>This applies just as much to psychology as to physics.

<sup>5</sup>Newton was undoubtedly very clever, yes, endowed with extraordinary mathematical talents. But he was also a most parochial Englishman. He is, perhaps, the archetype of the divided scientist. It isn’t well known that he spent more time studying alchemy and theology than he did physics and mathematics. Yet he never succeeded in unifying the two.

was no consideration of unicycle (circular wavefunction) structure, because it never showed up in experiment or experience. We assumed that the saddles on which we sat and still sit were fixed, undeviating, zero-dimensional • dots. With everyone footling around in top hats, enslaving foreigners left right and centre, this was a most pleasing discovery. We White Men had understood the world, and those Black Men, therefore, should bow. The  $\uparrow$  ( $W$ ) dimension of unicycle height was ignored—“Dimension, *what* dimension?”—and people became point particles roaming around on a flat plane.

Then along came the Facts. These took an unceremoniously large shit on the whole affair. Having got fit enough to go fast, Victorian folk noticed, to their great consternation, that, at high speeds, strange things happen to the world. Towards the end of the 19th century, “bicyclists” were forced, proud as they were of the so-called bicycles they *knew* they rode, to theorise: “With acceleration, the horizon rises.” This sounded like quite a revolution. Many thought it was only a mathematical stopgap, given there was no physical mechanism by which it could possibly take place, but, in time, people got used to it. There was, after all, no (acceptable) alternative. The data were unequivocal: with acceleration, the horizon *does* rise. So, horizon “relativity” was born. It was all spot on in the mathematics, of course, but it made little sense in any logical manner. A few of the Top Hats felt obliged to point this out—even the mad-haired one who invented it, indeed—but the rest were just glad to have the enigma resolved in a way that allowed them to sleep at night. (And retain their places at the blackboard.) They didn’t want to think about the contradictions, because they had an inkling that they might, in fact, be doing something rather stupid. That being an unpleasant thought, they did something very ~~clever~~ stupid indeed: since the mathematics agreed with what they *wanted* to be true, viz. “Mine is a sturdy bicycle”, they raised mathematics to the Ultimate Truth (sigh) and forced intuition to bow.

“*Shut up and calculate!*” they yelled.

At this point (the 1900s) physics began to eat itself.

Everywhere, the bicyclists sought out cunning ways to remain upright on their “bicycles”, and tromboned themselves silly with Nobel prizes. Anyone who could come up with a clever way to reconcile another set of contradictions—these were coming thick and fast—between data and the bicycle myth (materialistic worldview) was lauded as a hero. Pull out a smart-looking broom, and oh how people leap to lift the corner of the carpet. The Big Bang? Dark energy? Inflation? Ah, what intellectual prowess! What dazzling insight! Disappearing up its own



jacksy, physics threw all of its eggs into the basket of its bicycle—"We are made of stuff called matter, and that matter is *solid*. We can rely on it. Yes."—and lost the plot. In doing so, the whole affair became insufferably dull. Its star players took to eking out, in algebra, ever more devious ways to snuff out all possibility of change, and, by the turn of the 21st century, the world proposed by physicists was an absurdity, a lunacy, a bicyclist-centred patchwork of Hocus-Pocus bereft of rhyme and flawed in reason, whose sole purpose was to maintain the gospel truth of *Uprightness*, in the face of the facts.

"You're on a unicycle, pal."

It's amazing the reaction you get when you suggest it. "I'm *what*? Nonsense. Drivel. An absurd and unscientific suggestion. I ride around on a solid bicycle. If I rode around on a unicycle my top hat would fall off. In fact, I'm not even going to dignify this this metaphysical speculation, this quasi-Buddhist esotericism with an answer. My bicycle is a bicycle. It always has been, and it always will be. Any decent human being rides a bicycle. We all know that. Only twats ride unicycles."

"What's that under your saddle, then?"

"A bicycle, of course."

"Where's the other wheel?"

"Behind me."

"I can't see it."

"That's because you haven't the experimental nous. Only a Nobel-seasoned experimentalist can see the second wheel of the bicycle. It takes many years of dedicated study to gain the requisite skills to see the second wheel of the bicycle. Look, I have a PhD in this very field. I studied the back brake for eight years at post-doctoral level."

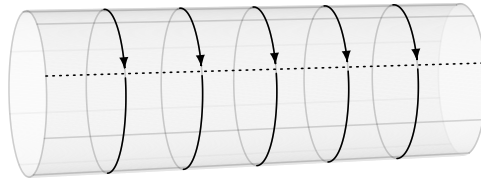
"It's a unicycle, mate."

I joke, but that is the way of it. Let's not stoop to the level of the obfuscators. We, who have seen through the Western error, whose minds aren't cobwebbed corridors, whose love of life is such that *any truth* is eternally welcome, don't need to feel ashamed at our lack of physics Professorships. Pardon me for saying, but you don't need a Nobel prize to count the number of wheels on a bicycle. The mathematics is, as ever, simple. It was invented by a rather famous Greek fellow named... Pythagoras, of course. That's all the special theory is. Along with, well, just about everything in physics, it's the fact that the square on the hypotenuse is equal to the sum of the squares on the other two sides. Apply that to the tilting of the unicycle, and you get the SPECIAL THEORY in full mathematical form.

# Lorentz Factors

Why can't matter accelerate beyond the speed of light? Well, it's now so obvious it's becomes rather silly. MATTER is a *wave*, and WAVES travel at the speed of light. So, they clearly can't go any faster than  $c$ , because, um, that is their speed. Tada! *Quod erat* etc. Applaud me, O You Newtonian Gremlins! Now, the above is a *qualitative* fact, and, it might (semi) reasonably be suggested, could be put down to mere coincidence. Unlikely, but plausible. So, what about the mathematics? What about the LORENTZ FACTORS that form the empirical theory? Well, here's where "coincidence" starts to look like Top Hat talk. Exactly the structure which we introduced re the Schrödinger equation produces the precise mathematics *in full*, with no need to resort to bendings of space, stretchings of time, philosophical principles of "relativity", or indeed any hypothesis beyond Unity.

Consider a stationary electron, which consists of a wave travelling directly in  $W$ . Let's pick downwards, this time.<sup>6</sup> This is a wave without  $\psi_{\text{seen}}$  variation, consisting entirely of  $\psi_{\text{hidden}} = \phi[\mu(W - ct)]$ . In the diagram below, each circle is a symmetrical *wavevector*, and the dotted line is a *wavefront*.



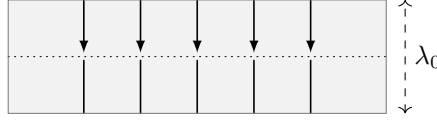
Stationary electron wave propagating in  $W$

The length of each solid *wavevector* is one circumference of the  $W$  dimension, which defines the *wavelength*  $\lambda_0$  of the resting electron, i.e. the physical (though not perceptible) distance, in metres, over which the  $\psi_{\text{hidden}}$  wave repeats itself.<sup>7</sup> The "resting" wavelength  $\lambda_0$ , then, defines the REST ENERGY  $E_0 = mc^2$ . The

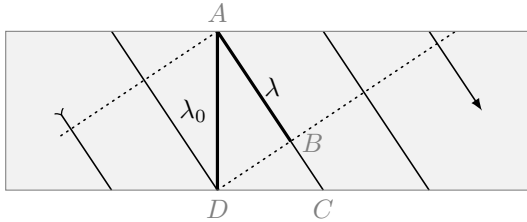
<sup>6</sup>Electrons do have negative charge, so in some sense *downwards* is more sensible. But it's more important to recognise that the choice of *representation* is entirely arbitrary. All too often in the West, consistency gets conflated with intelligence. A wise person should never be too consistent.

<sup>7</sup>There may be one or more factors of two involved here, as only a half-turn of physical rotation is enacted in one circumference of  $W$ . I prefer to remain undecided as to the precise circumference of the  $W$  dimension. It isn't clear to me exactly how (in factors of two) the experimental value  $\mu$  corresponds to a physical length in  $W$ . One can never be certain about the imperceptible.

electron mass  $m_e$  is an expression of the fact “one wave cycle for once around  $W$ ”. Unwrapping the  $(x, W)$  cylinder, then, we have



Consider now a *non-stationary* electron moving at a significant fraction  $\frac{v}{c}$  of the speed of light. This necessitates a tilting of the unicycle. In order to achieve motion through space, the wavevectors can no longer point in  $W$ , but must have a large  $x$  component too. Hence, the wavevector must now be pointed at an angle to  $W$ . Wave propagation on the  $(x, W)$  cylinder now looks as follows:



The dotted wavefront is no longer parallel to  $x$ . So, because it must join up around  $W$ , the wavelength  $\lambda$  between two successive wavefronts<sup>8</sup> is now *shortened* to  $\lambda$ , a new wavelength depending on  $v$ . We know that  $\lambda < \lambda_0$ . And *shorter* wavelength means *higher* energy. The energy has been scaled, then, to

$$E = \frac{\lambda_0}{\lambda} \times E_0.$$

So, to calculate the energy  $E$  of our new wave, all we have to do is work out the geometric relationship between  $\lambda$  and  $\lambda_0$ , in terms of  $v$ , the speed of the wave through space, and  $c$ , the speed of propagation. Consider triangle  $ADC$ . As the wave propagates at  $c$  along  $AC$ , the perceived motion through space is at  $v$  along  $DC$ . Hence, we know that triangle  $ADC$  has sides in the ratio

$$\frac{DC}{AC} = \frac{v}{c}.$$

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<sup>8</sup>In actual fact, it's all one wavefront, looping back in front of itself

Now, the triangles  $ABD$  and  $ADC$  are *similar* in shape, because of both being right-angled and sharing the common angle  $\hat{DAB}$ . So, the equivalent ratio in triangle  $ABD$  must be the same:

$$\frac{BD}{AD} = \frac{v}{c}, \text{ thus } BD = \frac{v}{c}AD.$$

And we already know that  $AD$ , which is a full circumference of the  $W$  dimension, must have length  $\lambda_0$ , which is the wavelength of a resting electron. Hence

$$BD = \lambda_0 \frac{v}{c}.$$

Using Pythagoras (of course!) on triangle  $ABD$ , we get

$$\lambda_0^2 = \lambda^2 + \lambda_0^2 \frac{v^2}{c^2}.$$

Dividing by  $\lambda_0^2$  and rearranging gives

$$\frac{\lambda^2}{\lambda_0^2} = 1 - \frac{v^2}{c^2}.$$

Since  $0 < \frac{v^2}{c^2} < 1$ , we can take the positive square root, yielding

$$\frac{\lambda}{\lambda_0} = \sqrt{1 - \frac{v^2}{c^2}}.$$

Reciprocating, we reach

$$\frac{\lambda_0}{\lambda} = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}.$$

This fraction is known as the LORENTZ FACTOR  $\gamma$ , and it runs the whole show. While there are various applications of  $\gamma$  and various tools for its manipulation, the special theory has no other mathematical content. Everything involves scaling either up by  $\gamma$  or down by  $\gamma^{-1}$ . In energy, we scale *up*, since longer wavelength means higher energy. Hence,  $E = \gamma E_0$ , which, written out, is

$$E = \frac{E_0}{\sqrt{1 - \frac{v^2}{c^2}}}.$$

And that's it! This is why, if you keep applying a force to a massive object, it keeps getting more and more energetic, but, contra Newton, never goes faster than  $c$ . As a matter particle approaches the speed of light, its unicycle wavevector tilts all the way down towards  $x$ , and, as a result, its wavefronts coil up increasingly tightly (without bound) around the  $W$  dimension. There's no crazy bending of the Universe, no warping of time, no "relativistic" effects whatsoever. The special theory is just Pythagoras on cylinders.

Magic!

## Effect on Clocks

The "tilting of the unicycle"—wavefunctions on the  $(x, W)$  cylinder—idea produces, in one Lorentz factor breath, the rest of the physics of the special theory, now with justification. Previously, there was none: with respect to Einstein, the principle of relativity just isn't true, so it can't be used to justify anything. We can do better than hiding behind mathematics. Propagating at a faster  $v_{\text{seen}}$  in  $x$ , a wave propagates at a slower  $v_{\text{hidden}}$  in  $W$ , according to Pythagoras:

$$v_{\text{hidden}}^2 = c^2 - v_{\text{seen}}^2.$$

This slows the internal "clock" of the particle. Hence, *actual clocks* also slow down, and by the very same factor. *Time itself* (if that means anything) is unaffected; nothing spooky happens. Particle-based clocks slow down because, according to the rigour of the new paradigm, laboratory speed  $v = v_{\text{seen}}$  doesn't come for free: speed through space is, in fact, on loan from the bank of  $v_{\text{hidden}}$  speed in the inner dimensions. The scale factor by which  $v_{\text{hidden}}$  is reduced is given by

$$\frac{v_{\text{hidden}}}{c} = \frac{\sqrt{c^2 - v_{\text{seen}}^2}}{c} = \sqrt{1 - \frac{v_{\text{seen}}^2}{c^2}} = \gamma^{-1}.$$

In other words, the particle's own *inner clock*, viz. its speed around  $W$ , is slowed down by a factor  $\gamma^{-1}$ . For such a particle "time" ticks more slowly. In fact, "time" has nothing to do with it. But the *clock* certainly ticks more slowly. A process, such as moving the second hand by some number of degrees, that would have taken a resting clock  $t_0$  seconds now takes

$$t = \frac{t_0}{\sqrt{1 - \frac{v^2}{c^2}}}.$$

This has been confirmed in copious experiments.

## Effect on Rulers

The lengths of fast-moving entities also contract in their direction of travel, in an effect known as *space contraction*. It produces the (classically unexpected) *constant measured value* of  $c$ , irrespective of the speed of the person doing the measuring.<sup>9</sup> That empirical fact is, as Einstein discovered, impossible to reconcile with the world-as-thing paradigm without resorting to relativity. But this doesn't, of course, imply we need relativity: it simply implies that the world isn't a *thing*.

Having derived  $E = \gamma E_0$  and  $t = \gamma t_0$ , space contraction  $l = \gamma^{-1} l_0$  completes the special theory. Compared to the other two, it is a little harder to see with the simplifying assumptions made in this book, and I wouldn't expect you to end up with a full understanding of it from this short chapter. That's because, in this text, I am, for simplicity's sake, describing waves with theoretically *infinite* extent, for which spatial "length" doesn't have a meaning. So, space contraction is harder to describe in *explicit* terms.<sup>10</sup> Nevertheless, the mathematics can, at a broad level, be understood.

At significant speed, as WAVEVECTORS (saddle posts) tilt "into the wind" in  $x$ , WAVEFRONTS (saddles themselves) duly tilt "out of the wind" into  $W$ . Hence, whatever wavefront extent a resting particle or configuration of particles has, that wavefront extent is *rotated*, as the particle accelerates to speed  $v$ , out of the  $x$  dimension and into the  $W$  dimension. This produces a reduction in the spatial component of the wavefront extent: the factor is the ratio  $\gamma^{-1}$ . This shortens the  $x$  lengths of the world-images of rulers by  $\gamma^{-1}$ , giving, as observed,

$$l = \sqrt{1 - \frac{v^2}{c^2}} l_0.$$

This experimentally observed "pancaking" would cause space, in perception, to stretch out like an elastic band. Most curious to a wannabe-bicyclist! But it isn't strange; it's as curious as Alice seeing things get bigger as she shrinks. Again and again and again: the world an observer perceives is *not a physical object*; it is an *image* of a physical object, and that image depends not only on the world-object, but also on the observer-subject. Squish the subject in gaining speed, and the world-object seems to elongate. This is inbuilt into the very structure of matter.

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<sup>9</sup>It was this fact that was primarily responsible for the original victory of the "relativity" idea. The principle of relativity does give a pretty good account of it, although it fails spectacularly elsewhere. The issue is resolved without spookiness in Unity theory.

<sup>10</sup>I examine this notion in more depth in UNITY THEORY, the book.

# The Disease and the Cure

Sometimes, my jaw drops when I see how simple the laws of the Universe are, when I see how quite how much *sense* it makes. I spent many years accepting the old paradigm, working within it, trusting it implicitly, and using its logic to doubt all sorts of thoughts that would have made my life richer, fuller, deeper. I regret nothing, however, because my appreciation of the Universe is all the broader for having sat within both paradigms. But I know of the pain of the shallow-minded. There is so much untapped potential in the world; there are so many higher-dimensional creatures, people with minds that stretch beyond matter, deep souls with everything to give and experience, whose lives are stunted, whose dreams are crushed by the pitiful state of our culture. This is no self-flagellation; I have no guilt. And neither is it hatred of my people: the well-to-do, the English, the British, the Europeans, the Whites, the Humans, the Vertebrates, whatever you want to call us. I love even the gumps. But my heart feels the waste, the sheer tragedy of a civilisation and epoch that values exactly *the wrong thing*. And this not in a moralistic sense; morals are for braying arses. I'm talking about the Facts. As I went through the derivation above once more, I was struck again, as I have been so many times, by how bewilderingly basic it is, when compared with the mathematical diarrhoea that currently passes for physics. That derivation could be understood by a smart six-year old. The Lorentz factors are just Pythagoras.

How can these ideas have been missed?

Because what we have seen as the CURE is the *disease*.

Everywhere in our culture, people look *outward* to fix themselves. Goods, sex, money, pleasure, jobs, exercise, holidays, houses. And nothing wrong with those things, of course!<sup>11</sup> And if all is well, great. A simple person doing simple things happily is a triumph; what does it matter how they think? But if something hurts, if something lacks, if there seems to be a *hole* inside, then seeking solution, seeking solace in the list above is a tragic misplacement of hope. Sometimes, yes, one can fix a computer by clicking on the icons on the screen, but not if it has got a blown fuse. Not if the whole damn motherboard is missing. Sometimes, one has to get down on one's hands and knees and *fix* the fucking thing. There comes a point, in every genuine life, when one must look the facts of Reality squarely in the face. No amount of clicking icons will do it. The *categories* are wrong. Eventually, one must look beyond the material. Life is everything, yes; *this* life is

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<sup>11</sup>Puritans, who deny all pleasure, always end up burning witches.

everything, yes; to point to a deeper Reality is not to suggest removal of oneself from the business of living. Quite the opposite! Take a long hard look at every truly great person, whether they are great by dint of their love, their nobility, their deeds, their sacrifices, whatever, and you will see their commitment to something greater than the material. There is no way around this; the system can't be gamed. To heal ourselves, to heal this world that we have ravaged and are so viciously ravaging, we have no choice but to *deepen ourselves*.

Let me share with you my vision of the next age. In it, we are cured of the Western error, and, a little older and wiser, have recognised our statuses as images in a perceived world. People still drink beer, sell toothbrushes, play ping-pong. But, as they do what they do, folk talk a little less of *what* is happening, and more of the *experience*. They speak less of *things*. Folk see themselves as motes of the Infinite, rather than isolated islands of matter. There is, at the level of offices and parties, widespread knowledge of the distinction between perceived reality and Reality. Advertising (the ultimate soul-killer) goes the way of the dodo; people laugh at the idea that someone might try to tempt them into buying something. "What would I need that for?" they say, with warmth in their hearts, feeling wry pity for the dinosaurs of the old world. People don't live as two halves divided, standardised outside to cultural norms while yearning inside to be interesting. No. They live simultaneously as gods and people, witnessing their lives from a place outside the mind-image, outside thought and worded want.

*Language* has changed in this vision. People talk to the gods in each other, the souls, the centres, rather than to the material words. The default is to *deepen*. People take fewer holidays; just to *be* is quiet bliss, so they don't see the point. The talk is less of "What has been done" and more of "What is." Urban sprawl dwindles, and retreats. Shopping malls and retail parks become what they already are, *absurd*; their gaudiness and frippery grates on people, and they are rewilded. People work less and have more. Houses are emptier of goods and fuller of spirit. Folk don't own much, but then nobody does. Nobody needs it. Food, drink, a place to live and love. That's it. People are still happy, sad, some dull, some interesting, but less *greedy*. It somehow makes less *sense* to be greedy. If you don't want anything, then what is a bar of gold? Just a heavy thing. Strangers talk more, even in the city. Things happen *spontaneously*: street music, long wanders, kindness, true love. The marriage vows are rewritten; now the priestly talk isn't of the Abrahamic God, true in its way but awkward and outdated, but rather of the Universe, of the soul of the world, of how things Really are.



As folk realise that they are, deep down, the immortal consciousness of the Universal Mind experiencing human life, they lose their fear of death. Those in their last days are comforted that, when they die, all they lose is an image, a picture, a motif painted on a canvas. Folk know that the conscious *witness* of life, the Universe-soul also known as God, the one whose death would be truly sad, *cannot* die. So, folk meet death with equanimity, with courage, even with childlike joy. They know that the centre of knowledge, the deep centre of loving is not the body, which is only an image, but the deep Body, between which and God there are no lines. People know that, at the moment of death, one of two things may happen. Either the witness of their and every life, the Universe itself, will find another human being to watch, so to see all that goes on within, to watch the panoply of life unfold, or perhaps not. Perhaps the Universe, which is both you and me, will simply watch the whole show, behind the world, eternal, undying, beyond all eyes and ears. That's NIRVANA, I think.

Who do you think is conscious of your life? Your body? Your brain? Your mind? No. Those are conclusions of ego. Matter follows its rules, yes, but matter is just an *image*. Which entity has greater capacity for consciousness, for deep consciousness, for the capacity to understand *that* it exists: the three-dimensional icon on the screen, or the eight-dimensional computer below? Is it the three-dimensional surface, or the eight-dimensional ocean? Which entity makes it rain, the perceived cloud or the cloud itself? It is obvious. Yes, the old paradigm rules out such things: with reality a three-dimensional box, how could consciousness, your awareness, your deep you-ness be centred in any place other than the body? I know that feeling. I have lived it in past years. But I now know it to be false. How tragic logic can be. Look at two islands in the ocean, isolated, cut off from one another. Without reference to the deep, two islands are *lonely*. They are never together, never One. But, beneath the surface of the ocean, in the dimensions that the islands cannot perceive, they form a continuous mountain chain. Under the water, what was separate is together; at depth, what was discrete is continuous. On what grounds, then, do we place the witness of life in the body? On what grounds do we imprison our Selves in these mortal cages of flesh and bone? On no grounds at all. Flesh and bone is flesh-*image* and bone-*image*. Underneath the surface of the world, all is continuous. We are thoughts in the Universal mind, deep images and ideas of God. We aren't material islands cut loose in a sea of space; we aren't *in* the Universe; we *are* the Universe.

How could one ever feel more at home?

# 15

## THE QUANTUM

You have suffered and endured a thousand miseries because you will not let your genius play the part it was always destined to play.

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*Marcus Aurelius*

We come now to a major question, which has puzzled old paradigmers since it emerged, quite unexpectedly, in the work of Max Planck, at the very end of the 19th century. That question is:

### WHAT IS THE QUANTUM?

This is the deep enigma that occupied Einstein for the second half of his life. And to occupy a thinker like Einstein is something. His decades-long battle with the PHOTON, as the particle of light is now known, was an attempt to understand how the *wave* nature of light, quantified elegantly by Maxwell in 1873, could be reconciled with the *particle* nature of light, which had emerged in the early years of the 20th century, primarily in Einstein's own 1905 paper applying Planck's idea to the photoelectric effect. The domain in which Einstein sought reconciliation was space. Of course! There was, back then, and there yet remains, in the Grand

Circles of physics, virtually no doubting of this fact.<sup>1</sup> Indeed, there was so little doubting of space's role as the backdrop that the *question* had not even arisen. There was no forum in which to doubt. Einstein attempted unification on the stage of space, and his heroic attempt—he was still working the problem on his deathbed—brought no resolution. Why? Because the wave-particle nature of the PHOTON of light is not a duality that exists on the stage of space. As we have seen, wave nature exists at the level of the substrate, *below* the level of perceived reality; particle nature exists at the level of space, *at* the level of perceived reality. To attempt to unify the two within space is a categorical impossibility. It's like trying to describe SAND in terms of *sandcastles*.

On a beach, there is SAND. Let us suppose there is also a *sandcastle*. Both of these entities exist, at least in a certain sense. Now, sandcastles have qualities like number of turrets, height, existence of a gatehouse, depth of moat, and so forth. Imagine trying to describe Sand in those terms. How many turrets does Sand have? How deep is Sand's moat? How tall is Sand? The ideas are meaningless, the questions non-questions. The model "sandcastle" and the model "Sand" exist at different levels of reality. It's not that the same entity is simultaneously Sand and sandcastle—Sand is emphatically not a sandcastle: one is a mineral, the other is a temporary defense against hermit crabs—rather, the two models *apply*, at different conceptual levels, *in the same place*. Reality is what it is; "Sand" and "sandcastle" are words. And there is full asymmetry between them. A secondary phenomenon can be described in terms of a primary phenomenon; hence, one can describe *sandcastles* in terms of SAND, analysing mineral constituents, density and resistance to Crustacean Armies. But the reverse isn't true. You can't analyse Sand in terms of sandcastles; the concepts just don't apply. It is misleading to say Sand "has zero turrets", nonsense to say Sand has "zero height", and incorrect to award Sand any specific value for "ability to resist invasion by crabs." If *sandcastles* define the debate, however, that's what one is bound to do. And this is what the minds of the West have been trying to do for years. Particle physicists (who are, by literal definition, "boring scientists") continue to probe to ever smaller scales of magnification, hoping that, at some magical point, at some picoscopic level

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<sup>1</sup>Minkowski, who was Einstein's teacher, broadened *space* to *spacetime*. This idea was then absorbed by Einstein and the physics community at large. However, it was, in fact, a retrograde step *further* away from comprehension, a classic example (this often happens in physics) of mathematical simplification serving to *obscure* physical Reality, rather than clarify it. Spacetime *cemented* space's role centre-stage, and ensured that no one trained in its way of thinking could hope to see beyond the world-image. This is the hallmark of a PARADIGM; the relevant questions simply cannot form in the mind.

of length, they will come across The Truth that will reveal all. This Truth will allow them, as the Establishment fiction goes, finally to describe all of reality in terms of *fundamental particles*. But it is a pointless exercise, and much worse than pointless. The fool's errand of particle physics is equivalent to a man digging like a dog into the beach, first with his hands, then with a spade, then with a gigantic earth-mover, looking for THE FUNDAMENTAL CASTLE. The search is a category error. History, if the environment goes the way the materialists would have it go, will judge the building of the colliders very harshly. CERN and other high-energy (the clue is in the name) installations like it use staggering amounts of electricity. Look up the stats. They top the list, right up there with private jets and war, of the most environmentally costly of all human endeavours. They are monuments to the foolishness of the Scientist.<sup>2</sup> There can be, as Einstein found with pen and paper, and there could never be an answer to the question "What is the quantum?" in terms of the perceived world. The categories are wrong. The QUANTUM, just like the orphan MASS, is an artefact of the process by which the world-image emerges from the Reality that underpins it. We stand this side of the Doors of Perception, and all we see are castles. The QUANTUM, however, is the size of the shovel that builds them.

## The Planck-Einstein Relation

What Einstein and others found, in the early 20th century, is that LIGHT, despite its evident wave nature, is emitted, absorbed, and travels in discrete hunks of *energy* called QUANTA. In 1905, to explain light's ejection of electrons in the photoelectric effect, Einstein, building on work by Planck, gave the formula that now bears their names, the PLANCK-EINSTEIN RELATION. It is simply

$$E = \hbar \times \omega.$$

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<sup>2</sup>The truth can be a bitter pill. How galling for a physicist to discover that his Particle Quest is precisely the opposite of the noble, status-worthy, humanity-enriching piece of self-sacrifice it was sold as. But that's just the way of things. Do something shallow and foolish, and you end up looking like a shallow fool. Note that, in the construction of Unity theory, while I have referred to and used some of the results that came out of installations such as CERN (waste not, want not), the structure of Unity theory and its experimental validation require nothing from these facilities. We have the answers already. CERN, and other high-energy facilities, can and should be decommissioned and recycled. To build a gigantic playpen for oneself and one's friends is not the purpose of science.

## The Symbols

- ENERGY  $E$  is the classical energy of a PHOTON of light, in Joules.  $E$  is a full answer, at the level of the laboratory, to an underlying substrate question. The relation describes the *size of the packages*  $E$  in which light is dispatched in photoemission and received in photoabsorption. These package sizes can be measured, at some degrees of abstraction, in the laboratory. The symbol  $E$ , then, has the same eventual meaning, albeit with different sources, in all of the following:

$$\underbrace{E = \hbar\omega}_{\text{in light}}, \quad \underbrace{E = \frac{1}{2}mv^2}_{\text{in slow matter}}, \quad \underbrace{E = mc^2}_{\text{in mass}}, \quad \underbrace{E = i\hbar\frac{\partial}{\partial t}}_{\text{in matter waves}}.$$

- The PLANCK CONSTANT  $\hbar$  is  $1.05 \times 10^{-34}$  Joule seconds. Planck gave the constant in 1899, in his seminal work on the black-body spectrum, thus founding the field of quantum physics. It is a fixed *constant of proportionality* between substrate-level rates and laboratory-level energies.
- ANGULAR FREQUENCY  $\omega$  (omega) is the rate at which a sinusoidal wave is changing in time, in  $\frac{\text{revs}}{2\pi}$  per second.<sup>3</sup> Broadly, it is equivalent to  $\frac{\partial}{\partial t}$ . We cannot use  $\frac{\partial}{\partial t}$  here, however, as light waves are *sinusoids*, polarised in only one dimension, and, since different parts of a sinusoidal wave (peaks, troughs, neither) look different, the nice  $i$  mathematics of helices doesn't work. So, you can't equate  $\omega$  and  $\frac{\partial}{\partial t}$  directly. However, the *magnitudes* are equal  $|\omega| = |\frac{\partial}{\partial t}|$ . It is helpful to think of  $\omega$  as conceptually equivalent to  $\frac{\partial}{\partial t}$ , so long as one remains aware that the sinusoidal  $\mathbb{R}$  mathematics of light waves, while simpler on one level than the helical  $\mathbb{C}$  mathematics of matter waves, is a little less elegant in its algebra.

## The Equation

The equation  $E = \hbar\omega$  is the same unit translation as  $\hat{E} = i\hbar\frac{\partial}{\partial t}$ . Indeed, these are essentially the same equation, as applied to sinusoids polarised in one

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<sup>3</sup>The “angular” part is a convenience; in a phase rotation around a circle of radius 1, frequency  $f$  is number of *full* circumferences per second, while  $\omega$  is number of *units* of circumference per second. They differ by a factor of  $2\pi$ , but are otherwise identical. So, we can talk of  $\omega$ , in the following, as “frequency”, without angering the mathematical gods.

dimension and helices polarised in two. To bring the equivalence out, let's assume that our helical  $\hat{E}$  question (as asked of a matter wave) has a precise eigenvalue answer  $E$ . The two equations are then

$$\underbrace{E = \hbar\omega}_{\text{in sinusoids}}, \quad \underbrace{E = i\hbar\frac{\partial}{\partial t}}_{\text{in helices}}$$

The sinusoidal mathematics can be bypassed if one *squares* the equations. This converts two  $i$  rotations back into negation:  $i^2 = -1$ . They are now transparently the same equation, with positive  $\omega^2$  *defined* as the negative of the second time derivative (itself negative):

$$\begin{aligned} \omega^2 \times \hbar^2 &= E^2 \\ -\frac{\partial^2}{\partial t^2} \times \hbar^2 &= E^2 \end{aligned}$$

$\xrightarrow{\hspace{1.5cm}}$   
 Conversion via  $\hbar$

So, you can read the Planck-Einstein relation as a realised  $\mathbb{R}$  version of our prior complex  $\mathbb{C}$  energy calculation. The proportionality seen here in  $\hbar$  is exactly the same proportionality seen everywhere in QM;  $E = \hbar\omega$  and  $E = i\hbar\frac{\partial}{\partial t}$  are one conversion from substrate-level rates  $\omega$  or  $\frac{\partial}{\partial t}$  to particle-level energies  $E$ .<sup>4</sup>

## A Quick History

The scientific debate over the nature of light had already ebbed and flowed for centuries by the quantum revolution of the 1900s. In 1704, Newton proposed that light consisted of *corpuscles*, i.e. particles. He had reason for believing this. Waves, such as sound, don't go in straight lines; they bend around corners. Light, however, doesn't go around corners, or at least not in an obvious fashion. Hence, while you can *hear* a car approaching around a blind bend, you can't *see* it. At the level of experimental observation back then, which was broadly that of the street

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<sup>4</sup>The conversion  $\hbar$  is the same for radiation and matter waves. So, you might be wondering why I'm approaching the quantum via *radiation*, and not via matter waves. I choose this approach because the logic is easier to see re light. While electrons have components of propagation in the inner dimensions, i.e. MASS, light does not. Light is, therefore, the simpler phenomenon. This is important, because we are going to take another bold leap, and need to have a sure footing.

now, light casts sharp shadows. Hence, Newton concluded, light emerges from a lamp like bullets do from a gun. Bullets don't go around corners. And such was Newton's stature back then that what he said went.<sup>5</sup> The corpuscle theory of light held sway until 1801, when Thomas Young, in the experiment that is now the most famous in quantum physics, shone light from a single • source through a pair of parallel ■■ slits, and looked carefully for the wave behaviour known as *constructive* and *destructive interference*. He found it. Newton's bullet theory predicts that light shone through parallel slits should produce, on a screen behind the slits, solid bars of light ■■. But it doesn't. Instead, the light from the slits *interferes* with itself, in exactly the manner that sound and water waves do, producing not a pair of solid bars but rather an alternating pattern of light and dark bands ■■■, continuously smeared out. This pattern can be predicted quantitatively. Young's two-slit experiment matched a WAVE THEORY of light perfectly, and Newton's idea was duly deprecated.<sup>6</sup>

At the start of the 1800s, all were agreed: LIGHT is a *wave*. This belief reached its apogee in the figure of Maxwell, whose 1873 opus *A treatise on electricity and magnetism* is widely taken to be the greatest piece of theoretical physics between the *Principia* and general relativity. Studying the then-separate phenomena of electricity and magnetism, Maxwell showed that, if one views the two as aspects of one phenomenon, then that phenomenon, now called ELECTROMAGNETISM, should send out waves at... *the speed of light*. Eureka! Maxwell was duly impressed. His numbers had emerged from the study of electric coils and magnets, simple things long studied in the classical lab, yet they predicted the generation of waves that propagate at *c*, a speed which had been measured, to a reasonable level of accuracy, in previous decades. Maxwell's seminal work was, therefore, full and "final" vindication of the wave theory of Young. Not only did that theory make *quantitative, phenomenological* sense in terms of interference behaviour, it now also made flawless *theoretical* sense. It was and remains certain: LIGHT is a *wave*.

Then along came the QUANTUM. With just as much experimental certainty, it became clear, in the early 20th century, that LIGHT comes in discrete packets of

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<sup>5</sup>Pope wrote Newton's epitaph: "Nature and Nature's laws lay hid in night: God said, Let Newton be! and all was light." Too much praise, Nietzsche would have said, and not enough surpassing.

<sup>6</sup>Indeed, Young's idea explained (as any good idea must) what was wrong with the justification for the prior idea. He showed precisely why we see light as having sharp shadows. The rate at which waves bend around objects is related to wavelength. Low-frequency, long-wavelength waves, such as bass sounds, bend easily around corners, while high-frequency, short-wavelength waves, such as treble sounds, do not. The wavelength of visible light, Young noted, is very small, hence its bending around corners is minimal. But it does exist.

energy. Despite the fact that this seems irreconcilable with Young’s and Maxwell’s work, this is also beyond doubt.<sup>7</sup> Despite the wavelike and hence continuous nature of light, for which there is ample evidence, there is also ample evidence for the fact that the energy contained in a light wave comes in discrete packages of size  $\hbar\omega$ . The paradox, as Einstein knew, is a deep one.

## Quantisation

Consider light of a specific colour, say red. That colour is the perceived effect of a specific *angular frequency*  $\omega_{\text{red}}$ , around  $2.7 \times 10^{15} \text{ s}^{-1}$ . There is nothing “quantum” about such a value; it is a perfectly straightforward rate of change of a continuous Maxwellian wave. Now, enacting a unit conversion to ENERGY isn’t an *intrinsically* quantum process either. Doing the conversion, we get

$$\begin{aligned} E_{\text{red}} &= \hbar\omega_{\text{red}} \\ &= 1.1 \times 10^{-34} \text{ Js} \times 2.7 \times 10^{15} \text{ s}^{-1} \\ &= 2.8 \times 10^{-19} \text{ J.} \end{aligned}$$

This is a very small amount of energy. Nevertheless, if you took gazillions of such amounts, you could fire a rocket into the air. Imagine, then, a picoscopic substrate flea, one of whose leaps requires precisely this amount of energy  $E_{\text{red}}$ . Rename it  $E_{\text{flea}}$ . Having a value  $E_{\text{flea}}$  is not, in itself, a quantum idea. After all, if  $E_{\text{flea}}$  was the energy used in the flea’s highest possible leap, then a smaller leap would use a smaller amount of energy. Indeed, there should be a continuum of flea-leaps, all the way down to no leap at all. But this is not what happens. Instead, the value  $E_{\text{flea}}$  cannot, in an observable sense, be “dimmed down to zero”. The flea doesn’t know how to jump low; it’s  $E_{\text{flea}}$  or nothing. This is the QUANTUM. It’s not that  $E = \hbar\omega$  is inherently, that is to say, in its *algebra*, a quantum equation, nor that  $\hbar$  acts differently from any other number. No. It’s about the phenomena. While it is sensible to assume that jump height, and therefore  $E_{\text{flea}}$ , should be a continuous, *down-scalable* quantity, it is empirically observed that  $E_{\text{red}}$  is not so. Turn the dimmer switch on a red lamp all the way down, and there is *nothing* (observable)

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<sup>7</sup>It was the empirical certainty in *both* directions, towards wave and towards particle, that made this paradox so appealing to Einstein. As he and his friend Niels Bohr knew, and as I explore later in this book, a *total paradox* (e.g. a GOLDEN PYRAMID the size of Everest) is the very best of all worlds. Presented with such a thing, one knows for a cast-iron fact that one’s worldview is wrong.



between  $E_{\text{red}}$  and zero. And exactly the same occurs with  $E_{\text{blue}}$ ,  $E_{\text{purple}}$  or any other colour you care to mention. The packet sizes are different, depending on the different values of  $\omega_{\text{red}}$ ,  $\omega_{\text{blue}}$ ,  $\omega_{\text{purple}}$ , but they all share the same conversion. There are no observable half-quanta  $\frac{1}{2}E_{\text{colour}}$ . The question is, why not?

The quantum nature of light, which presents a simple and dramatic paradox of old world concepts, is a beauty. Anything interesting enough to hold Einstein's attention for decades is worthy of everyone else's attention. I suggest thinking about it just as deeply. I have, with Einstein, pondered long whether there is *any* feasible explanation of the photon paradox which maintains the physical reality of the world-image. The answer shouted at me by the Facts has been, at every turn and in every language “No, non, nein, nee, òχι, hapana, *bù kěnéng*, 𐤊𐤍𐤏𐤃.”<sup>8</sup> It's the great thing about seeking the truth without an agenda; look honestly, without any wish for things to be this way or that, and life will always show you the way. It's only *desire* (usually, the desire not to be Genius) that screws you up. As Einstein sensed, the Photon Paradox points, with no colliders needed, to the very crux of the mystery, viz. the relationship between *perceived reality* and REALITY.

Note that the quantum paradox is independent of the inner dimensions, that is to say, radiation quantisation is separate from—perpendicular to, indeed!—the mystery of the existence of mass. Both are resolved by the same broad idea, viz. imperceptible dimensions, but **not** in the same fashion. This is significant. Each mystery requires, independently of the other, the Universe to be dimensionally broader than the cosmos. Given the import of this conclusion, it is welcome news that there are redundant sets of evidence for it. This removes, as far as I can tell, even the slightest possibility that the overall conclusion of Unity theory—“The cosmos is not the full extent of Reality, but only a perceived image of it”—is a product of either logical error or bias.

## The *Direction* of Quantisation

Here's where the paradox really bites! Empirically, the quantisation of light, that is to say, light's undimmiability below the value given by the Planck-Einstein relation  $E_{\text{colour}} = \hbar\omega_{\text{colour}}$ , *does not involve quantisation in time or space*. Following extensive research in the 20th century, it may be taken as proven that PHOTONS

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<sup>8</sup>I would be delighted to hear from anyone who thinks they can reconcile ① *Natura non facit saltus*, ② the phenomenon of quantisation, and ③ space as the backdrop of reality.

are not quantised as a result of having either a specific location or duration. In a laser of pure colour, the waves are continuous, homogeneous, unbounded, that is to say, unquantised in every observable fashion. You can't isolate a quantum  $E_{\text{colour}}$ . And this isn't due to technological incompetence. You can produce a light wave with full symmetry across a large spatial range, containing the energy equivalent of squillions of photons, and it will be a Maxwellian wave; it won't consist of the various frequencies required to make localised wavepackets. No. It will contain *precisely one* frequency, and thus, by mathematical definition, be spread out evenly through space. There will be no sense in which it is *here* rather than *there*. And yet, it is, somehow, QUANTISED in energy terms.

Old paradigmgers, attempting to cram this paradox into the perceived reality of the lab, have proposed all sorts of absurd ideas. In order to imagine that the quantisation above is an aspect of the world-image, folk have proposed that *space itself* has a pixelated structure, that it exists in the form of a grid of some kind. How anyone can think Nature permits such an "essential grid", in a physical sense, is beyond me. *Natura non facit saltus*, it used to be said. Which is true permanently; whether or not Nature *seems* to make jumps is of no consequence. In what manner could Nature ever make a hard dividing line, encoded into the reality of space, maintaining pixels everywhere, separating every location from every other? Of what what would the dividing lines be made? Fairy wings? Wishful thinking? A similar nonsense involves *time* progressing in a quantum fashion, ticking like the numbers on a digital clock. What possible justification is there for such an idea? What happens in the time between ticks? How does nature know to proceed, unless something happens between the ticks? If time is frozen between these grid seconds, then how does one second become the next? What physical process enables such behaviour? What physical process *could ever* enable such behaviour? The lengths "rational" people have gone to! The sandbags they have been forced to use! The Facts demand a simpler truth.

So, what is the QUANTUM?

Once you have opened your eyes to the difference between perceived reality and Reality, resolutions present themselves immediately. LIGHT, as a Maxwellian wave in space and time, is continuous. No quantisation. So, in which direction is the quantisation of light? Easy. It has to be in one of the dimensions that goes into the *construction* of perceived reality. It has to be in a gallery dimension, a cinema dimension, a dimension along which one sees the Mona Lisa. Which one, then? Well, thus far, we have only one candidate: *W*. But that won't do. Light travels

through space at  $c$ , which, as is now firmly established, is the speed at which *all waves* travel on the  $(\text{space}, W)$  cylinder. An electron wave travels at  $c \uparrow$  in  $W$ , subsequently to be observed as a particle at rest; a photon wave, however, travels at  $c \rightarrow$  in  $(x, y, z)$ . Hence, a photon wave can have *no component* of wave travel in  $W$ , nor in any inner dimension. By definition, all of its wave speed  $c$  must be taken up with travel through space: there can be nothing left over.

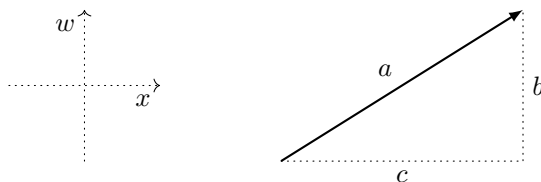
So how, we ask, could the perceived particle PHOTON, which exists in space, emerge from a fundamental substrate wave? If photon motion is exclusively in  $(x, y, z)$ , how can the underlying configuration, namely a continuous substrate-level light wave, produce a quantised photon? If light's propagation is exclusively in SPACE, shouldn't it be the same on *both* levels of analysis? Yes. And there's the crux. It isn't. Restating the logic, boiled all the way down: if the *wave underlying light* only travels in  $(x, y, z)$ , with no variation, and hence no propagation, in any other dimension, then there is categorically *no way* in which light can have continuous WAVE and discrete PARTICLE natures simultaneously. But, empirically, it does. We have reached a logical *contradiction* £. Booyah!

## Faster Than Light?

What do we conclude? Following the great Sherlock Holmes, we draw the only inference we can. The substrate waves which generate Maxwellian light and the photon *can't* only travel in  $(x, y, z)$ ; they must also propagate, in addition to that motion, in another imperceptible dimension. Or, to put it another way, a photon's wave velocity  $c$  in  $(x, y, z)$  must be only the *perceptible component* of a broader velocity vector. Or, to put it yet another way, since we are confident that wave propagation on the  $(x, W)$  cylinder takes place at speed  $c$ , the  $(x, W)$  cylinder *must itself be a projected image*. In short, the speed limit of the Universe must, in fact, be *higher* than  $c$ . And up jump the materialists!

"Higher than  $c$ ? Inconceivable! Impossible! The speed of light is the maximum of everything. Everybody knows that! You said so yourself! We know for a fact that nothing is faster. We learnt it at school! It was on the exams! This is blasphemy, apostasy, sacrilege, madness! He's a lunatic! A troll! A heretic! A witch! Burn him! Burn him! Burn the hippy shitbag! Stick him in the collider! Ionise him! Teravolt him! Hadronise him until he recants!"

Haha. Let's consider the speed limit again, without the "Ah, what cheek!"<sup>9</sup> What do we *know*? Well, we know, empirically, that the speed limit of perceived reality is  $c$ . Yes, the speed limit of *perceived* reality. That's all. Anyone who claims to know, empirically, that the speed limit of Reality itself is  $c$  is a nonsense-monger. No one could *ever* know such a thing. So suppose, for a moment, just for a moment, that the wave speed of the Universe is, in fact, *greater than*  $c$ . Let's call it  $a$ , in  $\text{ms}^{-1}$ . Take  $b$ , then, to represent the speed of a Light wave (capitalising here to refer to the underlying substrate disturbance) in whichever dimension the process of photon quantisation occurs. I'll call that dimension  $w$ .



If the speed of Light is in fact  $a$ , then the same must be true for *all matter and radiation*; according to Unity, all wave disturbances must propagate at the same speed. Now, at the beginning of this work we assumed (quite naturally!) that that speed was  $c$ . However, that was not an implication of Unity. Unity only implies that all waves travel at the *same* speed, and the phenomena only imply that that speed is *at least*  $c$ . The speed of perceived light is certainly  $c$ , but that doesn't stop the speed of its higher-dimensional producer Light being bigger. Nevertheless, whatever the speed limit is, everything must obey it. So, since, according to the Schrödinger theory, all radiation and matter waves travel at  $c$  on the (Space, Inner) cylinder, their underlying Radiation and Matter waves must have the same extra component of speed  $b$ .

And how does this "lunacy" tie in with perception? Perfectly! If the Light waves which produce light had *variable* component speeds  $b_1$ ,  $b_2$ ,  $b_3$ , etc. then those speeds would be, in some manner, *perceptible*. This, however, is evidently not the case; light comes in one variety and one variety only. So, a ubiquitous component  $b$  is both theoretically *and* empirically necessary. And we can take the same point further. If the imperceptible component of Light's propagation, whose speed, we now know, is fixed at  $b$ , could take place in various *directions*, then

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<sup>9</sup>What gold dust is indignation! If you ever find yourself indignant, about to utter a grandiose "How dare you?", then rejoice in full anthem, because, so long as everyone does you the great courtesy of either ignoring or laughing at you, you are about to be cured of being a dick.

we would *also* know about it. Variation of direction is variation all the same, and would produce perceptibility. It doesn't. So, we can only suppose, for consistency with the lab and the street, that the imperceptible wavevector components of Light, in the dimension of quantisation  $w$ , must not only have consistent speed  $b$ , but also consistent direction. In other words, they must have consistent *velocity*. As far as I can tell, there is only one non-paradoxical conclusion which can be drawn from the following facts:

- ① light is quantised,
- ② light is a continuous wave in (Space, Time),
- ③ light has no mass,
- ④ every quantum of light is identical in perception.

That conclusion is that the deep Light waves which travel through the substrate, subsequently generating the perceived phenomenon *light*, must have a consistent, non-negligible speed  $b$  in a consistent direction  $w$ , which is neither a dimension of space nor a small inner dimension.

## The Wave

This brings us to a key conception. Like many ideas in Unity theory, it sounds reasonable (necessary, indeed) to someone who has considered Life scientifically, and who has thus recognised that space is a perceived image, and it sounds like babbling insanity, even moral turpitude to someone who has not. *C'est la vie*. Light and Matter waves produce, in projection, light waves travelling at  $c$  in  $(x, y, z)$  and matter waves traveling at  $c$  in  $W$ . But every Light and Matter wave must also have a ubiquitous component of velocity  $b$ , in a  $w$  dimension oceanic enough to permit the construction of a non-resonant swell. In other words, the entire cosmos, i.e. every single particle of stable matter and radiation must, in addition to any energetic propagation in space or the inner dimensions, be progressing in a fourth *outer* dimension,  $w$ .

The entire COSMOS, then, is the perceived image of a single **Wave**.

Picture yourself in a train carriage, travelling steadily on a smooth section of straight track. The carriage world in which you sit—the seats, the people, the lights, the walkways—has a single speed, shared by the contents of that carriage world. Folk may get up and walk around, deviating from that underlying speed;

those walks to the buffet car are registered as non-zero departures from baseline. In fact, a person walking towards the rear of a train still has a very significant positive speed towards the front, but that isn't what comes to perception. Sat in the train, especially if it's dark outside, the baseline of "static" gets reset, and the carriage becomes the stillness against which motion is measured. All I am doing is taking the above idea to a logically necessary extreme. So, hold onto your hat here, and don't throw this notion out with the bathwater simply because it is big. After all, you can't fix a paradigm without breaking some World Eggs.

#### THE COSMOS ITSELF IS A TRAIN CARRIAGE.

You are quite accustomed to riding in trains, oblivious of your own motion down the track; you are quite accustomed to living on the surface of the Earth, oblivious of your rotation around its polar axis at some thousands of miles per hour; you are quite accustomed to living on the outer edges of the Milky Way, oblivious of your circling of the galactic centre at some five hundred thousand miles per hour; you are quite accustomed to living in the Laniakea supercluster, oblivious to its motion at God-knows-what speed through the Voids of Heaven. If you notice none of these things, then why should you notice the motion of *space itself*, as that cosmic carriage rides the biggest tracks there are? You shouldn't, and you don't. Ride the cascade of concepts, and you can't fail to see.

$$\text{City} < \text{Earth} < \text{Sun} < \text{Milky Way} < \text{Laniakea} < \text{Cosmos}.$$

Each of the first five has motion, at breakneck speed, which feels exactly like stillness; each is voyaging the wilds of the substrate. Each of the first five is... so why stop before the top? Why assume that the *cosmos* is special? Why assume that the *cosmos* is the be-all and end-all? There is no reason to do so, other than the small-minded prejudice of a paradigm which hypothesises (yes, *hypothesises*) the cosmos to be the full extent of Reality. What joy to discover we had it wrong! The Facts, such as fascinated Einstein, require that the *cosmos*, the entity formerly known as "the universe", is an *image*, perceived from within it, of a Cosmic Swell, a colossal **Wave** rolling across the deep.

Not only, it turns out, are there imperceptible *inner* dimensions such as *W* which host the masses of particles of matter, but there is also an imperceptible *outer* dimension, *w*, a broad, oceanic, space-like dimension in which the *cosmos itself* moves. This dimension is imperceptible, despite its size, because we are, as every perceiving entity is, inside the great Train Carriage of Experience. That

carriage *always* has no windows. In *w*, everything perceived, indeed, everything we could possibly perceive (outside of a hadron collider) is moving as one. Light waves, atoms, people and planets are passengers sitting in seats on a vast train; unbeknownst to them all, the entire damn show, the cosmos within the Universe, is **PROGRESSING** in *w*.<sup>10</sup>

When trying to cope with an idea of this magnitude, the first task is to ask whether it could *possibly* be true, before one tries to ascertain whether it *is* true.<sup>11</sup> And, if one admits the possibility of the cosmos progressing as a unified **Wave**, then one is forced to admit, immediately and fully, that the perceived world-image generated by such a scenario would be... *exactly* the kind of world-image we see. Project out the *w* dimension, *et voilà!* In this basic, basic realisation—the outer *w* dimension of progress is projected out in perception—which requires nothing more than an open mind, all empirical objections to the idea of **PROGRESS** in the *w* dimension are rendered null and void. Rejections by “no effing way” incredulity are logically invalid. If someone working in the materialistic paradigm can give me a reason, beyond panicked horror, why the cosmos cannot be mobile within the Universe, then I am all ears. I would love to hear a better explanation of the nature of light than mine. But I suspect they cannot. Even Einstein could not. Why? Because, I think, no such reason exists.

I call the wave configuration, whose image we perceive as the *cosmos*, the **WAVE OF THE PRESENT**. Or, for short, just the (sans serif and capitalised) **Wave**. Much work in physics can be done without reference to the **Wave**: all of classical mechanics, all of QM, the field theories of quantum electrodynamics (QED) and quantum chromodynamics (QCD), and the special and general theories. That’s a lot. But it isn’t everything. The **QUANTUM** itself and the field theory of the weak interaction both require consideration of the **Wave**. I’ll address those shortly. Before we do that, however, let’s make sure we’re on the same page, so that it’s clear exactly *what* I’m proposing. Then you can decide if it makes sense.

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<sup>10</sup>I use the word “progress” to refer to travel in the imperceptible *w* dimension, as distinct from “motion” in the perceptible (*x, y, z*) dimensions.

<sup>11</sup>This is a good idea with any revelation; it is always best to run the thing through the circuits. Perhaps reject it afterwards, yes, but hold it awhile first. Often, we turn down useful truths, such as “Your partner is cheating on you”, because we don’t want to process the implications of the fact. Courage is important. Without the courage to work through the implications of a possible truth, a human being is a slave to self-image. In order to live an enlightened life, one doesn’t have to *believe* tellers of purported truths, but one always has to *admit the possibility*. This is why the Western error is so intransigent. Freethinkers who point out the mistake (I am only one in a long line of such people) are ignored out of hand, because moneyed twats would sooner choose *denial* than Life.

What I'm suggesting is this:

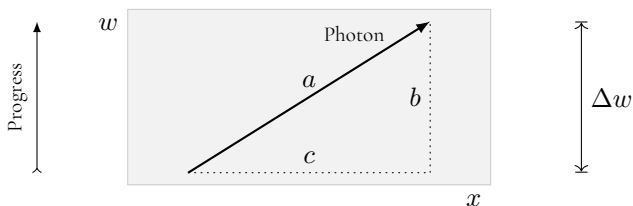
- ① There is a **UNIVERSE**, which is the sum total of Reality. It is the truest and broadest extent of what is. There is nothing beyond or outside it. In line with its nomenclature, it consists of one substance, which I have called the **PROTEAN SUBSTRATE**. The Universe is One, and there is no such thing as non-Universe. Everything is a configuration of its substrate.
- ② There is a **Wave** of supra-cosmic scale, a configuration of the substrate that is, in the current epoch, propagating coherently across the face of the Universe. If the Universe is an ocean and the substrate is the water, then the **Wave** is an ocean swell. It is energetic, with both macroscopic and microscopic structure. The **Wave** as a whole has a consistent **SPEED OF PROGRESS**, notated  $b$ , and also a consistent profile. But this macroscopic structure also allows for smaller wavelets, which vary along the wavefront. In the ocean analogy, the **Wave** is a broad swell of consistent shape and speed, on whose surface smaller wavelets (particles) move left and right, as surfers do. The **Wave** travels in the  $w$  dimension, which is its global wavevector, and its wavefront consists of all of the dimensions, outer and inner, of the *cosmos*. The **Wave** is a physical configuration of the substrate.
- ③ The **COSMOS** is then the *world-image* that is projected down from the **Wave** in the perception of the wavelets (humans) that move along its wavefront. Because the **Wave** has a consistent speed of progress  $b$ , that speed in  $w$  is imperceptible. Moreover, since the profile of the **Wave** is also consistent, the  $w$  dimension itself is imperceptible. Because all matter and radiation share the same **Wave** profile in  $w$ , both in speed and extent, there is no variation-data (outside of a high-energy particle collider) to contribute to perception. Unlike in a train, every part of the **Wave** has the same front-to-back shape in  $w$ ; hence, that shape cannot be seen. The  $w$  dimension is, therefore, projected out of perceived reality. The inner dimensions, such as  $W$ , are also projected out. Considering an electron: neither the outer  $w$  dimension in which the electron keeps abreast with the **Wave**, nor the inner  $W$  dimension which hosts the mass of the electron, features in the world-image, because those dimensions are involved in the *construction* of the particle-image “electron”. The same then applies to human beings.
- ④ **SPACE** is the backdrop of what is left once perception has had its say. The three dimensions  $(x, y, z)$  of space are the three macroscopic dimensions



of the **Wave** front. Looking at a swell from above, the sea is the  $(w, x)$  plane: the **Wave** rolls towards shore in the imperceptible  $w$  dimension, in which there is no variation between different elements of the world-image, while the front of the **Wave** stretches out in  $x$ . Since wavelets can roam to and fro along the **Wave** like surfers, there is variation in  $x$ . That variation-data is perception-data, which is subsequently seen as foreground matter moving against background space. We human beings, as wavelets of the **Wave**, live within the Train Carriage of Experience, and see nothing of its PROGRESS. What we see is the static image we call “space”.

## The Quantum

So, what is the QUANTUM? Well, consider a light wave now as a Light wave coproggressing<sup>12</sup> with the **Wave**. In which direction is the Light wave travelling? It is moving at  $a$  through the substrate, with  $b$  of that speed in  $w$  and  $c$  of that speed in  $x$ . Those quantities are linked by Pythagoras, as  $a^2 = b^2 + c^2$ . Below is a view of the **Wave** from the point of view of a hypothetical observer “*above the universe*”. It can be visualised as a seabird’s-eye view of a swell progressing shorewards. The **Wave** progresses up the page, in  $w$ , while one dimension  $x$  of space is represented across the **Wavefront**. The photon’s  $b$  component of speed “towards shore” is imperceptible; hence, the photon surfs the cosmos at  $c$ .



Now, consider the *thickness* of the **Wave**, as depicted in the vertical length  $\Delta w$  of the diagram above. The **Wave** cannot have unlimited **Wavetrain** length in the  $w$  direction, because that would rule out the very short timescales over which, say, radioactive decay occurs. Indeed, those timescales tell us that the **Wavetrain**,

<sup>12</sup>I use “coproggressing” to mean “having speed  $b$  in the  $w$  direction”, i.e. keeping abreast with the **Wave**. *A priori*, every perceptible element of the cosmos coproggresses. However, there are plenty of wavelets that don’t. The weak bosons don’t, for example, nor do certain breeds of virtual particles.

front-to-back in  $w$ , must be of very *limited* length. We also know, from the fact that we don't perceive the  $w$  dimension (except in colliders), that the **Wavetrain** length must, like  $b$ , be *consistent*, shared to a good approximation by all perceptible matter and radiation. If this wasn't the case, we would get perception data from it, and would live in a four-dimensional world-image. We don't.

What does  $\Delta w$ 's consistency imply? Well, in this conception, every Light wave must, despite its smooth wave nature in  $(x, y, z, t)$ , occupy, in a continuous but nonetheless well-defined sense,<sup>13</sup> a specific *interval* in  $w$ . Every wavelet of the **Wave** must partake of the same  $w$ -profile as the **Wave** itself. Putting it broadly, but not inaccurately, every perceptible wave, be it photon or electron, positron or proton, must have the same thickness in the  $w$  dimension. Scaled to appropriate units, this length is the QUANTUM. Why has it been impossible to interpret the Planck constant in terms of the laboratory? Because the Planck constant describes the *thickness of the cosmos* in a direction that is perpendicular not only to the lab, but also to the mass of the inner Lab. That's quite some abstraction.

THE QUANTUM  $\hbar$  IS THE THICKNESS OF THE WORLD.

This can be very hard to visualise. So, to close this chapter, I offer a number of statements and analogies to try and elucidate the thing. Play around with these and see what you think. Some of these are more precise than others, and they are not identical to one another. It is the *common ground* between these statements that I'm trying to convey: what is symbolised, not the symbols. It is far from an easy task! So, you don't need to understand all of the statements below: just a handful will do the trick! Remember that, despite the claims of intellectual bums, no words or mathematical symbols *are* what they attempt to describe.

1. If the world is a film, the quantum is the brightness of the projector.
2. Take  $\Psi_{\text{null}}$  to model the structure of the **Wave**, without matter or radiation detail. In perception, such a **Wave** would yield a featureless vacuum with no energetic matter rotations, i.e. empty space. In the terms of multiplicative groups,  $\psi_{\text{vacuum}} = 1$ . Then, PRODUCTION over  $w$  gives

$$\hbar \text{Js} := \mathcal{P}_w \Psi_{\text{null}}.$$

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<sup>13</sup>In fact,  $\hbar$  should be considered as a *production* across the  $w$  dimension.

3. The Planck constant converts from local substrate-level *rates* in the **Wave** to totalised laboratory-level *quantities* in the cosmos.
4.  $\varphi_{\text{Light}} = A \sin \left[ k \left( \frac{c}{a}x + \frac{b}{a}w - at \right) \right]$   
 $\varphi_{\text{photon}} = A \sin \left[ k \frac{c}{a} (x - ct) \right]$
5. Converting between the computer of Reality and the screen of the world,  $\hbar$  translates between the microchip's instruction "Pixel of Colour X" and the brightness of the pixel that subsequently appears on the monitor.
6. The quantum-mechanical operators are really:

$$\hat{E} = i \mathcal{P}_w \frac{\partial}{\partial t}, \quad \hat{p} = -i \mathcal{P}_w \frac{\partial}{\partial x}, \quad \hat{m}c = -i \mathcal{P}_w \frac{\partial}{\partial W}.$$

7. *Quantisation* is PRODUCTION over the dimension of progress.
8. When one gazes at a sunset, seeing the beauty of "the sky", one is admiring a projected sky-image. Nowhere in the sky does that grand wash of colour exist; it *only* exists in perception. The COSMOS, likewise, exists nowhere in the **Wave**. Rather, when one "gazes through the **Wave**", the COSMOS is the wash of energy in  $\psi_{\text{seen}} \times$  production;  $\hbar$  is the depth of colour.
9. Classical ENERGY is the summed effect of  $\frac{\partial}{\partial t}$ , over the domain of the **Wave**.
10. The WAVE EQUATION, with  $\nabla_U$  as differentiation over the substrate, is

$$\frac{1}{a^2} \frac{\partial^2 \Psi}{\partial t^2} = \nabla_U^2 \Psi.$$

11. The Planck constant  $\hbar$  is an *action*, whose units are Joule seconds. It is the *units* of action that encode the apparent is-ness of the perceived, classical cosmos. The real number  $\hbar$  is a scale factor: the size of the quantum. *Tangibility* itself, however, is achieved by the *setting* of the world-image in production.
12. If the world-image were a printed picture, then the Planck constant would be the density of the ink.
13.  $\Psi_{\text{Wave}} = \underbrace{\psi_{\text{progress}} \psi_{\text{mass}}}_{\text{hidden}} \underbrace{\psi_{\text{motion}}}_{\text{seen}}.$

14. The cosmos itself, as an energetic phenomenon, is a **Wave** rate of change.

15. Photons are PRODUCTIONS over  $w$ :

$$\mathcal{P}_w \Psi_{\text{Light}} = \hbar \times \psi_{\text{Maxwell}} = \gamma_{\text{photon}}.$$

16. In Plato's cave, projection  $(w, x, W) \mapsto (x, W)$  gives  $-\hbar$  as *shadow density*.

17. The derivative of the **Wavefunction** with respect to  $\psi_{\text{progress}}$  is  $\Psi_{\text{cosmos}}$ . This is equivalent to saying: "Put yourself mathematically in the shoes of the train carriage, and consider the variations of the **Wave** as they appear. These will form the inner/outer wavefunction  $\Psi_{\text{cosmos}} = \psi_{\text{mass}}\psi_{\text{motion}}$ ."

$$\frac{\partial \Psi_{\text{Wave}}}{\partial \psi_{\text{progress}}} = \Psi_{\text{cosmos}}.$$

18. The relationship between Light and the photon is the same as that between a 3D cloud and its 2D image. The quantum  $\hbar$  summarises the *amount of vapour* in the unseen vertical thickness of the cloud.

19. The **Wave** is  $\hbar$  fat.

20. Defining the symbol  $\bullet$  to be "the dimensions  $w$  and  $W$ ", or, in other words, "the two imperceptible dimensions of the electron and quantum mechanics", the FUNDAMENTAL THEOREM OF PERCEPTION states:

$$\mathcal{P}_{\bullet} \Psi_{\text{Wave}} = \left| \frac{\partial \Psi_{\text{Wave}}}{\partial \psi_{\bullet}} \right| \times \hbar \times \mathbb{T}_e.$$

"In perception, an observable electron  $\hbar \times \mathbb{T}_e$  emerges."

# 16

## ATOMIC STRUCTURE

The man who looks only outside and quails before the big battalions has nothing with which to combat the evidence of his senses and his reason. But that is just what is happening today: we are all fascinated and overawed by statistical truth and large numbers, and are daily apprised of the nullity and futility of the individual personality, since it is not represented and personified by any mass organisation.

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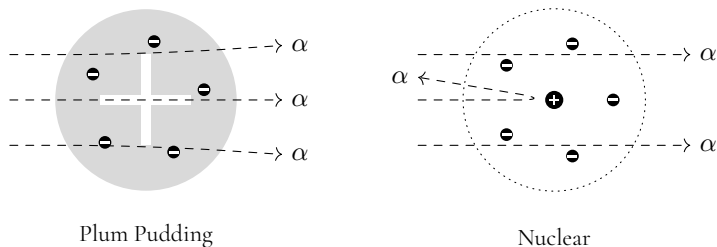
*Carl Jung*

The 19th century saw great leaps in chemistry. In 1815, as old Boney met the original Waterloo, William Prout, a physician plying his trade in London, hypothesised that HYDROGEN, the lightest element, is the fundamental atomic object. He called it the “protyle”, proposing that matter particles are *multiples of the hydrogen atom*. While not entirely accurate, this remains a good approximation to the truth; as such, it opened up the field. And, as the Sparkly New World of white imperialism (read “materialistic sickness”) drove technological advance, an abundance of lab work produced new atoms to be measured and classified. These were the glory years of the science. In 1869, the Russian Dmitri Mendeleev produced the first modern periodic table, and *voilà* chemistry!

In 1897, J.J. Thomson, at Newton's (and everyone else's) alma mater Trinity, made the first descent beneath a previously solid floor in physics: in discovering an atomic *component*, namely the negatively charged ELECTRON, Thomson dove into the *subatomic* realm. It was now empirically clear that atoms, which tend to be electrically neutral, contain at least two components:

- PROTONS, as Rutherford was to rename “*protyles*”, are positively charged particles with a mass around that of a hydrogen atom;
- ELECTRONS, discovered by Thomson, are negatively charged particles with a mass nearly two thousand times smaller.

The question of ATOMIC STRUCTURE had arrived. Shortly after this discovery, Thomson proposed the now-defunct *plum pudding* model. Making a longstanding Newtonian assumption, still sensible at the time, that *More Mass = Bigger*, he proposed that an atom is a sphere of positive charge (the eponymous “pudding”) studded with small negatively charged electrons (er... raisins, confusingly). But this idea didn't hold up.



Before World War One, Geiger and Marsden, working under Rutherford's direction, performed a series of experiments now among the most famous in physics, firing positively charged alpha particles (helium nuclei) at thin sheets of gold foil. According to the *plum pudding* model, the  $\alpha$  particles should have passed straight through with only minimal deflection, as a diffuse pudding of positive charge would not have had the concentration to affect the progress of the heavy and fast-moving alphas. But Nature, as ever, had other ideas. In fact, a few of the alpha particles were deflected *fully*, bouncing back to where they came from. Rutherford said:

“It was almost as incredible as if you fired a 15-inch shell at a piece of tissue paper and it came back and hit you.”

## The Question of Mass and Charge

The gold foil experiments showed that the atom must consist of a very small, very massive positively charged NUCLEUS,<sup>1</sup> surrounded by a much larger and much less massive cloud of negatively charged electrons. The obvious image, in those late-Newtonian days when the quantum was young, was that of a miniature Solar System, with the nucleus as the Sun and the electrons as orbiting planets. Now, QM grew up to prove this image incorrect in its planetary details, but the broad picture remains true to this day: an atom does consist of a nuclear sun surrounded by an electronic system. The electrons, being waves, aren't planet-like balls,<sup>2</sup> but the nucleus is certainly Sun-like. According to all theories, Unity included, it is accurate, at the level of the laboratory, to see the atom as consisting of a nuclear Sun surrounded by an undulating cloud of electron waves.

Having established the existence of the nucleus, Rutherford's task was to analyse the thing. A major question presented itself. Indeed, it did so boldly and clearly, in the simple terms of the lightest two elements: hydrogen and HELIUM, which had been formally identified in 1895. Taking the obvious atomic units, in which the mass and charge of the proton are both given the numerical value 1, the data are, to a good approximation:

Nucleus	Symbol	Mass	Charge
Hydrogen	${}^1_1\text{H}$	1	+1
Helium	${}^4_2\text{He}$	4	+2

The problem set by these data is simple. The helium nucleus  ${}^4_2\text{He}$  cannot consist, as Prout suggested, of a set of copies of the hydrogen nucleus  ${}^1_1\text{H}$ , because the mass and charge scale factors don't match. So, there must be something in the helium nucleus that isn't in the hydrogen nucleus. As things stand now, most physicists would call that something the NEUTRON. But Rutherford and others, in those days when Ockham's razor was still sharp, saw no need for such a thing. In line with Prout's hypothesis and much data, the *mass* of  ${}^4_2\text{He}$  could be explained by the presence of four copies of  ${}^1_1\text{H}$ :

$$4 \times {}^1_1\text{H} = {}^4_4\text{Overcharged He}$$

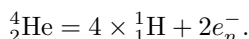
The question was: how to make the *charges* match?

<sup>1</sup>The etymology is Latin *nuculea*, "pertaining to a small nut"

<sup>2</sup>Like photons, electrons have no quantisation in space: protonic nuclei hold them in potential wells, yes, but their *energy* quantisation, encoded in  $\hbar$ , is at right-angles to the lab.

## The Nuclear Electrons Hypothesis

There is an obvious solution. There is copious negative charge in the cosmos, in the form of ELECTRONS; so, Rutherford reasoned (as I did a century later) that there must be something similar to the electron in the nucleus, which counteracts the positive charge of two of the protons there. A helium nucleus must, in other words, contain two NUCLEAR ELECTRONS:



This is the *nuclear electrons hypothesis*, the sensible assumption of Rutherford and everyone else working in the early days of nuclear physics. It was supposed, in the simplest available explanation of the Facts, that a neutral helium atom consists of four PROTONS, i.e. hydrogen nuclei, making up almost all of its mass, with two NUCLEAR ELECTRONS *tightly* bound to them, which do not interact chemically, and two regular ELECTRONS *loosely* bound, which do. Contra the mainstream, it's basically correct; with some refinements (not available back then) regarding wave-particle duality and the nature of matter, I will explain, in this chapter, that the theory of *nuclear electrons* is a far more accurate representation of reality than the up/down quark garbage that has emerged, at gigantic cost to both the taxpayer and the environment, to replace it. Put simply, Rutherford was right from the start, and a century of extremely complicated experiment has actively drawn us *away* from understanding, *away* from knowledge, *away* from the noble search for *scientia* that Big Science claims to be its goal.

## Authority Corrupts

As Westerners, we are trustful of an Establishment we want to think has our best interests at heart. We trust the unseen Patriarch, who, these days, wears not a Christian surplus nor a crown but rather a sharp suit or a white coat. As such, we believe blindly that there is only one direction in which society and its self-proclaimed “greatest achievement” science can go: Onwards! Upwards! Smarter! Better! Very few people, and even fewer scientists, and even fewer paid physicists, realise that it is eminently possible for science, in terms of its honesty, in terms of its rigour, in terms (independent of any ethical questions) of the pure *quality* of its models, to get *worse*. For many, this is a most unwelcome truth. Just as there's nothing in the democratic method stopping Tory dickheads from shafting the



poor, just as there's nothing in globalism stopping tyrants wanting *Lebensraum*, just as there's nothing in the religious method stopping priests interfering with children; there's nothing in the scientific method stopping a bunch of boring, emasculated dimwits from replacing good ideas with shit ones. That's exactly what happened in the 20th century.

The history of physics and nuclear physics, since the Age of Adventure, when every day was scientific Christmas, is, truth be told, a tale of *laziness*. It turns out, damningly for those who have spent trillions raping Mother Nature to feed their tungsten snakes, that Ernest Rutherford, using only a few pieces of gold foil and a set of scales, had a clearer and more accurate picture of nuclear structure at the very *birth* of nuclear physics than anyone has had since, for all the prizes and the glory. Oh, how the mighty Physics has fallen.<sup>3</sup> With the advent of nuclear technology in the years around WWII and the emergence of high-energy colliders, physics began, just like every other Ivory City through which rivers of money flow, to descend into decadence and corruption. Yes, *corruption*. Don't shy away from the word out of respect for This Particular Authority. If you value your soul as I do, the only correct amount of respect for authority, *any* authority, is zero. Academic elites are Establishments endowed with money and status, and their only hope for salvation is to be held to account; it would be a disservice to the very people in those elites to do anything else. In every age and every field, no matter how pure the goal seems to be, those who live in hallowed Castles, if they are allowed to do so, end up hoisting the drawbridge. Author-ity means nothing but "they who wrote"; it says nothing about *what* they wrote.

And what they wrote was *wrong*.

With the benefit of hindsight, the physics forged by Professor Saruman in the Hadronic Mines of Orthanc will go down as imbecilic at best. The up/down quark model of protons and neutrons, which replaced the nuclear electrons idea, will be seen, in time, as just as ludicrous as a Flat Earth perched on a turtle, and, given the ecological damage wrought in its construction, as a million times more damaging.<sup>4</sup> Even *without* the benefit of hindsight, many physicists have viewed the up/down quark model as a mere mathematical convenience, rather than as representing a piece of physical reality. But that only makes it worse. Why did they use it? I'll tell you. Collective cowardice chose to accept the Establishment

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<sup>3</sup>Einstein, particularly, would have been horrified at the current state of Big Science.

<sup>4</sup>The building and continued running of the colliders is, now that we are clear about the ravages of climate change, more appalling than the logging of the Brazilian rainforest. I don't say this for shock value. The environmental cost of collider science is cataclysmic. What are they trying to achieve?

dollar, and a collective averting of the eyes swept the deep paradoxes under the carpet.<sup>5</sup> This is what has doomed “cutting-edge” physics to become what it is now: an act of self-harm. Too many looked away, and physics was done, lost in hypocrisy, destined to waste the world’s scarce resources on the largest-ever Weapon contra Nature: the high-energy collider. Never was there a story of more woe than this of the Laureates and their chromey O.

Here, I tear the quark model a new one.

In doing this, I pay no insult to Gell-Mann and Zweig, who had the idea; there’s nothing wrong with it as a piece of theory when restricted to its proper domain of application (the collider). Indeed, I have incorporated it into Unity theory; it does contain elements of truth. Where I take umbrage, however, is the incorrect application of this model to all of reality, the teaching of it despite its glaring flaws, and the associated tacit and self-glorifying assumption that, because the Lords of Academia have decreed it, the quark-based *Standard Model* of particle physics (seriously, how boring can you get?) will soon lead us all, Pied Piper style, to the truth of all existence. What balls! What has the Standard Model done for us? *Rien de bon*; shit-tons of the opposite. It has clarified nothing, simplified nothing, elucidated nothing. There is no magic to it, no poetry, no elegance, nothing that might help a young mind inspired, as Einstein was, by Inklings of the Deep, to face the HUMAN CONDITION. The whole endeavour is bereft of value, bereft of courage, bereft of soul. Quark physics is the world’s most expensive strap-on, a girthy monster 17 miles long with which Prof Tallywhacker, Nobel Laureate, makes a bunch of laboratory gimps his arse-fodder. Particle physics has distracted some of the smartest people in the world from the true questions of life, forced them to jump through endless dogmatic sphincters, demanding that they squander their mental independence, along with their hopes, vim and vigour, for a shot at ESTABLISHMENT STATURE, viz. being dull as pigshit. The wild goose chase of the Standard Model, which has the temerity to cast itself as “cutting edge”, has wasted monumental amounts of energy, in every sense, in Establishing as true (pah!) a grubby, stultifying and outright false view of physical reality. When it comes to 99.99% of matter, the up/down quark model is actively *incorrect*, false in a  $\times$  versus  $\checkmark$  way. This will soon be obvious to you, *inshallah*, if you are lucky enough not to have been indoctrinated into *The Church of Latter-Day Whitecoats*.

I urge you to imagine yourself more than that.

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<sup>5</sup>Not everyone in a cowardly Establishment is a coward. But, by definition, most are. One cannot point to the culture of an institution, a town, a people, a civilisation; culture abides in *actions*. And the litany of greed that is Big Etc. is a travesty of honesty. How easily men’s hearts are corrupted.

## The Arguments Against Nuclear Electrons

With the quantum revolution of the 1920s, a number of problems emerged with the *nuclear electrons hypothesis*. Most of these were, and still are, based on quantum-mechanical arguments involving SPIN. Now, SPIN is obvious in Unity theory: the wavefunction  $\Psi$  of an electron can rotate in one of two directions, as a left- or right-handed corkscrew; these two, known as SPIN-UP and SPIN-DOWN, produce identical electrons  $\mathbb{T}_e$ , same charge, same mass, same obedience of the Schrödinger equation.<sup>6</sup> According to the Standard Model, however, SPIN is a  $\pm$ , yet another piece of abstract mathematics lacking any physical interpretation. The list is long at... yes, *all of physics*. In the old paradigm view, particles simply *have* SPIN, in exactly the manner than they just *have* MASS or *have* QUANTISATION. As Feynman rightly pointed out, this is a copout. When asked *what* is spinning in an electron, professors of quantum physics say something loud and physically meaningless about “intrinsic” angular momentum, eigenvalues or representations of the Poincaré group. Then, if the student persists, here it comes...

*“Shut up and calculate!”*

Grrrr.

It emerged, in the Roaring Twenties, that the spins of the proposed particles of the nucleus—protons and nuclear electrons—didn’t add up in the way they should have done. In a nitrogen nucleus  $^{14}_7\text{N}$ , hypothesised by Rutherford et alia to consist of 14 protons and 7 nuclear electrons, the odd total 21 should have given a half-integer value for spin, since individual protons and regular electrons are observed to have half-integer spin. But  $^{14}_7\text{N}$  was observed to have integer spin. This ruled out NUCLEAR ELECTRONS (version 1.0). And, alas, more than that. The above contradiction, and others closely related to it, forced the deprecation not just of version 1.0, but of the entire nuclear electron idea.<sup>7</sup> This ushered in the age of the NEUTRON, the neutral proton, which has ruled the roost since then.

Now, it might seem curious to you that decisions regarding the fundamental constituents of atoms, and thus virtually all of the cosmos, should have been made, and made firmly, based on an idea, namely quantum-mechanical SPIN, that has *no physical interpretation* in the old paradigm, i.e. that is not understood in any meaningful sense. How, you might wonder, can you rule one thing out based

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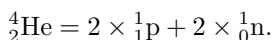
<sup>6</sup>Electrons with differing spins are only distinguished by *magnetism*, which, in e.g. a Stern-Gerlach apparatus, can send the two spins in opposite directions as movement does a gyroscope.

<sup>7</sup>There is, indeed, a fair bit of literature about the naivety of the nuclear electrons idea. Again we hear the refrain, as in every single age of Man: “Aren’t we glad we’re modern and clever!”

on another you don't understand? It's a key question.<sup>8</sup> Now, I'm not denying that the "NEUTRON" is a model with merit. There is plenty of evidence that the word corresponds to a recognisable configuration of the substrate. But let us leap nimbly over the gump-pit REIFICATION, into which White Men and whitecoats are so desperate to hurl themselves. Remember, at the deep level, there are no things. Everything for which there is a name is just a castle in the Sand. Words like "neutron" are models, nothing more. And just because a word like "neutron" does correspond broadly to some configurations of the substrate doesn't mean that there aren't *better* ways to describe what is going on.

## The "Neutron" and the "Quark"

When Chadwick identified the *Aspect of Perceived Reality* "Neutron" in 1932, nuclear physicists (the dull ones, at least) breathed a sigh of relief. The NEUTRON, identical to the proton except for its slightly higher mass and electrical neutrality, resolved, it seemed, the puzzle of mass, charge and spin. In the new view, which was accepted into the mainstream swiftly and broadly, the helium nucleus, mass 4, charge +2, is taken to consist of two PROTONS and two NEUTRONS:



This gives the correct values for mass, charge and spin. Hurrah! Collectively, it has never been doubted from that day to this that the nucleus is built of protons and neutrons.<sup>9</sup> And yes, at a certain level of modelling, there is truth to the idea. But just because a word like "neutron" has meaning at one level of modelling doesn't mean it is *A Thing With Permanent Thingness*. It isn't.

Enter the "quark".

In the 1950s and 60s, as particle physics advanced in technological capacity, it became evident that, in addition to the stable matter of the street, there are also *unstable* particles that appear in the world-image. These were first observed in cosmic radiation with high-altitude photographic plates and then produced in

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<sup>8</sup>Keep pulling that thread: you'll unravel your straight-jacket. Most scholars are theory addicts; they build layer upon layer of thought on nothing, statues of gold on feet of clay; they wield ideas that they do not understand to create new ideas they then claim as understood. Faced with foundations that make no sense, they obey the unconscious desire, the most pernicious of all scholarly tricks, to build so many storeys of clean, whiter-than-white, "rigorous" mathematical theory on top of the bog that work can be done without smelling the turds. There is no intellectual trick so low.

<sup>9</sup>When things make it into school syllabuses, you know they are mainstream.

purpose-built bubble chambers. The new particles were like the familiar protons and neutrons, only heavier. Soon, these strange incidences were proliferating, multiplying like quantum rabbits, spawning countless “fundamental” particles. The PARTICLE ZOO had emerged. It was a mess, and something had to be done.

The *quark model* was, quite reasonably, introduced to classify the menagerie. It made and still makes sense, at least in a certain domain. If you consider these heavy, unstable particles as consisting of three smaller QUARKS, then taxonomy becomes possible. I agree with this fully in Unity theory: the quark model has elements of truth to it, most notably in its distinctive “threeness”, which I will explain shortly. Its application to the world of the collider is not fallacious.<sup>10</sup> But it is *elsewhere*. What physicists have done, with classic groupthink blindness, is built a certain type of readily observable reality (the collider), and have then extrapolated beyond and back from that reality, inferring that the domains they *can't* observe, such as the interior of the stable proton, follow the same rules.

Nobel prizes! Fame! Horseshit!

## An Elementary Problem

The problem came in the 1960s and 70s, when attempting to retro-fit the *new* quark model, so effective concerning the new unstable matter, to the *old* stable particles, protons and neutrons. Do this, and, as generations of particle physicists discovered (and subsequently ignored, in order to save face), the numbers go doolally. The mathematics involved is, as ever, embarrassingly basic. Let's run it. Suppose, going for a moment with the flow of 20th and 21st century physics, that PROTONS, with mass 1 and charge 1, and NEUTRONS, with virtually the same mass 1 and charge 0, are each constructed of three “quarks”. Note that the number three is empirically non-negotiable: it is precisely “threeness” that led to the quark model's initial success regarding unstable matter. Now, since three quarks have to generate +1 charge in one instance and 0 charge in another, there must clearly be at least two types of quark. The first two are dubbed *up u* and *down d*.

According to the quark model, when a free neutron decays to become a proton,<sup>11</sup> the change can only occur in one quark; if it happened in more than one constituent quark, then it should be possible to observe partial decays. These have never been observed, despite gazillions of experiments. Hence, it was determined,

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<sup>10</sup>They shouldn't have bothered, in fact, but it's no use crying over spilt electricity.

<sup>11</sup>This is radioactive *beta decay*, possibly the most studied interaction in all of nuclear physics.

logically, that the proton and the neutron must share two quarks, and differ only in the third. Hence, quark structure was assigned as follows.<sup>12</sup>

Particle	Mass	Charge	Quarks
Proton	1	1	<i>uud</i>
Neutron	1	0	<i>udd</i>

Run the numbers. In order to retro-fit the quark model to stable matter, two facts must be true regarding the charges of quarks: firstly, two ups and a down must give a total charge of +1, and secondly, the difference in charge between an up and a down (which is the difference between a proton and a neutron) must be 1. With *U* and *D* representing the respective charges, this gives us a pair of simultaneous equations:

$$\begin{aligned} 2U + D &= 1 \\ U - D &= 1 \end{aligned}$$

Solving these yields

$$U = +\frac{2}{3}, \quad D = -\frac{1}{3}.$$

What the fuckety *whaaaaaat*? These *u* and *d* particles, with their charges of  $+\frac{2}{3}$  and  $-\frac{1}{3}$ , are claimed, in the Standard Model, to be “fundamental”. Almost all of the observable mass of the cosmos is proposed, according to this mind-spuff, to consist of particles of  $+\frac{2}{3}$  and  $-\frac{1}{3}$  charge, despite the fact that... no particle of fractional charge has ever been observed. Forgive me if I put that in shouty caps: NO PARTICLE OF FRACTIONAL CHARGE HAS EVER BEEN OBSERVED. That’s right.

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<sup>12</sup>Note that the individual quarks *u* and *d* have *never* been observed; they have only been theorised as *needing to exist* in order to satisfy a model whose experimental validation lies solely in the realm of unstable matter. In other words, the above table isn’t empirical data. Nevertheless, it is taken, in the Standard Model, to be Gospel Truth; no one (present company excepted) seems willing to summon the strength to doubt it. Governments and august Institutions of Science spend trillions of dollars, pounds and euros funding refinements to theories of quarks, so that they can predict, with spectacular accuracy, the outcomes of collisions. They believe, because they have achieved many decimal places of accuracy in that pet world, that they done something worthwhile. Drones. I can’t begin to describe the magnitude, complexity and algebraic hubris of the Balsa Wood Tower of Thought that has been constructed on the (blatantly false, as you will see) hypothesis that a proton is built of two *up*-fairies and a *down*-fairy. Literally thousands and thousands of PhDs. The sheer *pointlessness* of it all. What the fuck do these people think they’re doing? For more than half a century, a cabal of clever folk, convinced by self-awarded glory of their own academic righteousness, has spent literally earth-shattering quantities of time, money and carbon dioxide refining this immature and poor-quality idea. The thing is unworthy of a twelve-year old.

Every observed charge is a multiple of the ELEMENTARY CHARGE, 1 in our units, of the proton and electron. Yet the entire edifice of the Standard Model starts with the up quark having charge  $+\frac{2}{3}$ . This is the kind of answer that, if it were found by a student, would elicit a “Huh? Two-thirds? That can’t be right...” Which is *exactly* the right response. I will say it again and again, as the future of the fucking human race depends on it: it cannot be overstated into what knots our civilisation has tied itself to avoid looking the truth in the face. To propose that the proton and neutron, with their sensible +1 and 0 charges, are constructed of trios of particles with charges  $+\frac{2}{3}$  and  $-\frac{1}{3}$  is goddamn *stupid*.<sup>13</sup> It is glaringly obvious that such an assignment, for which there is *no* evidence (fractional charges *never* having been observed) is an artefact of modelling error. The quark model suggests that when an observable NEUTRON, of 0 charge, emits an observable BETA PARTICLE, of  $-1$  charge, to become an observable PROTON, of  $+1$  charge, what is *really* going on, beneath the surface of the empirical integers, is that a “down quark” (never seen) of charge  $-\frac{1}{3}$  (never measured) has transformed into an “up quark” (never seen) of charge  $+\frac{2}{3}$  (never measured). It almost beggars belief.<sup>14</sup>

## Resolution

Here’s a resolution of the whole thing. Consider, once more, Rutherford’s *nuclear electrons hypothesis*. Remember how, aside from with regard to the (poorly understood) issue of quantum-mechanical spin, it gave sensible integer values for everything? Remember how natural, simple and sensible it was, involving as it did exactly the kinds of charges that are observed empirically and none of the ones that aren’t? Why does the *nuclear electrons idea* seem to agree so well with the facts? Because, of course, it is essentially correct. I can resolve the thing in one sentence. There are two types of electron wave: HELICAL and SINUSOIDAL.<sup>15</sup>

Stick that in your quark-pipe and smoke it!

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<sup>13</sup>If I didn’t understand the psychological cause of such denial—a deep-seated fear, as described by Jung, of the human shadow—I would find myself unable to believe it.

<sup>14</sup>In the literature, there is plenty of lip-service paid to using “the quark *model*”, but never any follow-through. Hardly anyone in the Standard Model community thinks outside of it, because few bosses fund research projects entitled “To Six Decimal Places, How Much Of A Twat Is My Boss?”

<sup>15</sup>Earlier in the book, I said that matter waves need 2D polarisation, which is why we used  $\mathbb{C}$  to model electron waves. That is not, however, *quite* true. There is another type of undulation, which I call a SHEAR WAVE. It involves the oscillating *rotation* of a single inner dimension, as opposed to the oscillating *expansion/contraction* of a pair of them. Light is a wave of this kind. The nuclear electron can be thought of, then, as similar to Light aimed in *W*. I explore this idea in depth in UNITY THEORY.

A *helical* electron wave, with a complex-valued wavefunction, is a regular ELECTRON; a *sinusoidal* electron wave, with a real-valued wavefunction, is then a NUCLEAR ELECTRON. Both derive their mass from periodicity in  $W$ , which is why they have similar mass and can both reasonably be thought of as “electrons”. The difference is in *polarisation*. A helix has a direction of spin (left- or right-handed in  $\mathbb{C}$ ), while a real-valued sine wave, which goes up and down, doesn’t. So, while a regular electron has quantum-mechanical spin, a nuclear electron doesn’t. Complex-valued quantum mechanics doesn’t apply to it at all. The neutron is a proton with a spinless nuclear electron bound to it. And that’s it. That’s the whole issue, a century of codswallop, resolved. Just compare the accounts, as given by the paradigms, of the process of ELECTRON CAPTURE, a type of radioactive transmutation that goes on in the nucleus of heavy atoms:

- ① THE STANDARD MODEL says: an electron of charge  $-1$  is absorbed into the nucleus. There, it meets a down quark of charge  $-\frac{1}{3}$ . In this meeting, the electron *disappears* (physically meaningless) and the down quark is *transmuted* (physically meaningless) into an up quark of charge  $+\frac{2}{3}$ . The *uud* proton in the nucleus becomes a *udd* neutron.
- ② UNITY THEORY says: an electron wave, hitting the nucleus, repolarises. Nothing is created or destroyed; nothing magically becomes anything else. The proton is unchanged. An electron repolarises to a nuclear electron, in a type of wave interaction that has been observed a gajillion times.

What does the evidence say? Well, firstly, we must recognise that *both accounts* agree equally with experiment. On those grounds alone, we should reject the up/down quark model immediately, since it is more complicated, less elegant, ugly, boring, and involves theoretic elements... requiring colossal suspensions of disbelief... which have never been observed. But that isn’t all. In almost all respects, protons and neutrons are observed to behave almost identically in the nucleus; particularly in interaction with ELECTROMAGNETIC WAVES. Now, just to remind you, an electromagnetic wave interacts with electric charge. The clue is in the name. If protons and neutrons are made of particles with different charges, then how come they produce virtually identical interactions with electromagnetic waves? It makes... ah, zero sense. What, instead, is the obvious explanation for the fact that the particles PROTON and NEUTRON behave almost identically in the nucleus? Ask a ten-year old! They *are* almost identical. This is exactly what the Unity model says. According to Unity theory, there is only one nucleon, the



PROTON, which may or may not have a nuclear-type electron bound to it. Those bound particles have a polarisation perpendicular to that of proton, photon and electron, and so do not interact electromagnetically. Hence, to a photon, a proton and a neutron look identical.

This is *exactly* what is borne out by experiment.

You might well imagine that, upon being told that a breathtakingly simple resolution exists to a major question of laboratory physics, the reaction would be interest, and a subsequent desire to apply the scientific method to the idea. But do not expect that the Grand Viziers of Nobel will welcome this simplification. Like the last Church, the scientific Establishment actively does not want things to be made simple, because it is precisely the *complexity* of science that bestows *status* upon scientists. The successful physicist, the physicist of stature (those are the ones who make the rules, of course) will do almost anything to avoid the paradigm shift that tells him his life's work has been at best misguided, at worst outright destructive. As Einstein said, there are very few "true seekers" on the planet at any one time. Most people, even those who claim themselves philosophers or scientists, just aren't interested in how things actually are. When presented with the choice of ① a simple truth, beneficial to all, that renders them decidedly foolish, or ② a complicated falsehood, detrimental to all, that maintains their status as lauded intellectuals and members of a global elite, it isn't surprising (though it shouldn't be condoned) that they choose the latter.

What can we do, in the face of such power?

*Study.*

We can learn, without respect for authority (while maintaining, of course, immense respect for people), taking nothing at the face value presented to us by the Establishment.<sup>16</sup> We can question the powers that be boldly, demanding that the forces that shape the Zeitgeist provide answers. We can *become* the Zeitgeist. We can, as students, as lovers of knowledge, as seekers after truth, ask and ask and ask again upon what grounds the old paradigmers assume that the world of the lab is the extent of Reality. Just imagine—oh, how frauds hate the bravery of youth!—the following. In a university course on quantum mechanics, a bold student puts up a hand, and asks the professor to produce a derivation of the Schrödinger equation, which has just appeared on the board.

"The equation is a postulate," the professor says, "it cannot be derived."

"But I have seen a derivation," the student replies.

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<sup>16</sup>This includes me. I do not in any sense view my work as an end, but as a beginning.

The professor frowns. "In Unity theory? That's just conjecture."

"Please explain to me how it is incorrect."

This is an eminently reasonable request. A teacher who refuses such a request isn't a teacher. He is a fraud. If the august professor can disprove Unity theory, then fine; everyone can go about their dull days, "safe" as rational materialists. If the august professor cannot, however, then it is reasonable for the student to ask "Why are you not teaching us this derivation?" If the answer comes back "Shut up and calculate!", then the student knows *exactly* what is going on. The point is: the old guard will deny the truth for as long as they are allowed to do so. It is not that youth will be able to *persuade* them—in most cases, Planck's principle holds: you really can't teach an old dog new tricks—but, with sufficient mobilisation, old fools can be swept aside.<sup>17</sup> Imagine trying to teach a group of students via "Shut up and calculate!", if every time those words are uttered, a number of students answer with the REALITY MANIFESTO:

"You are refusing to answer our questions because you are blind to the Western error. You are in denial about the fact that Reality is deeper than science has portrayed it to be. You are hoping that we will take your view of reality on trust, and that your status as an intellectual in authority will carry you through. However, we refuse to be the next generation implicit in the destruction of both this planet's ecosystems and the mental health of the human race. Unless you are willing to address openly the possibility that the world is a perceived image, not a physical object, it is our view that your opinions are dogmatic and thus unworthy of our attention."

This responsibility lies with all of us; claiming ignorance or blamelessness is no longer acceptable. Some say: "The destruction of the natural world, the slow leaching of happiness, the mental sickness of the consumerist, the paucity of culture in the West is not my fault; my culture is bigger than I am." Those are the excuses of cowards. A culture resides in its people, and we are no longer ignorant. I'm telling you now *exactly* what is wrong. As long as we condone our leaders, the Big Men of education, politics, business, whatever, promulgating the Western error, then we are all complicit in the misery already being wrought, which will only grow in the years to come. Unless we wake up, unless we each

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<sup>17</sup>"Come mothers and fathers throughout the land, and don't criticize what you can't understand, Your sons and your daughters are beyond your command, your old road is rapidly agin', Please get out of the new one if you can't lend your hand, for the times they are a-changin'."

shoulder the grand responsibility, there is no way out. Why do you think the Shawshank Redemption tops everyone's list of greatest films? Because it tells of a hope that can't be seen. Hope lives, yes. But the only hope for humanity, as we face the environmental abyss, is a *paradigm shift*, a GLOBAL ENLIGHTENMENT, a total restructuring of the priorities of life. This is not a pipe dream; it can be done. But it requires that we, who hold the hopes of youth, are, in what will be the sternest period of self-examination in the history of mankind, *honest* about ourselves. Without full recognition of the disastrous errors of cultural direction that, for five centuries, led Europe, then America, then everywhere else in turn to consume the planet with reckless abandon, we are lost. If the old paradigm is allowed to endure, by those who can't resist taking the money, there is no hope for avoiding environmental tragedy. Many have a distant sense of dread:

“How could we *possibly* save the world? How? How could the orgy of consumption, the plastic, the weapons, the emptying of the sea, the need to gain gain gain, the continual expansion into nature's bounty and the myopic destruction of her ecosystems end in anything but utter ruin and extinction?”

From the point of view of the old paradigm, it is an entirely reasonable point of view. The West, despite claims to the contrary, has no plan. Let's face the facts squarely: the world has no plan. There is only a vague hope, the classic hope of the denier, that it won't get too bad in our own lifetimes, that we might as well use and abuse, fly hither and thither, get our fill while we still can. But I'm here, as the conscience of the West, to offer an alternative view. We are in the last throes of a Dark Age, the *Materialistic Age*. And the night is darkest before the dawn. See the possibilities! See the way it could be! There's such bliss to be had, such simple joy, such undying contentedness beyond consumption. And these are not the words of a mystic. I am not, as Jesus was, lost in a sea of unconscious grandiosity, channeling thoughts I do not understand. There is nothing unconscious about the content of this book. I speak of things that I understand on many levels: Western, Eastern, masculine, feminine, new, old, scientific, religious. In this book, I am writing facts, not fiction. I propose no Bronze Age god to save us. I propose only what is: REALITY.

The model of Reality, the truth of Reality presented in Unity theory has the highest hope for which we all wish, the cure for greed that is *immortality*. As long as we remain mortals doomed to die, of course we grasp and grab for everything we can. Our current models posit the future as heat death: a flat, empty, cold

universe with nothing in it, forever. The bleakness of the material paradigm is appalling. And I say that not out of a lack of courage. In my youth, I believed with conviction that I was a material being, a quickly ticking corpse. I embraced that idea thoroughly. However, that doesn't mean I wasn't subsequently rather pleased to find out that, in an empirical sense, I am immortal. As are *you*. Not as your body, of course, not as your neural personality, your memories or your matter, but as the *witness* of all of that, as the one who sees life, as the soul of the Universe who sits behind. You are higher-dimensional, unbounded by space, broader than your protons and neutrons. Oh, you won't go to Christian heaven, that was another modelling error, nor will you go to hell, but you will live forever. The Universe will never fade. And you, the very *deepest* you, will experience it all, the great panoply of life, for all coming time.

So relax, pupils and friends, what will be will be.

Just enjoy the ride!

# 17

## THE PROTON

In not recognising the oneness of all, an unenlightened mind emerges, and with it unenlightened thoughts. It is like the traveller who has lost his way: he is confused because his sense of direction is wrong. But if he relinquishes the concept of direction altogether, how can he go astray?

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*Ashvaghosha*

Having gleefully swept away the detritus of the up/down quark model, we can look into the true nature of that building block of all things, the PROTON. This will complete the global structure of the Unity model, as I see it now, offering new insights into the physical nature of force and, crucially in this time of quiet despair, an alternative fate for the Universe. There is, it turns out, precisely one structure for the proton that fits with both the evidence of experiment and the axiom of Unity. Which, as ever, is most reassuring! It brings full symmetry to the modelled Universe, explains a range of paradoxical phenomena in cosmology, and, remarkably, permits *direct* empirical validation: it predicts quantitatively one of the key parameters of the Standard Model, known as the *weak mixing angle*. This angle,  $\theta_w = 29.2^\circ$ , has no explanation, in either its qualitative existence or its quantitative value, in mainstream physics.

## Structure Thus Far

We have established that, in the Reality that underpins perception, the three dimensions of space are joined by a circular  $W$  dimension, in which electron waves propagate, and by an open, space-like  $w$  dimension, in which the entire **Wave** of the present, perceived as the cosmos, progresses. These dimensions are imperceptible for different versions of one fact: both are involved in the *production* of the phenomenon **MATTER**. According to the Unity model, a “resting” electron is the perceived image of a wave moving through the substrate at a superluminal<sup>1</sup> speed  $a > c$ , with components  $b$  and  $c$  in  $w$  and  $W$  respectively. The outer  $w$  dimension hosts the **QUANTUM**; the inner  $W$  dimension **MASS**. And, since neither dimension can contribute *variation*-data to material beings, neither dimension, despite being deductible behind the scenes, features in the realm of shadows the old West so brazenly claimed to be “The World”. What about the **PROTON**, then? The Unity model, as it stands thus far in this book, allows for the theoretical modelling of the electron, yes, but what *other* possibilities does it offer? Can the  $(w, x, y, z, W)$  structure laid out thus far, which models the **ELECTRON** in sturdy fashion, also describe the **PROTON**? Short answer, no! Let’s see how.

### The outer $w$ dimension

For stable matter, there is no wiggle-room in the  $w$  dimension. Whether it be electronic or protonic, matter must coprogress at average speed  $b$  in  $w$ , if it is to remain abreast with the **Wave**. If a matter wave had any other component of  $w$ -speed, it would leave the world-image forthwith, never to be seen again. Now, given the homogeneity of the substrate, such **EPHEMERAL** waves, as I call them, must exist—why wouldn’t they?—but they can’t produce repeatable thus scientifically observable behaviour. Experience of them could only be in isolated incidents, as a window experiences a rock, that is to say, without the slightest precedent or possibility of empirical investigation. To register as matter, i.e. to appear in the world-image for any length of time, a wavelet must surf the **Wave**. Furthermore, we know that protons, along with electrons, photons and every other type of perceptible particle, have the same thickness front-to-back in  $w$ ;

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<sup>1</sup>The “superluminal” speed  $a$  refers to “faster than Maxwellian light waves, which, as perceived images, travel at  $c$ .” Note that nothing travels upper-case *super-Luminally*, because substrate-level **LIGHT** also propagates lower-case *super-luminally*, at speed  $a$ .

this is seen in the experimental fact that every perceptible particle is identically quantised; the Planck constant  $\hbar$  is ubiquitous.<sup>2</sup> So, in the Unity model, neither speed of progress in  $w$  nor **Wave** profile in  $w$ , both of which must be (extremely close to) constant for matter appearing stably in the lab, could possibly be the physical feature distinguishing PROTONS and ELECTRONS. The marked difference between the two particles, which is evident in the laboratory not only in terms of mass but also in terms of interaction behaviour, must *remain* a marked difference once the  $w$  dimension has been projected out.

## The inner $W$ dimension

What wave-particles can  $W$  host? Well, our friend  $\Psi = \psi_{\text{seen}}\psi_{\text{hidden}}$ , which we used in deriving the Schrödinger equation, is one such. I've called that the ELECTRON, confident in the naming because Schrödinger's is the wave equation observed (in e.g. hydrogen atoms) to govern the behaviour of the electron. But there is more than one type of electron, and more than one type of wavefunction  $\Psi$  with  $W$ -mass. How do these marry up? Well, as discussed in the last chapter, there is, at the broadest level, a distinction, among waves propagating in the  $W$  dimension, between one-dimensional and two-dimensional polarisations:

- ① NUCLEAR ELECTRONS propagate in  $W$ , polarised in one dimension.
- ② ELECTRONS propagate in  $W$ , polarised in two dimensions.

Neither of these wave-types, it turns out quickly, has the faintest possibility of generating the PROTON. The former is out immediately, based on polarisation. One might suppose, if one were to labour the point, that a repolarisation from two dimensions down to one could increase the mass of an electron significantly (in fact, it does increase the mass, but only slightly), but, even if that did manage to match the masses, a proton has spin, which means it must employ *helical* waves. So, ① is ruled out. What about ②? Could any souped-up and reversed version of the helical ELECTRON be the PROTON? Again, no, as follows.

I mentioned in the last chapter that a helical wave propagating in  $W$  can rotate clockwise  $\odot$  or anticlockwise  $\ominus$ . These options, with an arbitrary choice of nomenclature, correspond to SPIN-UP and SPIN-DOWN electrons, as they are known in QM. In addition to this, a wave may travel in the positive  $W$  sense  $\uparrow$  or the negative  $W$  sense  $\downarrow$ . This further option, independent of spin, is the

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<sup>2</sup>This ubiquity doesn't extend to *dark matter*, as I will discuss shortly.

distinction between MATTER and ANTIMATTER. In other words, not only may the handedness (spin) of the corkscrew vary, but so may the end of the cork into which it is inserted. This corresponds to an input variable ( $W + ct$ ) rather than the usual ( $W - ct$ ). In total, this gives us *four* possibilities for electron-like waves:

$$\Psi = \psi_{\text{seen}} \phi[\pm \mu(W \pm ct)].$$

In 1928, Dirac theorised the existence of POSITRONS (antielectrons) when, extending the work of Schrödinger and Pauli, he formulated the famous equation that now bears his name.<sup>3</sup> They were discovered experimentally a few years later. And, since then, ANTIMATTER has been a fundamental part of quantum physics. Just as with spin, however, despite its experimental validation, no one has been able to *interpret* antimatter satisfactorily. Dirac tried, but without success. His physical, as opposed to mathematical, model of positrons, the *Dirac sea*, doesn't make much sense. But this, as with so much, was inevitable; the old paradigm, hobbled as it is by its assumption of space as the stage of reality, cannot cope with the  $\pm$ 's of either spin or antimatter. The categories don't match: wavefunctions don't *occupy* space, they *make* it.

In Unity theory, with an inner  $W$  dimension, the Facts emerge naturally. There are spin-up/spin-down electrons because there are left- and right-handed corkscrews, and particles/antiparticles because a wave can circumnavigate the  $W$  dimension in one of two directions. And that's it! Nevertheless, these four particles,<sup>4</sup> while fitting in nicely with both the Unity model and the empirical Facts, do leave us, in our search for a theory of atoms, rather short. The structure of Unity theory, as I have thus far explained it in this book, is all *electronic*; it lacks PROTONS; indeed, it lacks various other things besides, but it is the proton, being, well, the main constituent of everything, that stands out. Though both have positive charge, the PROTON is definitely not the POSITRON:<sup>5</sup> the squares in the energy-momentum-mass relation dictate that the magnitudes of the masses of electrons and positrons must be the same, but the proton is far heavier, by a factor of around 1836.

So, where does the proton fit in? Evidently, somewhere else!

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<sup>3</sup>The DIRAC EQUATION is  $i\hbar \frac{\partial}{\partial t} \Psi = (\boldsymbol{\alpha} \cdot \boldsymbol{p}c + \beta mc^2) \Psi$ .

<sup>4</sup>These form precisely the four components  $\psi_1, \psi_2, \psi_3, \psi_4$  of a *Dirac spinor*  $\Psi$ , which is the central object of study of quantum field theory. The fourfold structure of Dirac spinors, which is a direct prediction of Unity theory, enjoys overwhelming empirical validation.

<sup>5</sup>Dirac himself suggested this briefly. Given the mass asymmetry, it was a somewhat elementary blunder from a most remarkable theorist. Everybody makes them!



# Inner Space

A *single* inner dimension  $W$  simply won't do. Is this a problem? No. After all, once you have made the initial leap of supposing that there is at least one imperceptible circular dimension, it requires no great leap of intuition to propose that there is *more than one*. And, looking at atoms, this is clearly the case. A Unity theory with only one inner dimension would make for a world of ELECTRONS and POSITRONS. This is not our world. Now, we might worry that, in allowing *multiple* inner dimensions, we are throwing ourselves down a rabbit hole. Where will it end?! Are we bound to keep proposing *hundreds* of inner dimensions to match the *hundreds* of known particle resonances? That would, of course, defeat the whole purpose, simplicity; a new paradigm with hundreds of inner dimensions would be no better than the old paradigm with its hundreds of particles. Pleasingly, however, the Facts step in. There is, it turns out, exactly *one* formulation that fits all of the empirical and logical requirements. There is a small rabbit hole, yes, but Alice needn't fret: it has an obvious bottom. We'll hit it immediately.

## Option 1: $X$

Option 1, which is another *solitary* circular dimension, doesn't work at all. That's because another solitary circular dimension  $X$  would produce another particle very much like the ELECTRON. Its mass would be different, yes, depending on the circumference of the new circle; nevertheless, it would be a particle that behaved like an electron. It would have electron-like properties. The PROTON, however, doesn't have such properties: it feels the *strong force*, while the electron doesn't. There is no equivalent asymmetry in the other direction. So, we can rule out the proton propagating in a single non- $W$  inner dimension.

## Option 2: $X, Y$

Option 2, a spherical inner space of *two* dimensions, isn't ruled out in quite such elementary terms, but it is nevertheless (a little deeper in the mathematics) ruled out. A two-dimensional inner space would produce a particle sitting somewhere between an electron and a proton; specifically, it would produce particles with a *twofold* inner symmetry associated with them, which does not fit experiment. PROTONS, as is now well known in the context of the quark model, have a *threefold*

inner symmetry associated with them. You can see where we're going. In the end, it requires no Baker Street detective: in the Unity model, there is exactly one formulation that fits: the proton's inner waves travel in a *three*-dimensional INNER SPACE, which I give coordinates  $(X, Y, Z)$ .

### Option 3: $X, Y, Z$

Option 3 wins for many reasons:

- The three-dimensionality of the inner space of the PROTON is what yields the threefold QUARK MODEL for unstable matter, which has overwhelming empirical validation in the realm of the collider.
- The structures of the Universe that we already know about have empirically verified dimensions THREE and ONE. Space  $(x, y, z)$  is three-dimensional, while the  $w$  and  $W$  dimensions are solitary. There is no evidence for the existence of two-dimensional structures.
- A *circle* (1-sphere) and a so-called *glome* (3-sphere) share a property, which is crucial under the bonnet of Unity's mathematics. This property is known as PARALLELISABILITY. It can be visualised as "comb-ability". This property is not shared by the two-dimensional surface of a *ball* (2-sphere), a fact expressed in the charmingly named *Hairy Ball Theorem*: you can't comb a hairy ball flat.<sup>6</sup> You can, however, comb a hairy circle or glome.
- A three-dimensional inner space brings full symmetry to the Unity model, with four large outer dimensions, grouped as three and one, corresponding exactly to four small inner dimensions, also grouped as three and one.

The lovely thing about Unity theory, as I have been privileged to discover as I have worked on it, is that there is, it seems to me, only one feasible formulation of it. The thought isn't "On balance, it's likely that the proton propagates in three inner dimensions." It's more basic than that. There are many phenomena that make perfect sense in this structure, and make no sense in any alternative. Not only that, but the same formulation also produces quantitative results which

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<sup>6</sup>This property is required to make theoretical sense of the NUCLEAR ELECTRON. In order to satisfy the substrate equation, the wavefunction of a particle can only be polarised sinusoidally if it can shear an entire inner dimension or set of inner dimensions, without expansion or contraction. The photon does this in  $W$ , the nuclear electron in inner space.

then post-validate it. Therefore, while I know I will have made many mistakes in these exploratory years of Unity theory,<sup>7</sup> I am pretty confident as to its broadest content: a Universe of one substance and eight dimensions:

- ① four large OUTER DIMENSIONS ( $w, x, y, z$ ),
- ② four small INNER DIMENSIONS ( $W, X, Y, Z$ ).

Another version of Unity theory, with fewer dimensions, must, as far as I can see, fail in multiple ways, and any more would not only be superfluous but would also wreck the symmetry. It's easy to follow a path with no turnings!

## A Question for the Devil

The INNER DIMENSIONS are smaller than the OUTER DIMENSIONS, and our human scales lie in between the two. ( $W, X, Y, Z$ ) are small, and ( $w, x, y, z$ ) are large. Until this point in the theory, those qualitative sizes “small” and “large” have been the only relevant facts. But, by adding in a second set of inner dimensions ( $X, Y, Z$ ), a possibility presents itself: *different* sizes of small. Indeed, since a three-dimensional space is fundamentally different from a one-dimensional one, this possibility is, in fact, a *certainty*. There is no reason to suppose that  $W$  and ( $X, Y, Z$ ) have the same circumference, and every reason to suppose otherwise. And, in broad terms, it's obvious what the difference is. From Rutherford's gold foil experiments, we know that the PROTON is much smaller than the ELECTRON, and much heavier. Now, high mass corresponds, via  $E = mc^2$ , to high energy, which corresponds, via  $E = i\hbar \frac{\partial}{\partial t}$ , to high frequency, which corresponds to short wavelength. In other words, the protonic ( $X, Y, Z$ ) dimensions must be smaller, i.e. wrapped into tighter circles, than the electronic  $W$  dimension is. This idea presents an observation and a question.

**Observation:** if the PROTON's dimensions are smaller than the ELECTRON's, then the *ratio between the two sizes*—this must, according to Rutherford's gold foil, be a dimensionless number<sup>8</sup> a long way from 1—should be a physical constant of major significance. Indeed, we should expect this ratio to be *ubiquitous* in physics,

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<sup>7</sup>God knows how many errors I have made up this point. It's a lot. There's no reason whatsoever to assume, and you certainly shouldn't do so, that I have not made mistakes in modelling. Compared to the (pointless and paradoxical) doddle of working only in the world-image, Unity theory is hard!

<sup>8</sup>A *dimensionless number* is a pure ratio. For example, the ratio of speeds  $v/c$  is dimensionless, because the dimensions on the top and bottom of the fraction are identical, and therefore cancel out;

since it must dictate not only the ratio of *masses* of the PROTON and ELECTRON, such as make up all virtually all matter, but it should also govern the ratio of the strengths of the FORCES that result from the curvature in the protonic ( $X, Y, Z$ ) and electronic  $W$  components of the inner dimensions. We should also expect this constant to have evaded interpretation, despite its ubiquity in the lab. The **question**, then, is: “Is there a constant of physics, a dimensionless ratio far from 1, which appears ubiquitously in physics, yet has no interpretation in the lab?” The answer, reassuringly, is a resounding *yes*.

Wolfgang Pauli, the theorist of quantum spin and the man who, following Einstein’s recommendation, came to be seen as “the conscience of physics” in the middle years of the twentieth century, said:

*When I die, my first question to the devil will be:  
What is the meaning of the fine-structure constant?*

He was speaking of the number  $\alpha \approx \frac{1}{137}$ , introduced by Sommerfeld in 1916 to describe the *fine structure* of the hydrogen spectrum. Dirac is said to have made the same joke, but with God in place of the devil. Feynman, father of modern quantum field theory and perhaps the greatest ever teacher of physics, put it thus:

*It’s one of the greatest damn mysteries of physics: a magic number that comes to us with no understanding by man.*

The FINE-STRUCTURE CONSTANT  $\alpha$ , whose reciprocal is very close to 137, is the ratio of the coupling strengths of the *strong force* (which binds protons) and the *electromagnetic force* (which binds electrons). In other words, it is a “proton to electron” ratio. This ratio 1 : 137 appears everywhere, and it has demanded a physical explanation ever since it was introduced over a century ago. This is, of course, *exactly* the constant we are looking for. It is the right size; it refers to the right forces; it sits at the heart of a hundred equations; it is dimensionless, ubiquitous and unexplained. If I had been trying to *fabricate* a number to fit the bill better, I couldn’t have done so. So, in Unity theory, I propose an answer to Pauli, Dirac, Feynman and the many others who have thought to enquire, of either God or the Devil, as to the nature of the fine-structure constant. It’s very simple.

**Conjecture:**  $\alpha \approx \frac{1}{137}$  is the ratio of inner-dimensional circumferences.

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algebraically, this is expressed  $[v/c] = [v]/[c] = (LT^{-1})/(LT^{-1}) = 1$ , where  $L$  and  $T$  are dimensions of length and time.

So, I propose that the protonic ( $X, Y, Z$ ) dimensions are some 137 times smaller than the electronic  $W$ . It's as simple a resolution of the fine-structure mystery as could be. But don't just take my word for it; let's follow the idea through and see if it holds water. The electron mass is determined by periodicity around  $W$ ; so, our conjecture dictates precisely what the masses of waves in the *protonic* dimensions should be, in terms of the electron mass  $m_e$ . Now,  $m_e$  isn't predicted (yet) by Unity theory—one must start somewhere!—but we have its empirical value. In units of energy,  $m_e c^2 = 0.511$  MeV. So, it's now possible to test the idea that, alongside the inner  $W$  dimension, about whose existence we are already confident, there is a three-dimensional inner component whose circumference is 137 times smaller. The obvious question is:

*What is the mass of the simplest, i.e. lightest observable wave in ( $X, Y, Z$ )?*

The tempting answer is “137 times the mass of the electron”. And there is truth to this: if you reduce circumference by a factor of 137, then you do increase the energy of waves circling that circumference by a factor of 137. This scaling up of mass-energy by 137 times, from that of the electron to that of this new particle, does indeed take place. There is, however, one other complicating factor: a structural fact about a 3D spherical space, as opposed to a 1D circular one.

## The Structure of Inner Space

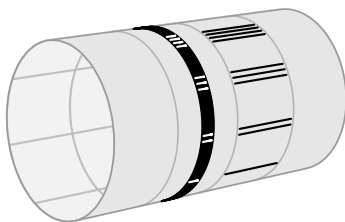
Visualising this is easier than you might imagine, because, in this instance, the relevant fact is as true about a *two*-dimensional spherical space as it is about a *three*-dimensional one. Hence, in the following, we can compare a “circle” and “the surface of a ball”, and the argument will hold true. All you need to do is visualise the surface of ① a cylinder,<sup>9</sup> and ② the surface of a ball. Follow the argument in those spaces, and you will have a full understanding of how the arguments work in the inner dimensions. In this case, the only mathematical distinction is between *one* and *more than one* inner dimension.

To visualise it, imagine a solid metal bracelet, on which a direction is picked out by four sets of marks |, ||, |||, ||||. Put such a bracelet on a cylinder, for example an arm. Then draw matching |, ||, |||, |||| marks on the cylinder itself, in line with those on the bracelet. Is it possible to reverse the direction of the bracelet, so that

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<sup>9</sup>It's easier to picture the mathematics with reference to a cylinder than an isolated bracelet.

its  $|$  matches the cylinder's  $||||$  and its  $||$  matches the cylinder's  $|||$ ? Simply, no. Around a cylinder, the only possible transformations one can apply to a bracelet, without cutting or removing it, are to move it or rotate it around the cylinder. But such transformations *preserve orientation*, i.e. they keep the same order of  $|$ ,  $||$ ,  $|||$ ,  $||||$ . This is a familiar fact, albeit one that is rarely stated in such explicit terms: a bracelet cannot be reversed without taking it off the wrist.



Now, consider the same question, re the same marked bracelet, but with the cylindrical structure (one circular dimension) replaced by a *spherical* structure (more than one circular dimension), i.e. having replaced the wrist with a *tennis ball*. It is now child's play to switch the sense of direction. Take the bracelet from the equator of the tennis ball, move one side up and over the North pole, the other side down and below the South pole, and, hey presto, the marks are reversed. So, while a *circle*, such as the electronic  $W$ , has a sense of direction, a *sphere*, such as the protonic  $(X, Y, Z)$ , doesn't. This is significant when it comes to waves travelling around the inner dimensions. It means that, in  $W$ , the direction of wave travel is permanent. This is why electrons never transform into positrons. Their charge, which corresponds to the direction of propagation in  $W$ , is a permanent fixture.<sup>10</sup> An electron goes one way, a positron the other, and nary the twain shall twine. But, as is evident with a bracelet around a tennis ball, the same just isn't true of a three-dimensional inner space. If one attempts to make the protonic equivalent of an electron, travelling around just one of the "equators" of  $(X, Y, Z)$ , like a bracelet around the equator of a tennis ball, then that wave ends up with a *choice*. It can keep going in the positive  $X$  direction, or it can turn around and go in the opposite direction. And this choice ends up easily made, because, given the chance, Nature seeks *balance*.

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<sup>10</sup>In technical parlance, such a permanent fixture is known as a *topological invariant*. This means it is an immutable fact of structure at the deepest level. A knot such as the *overhand knot* (the most basic one, which magically appears on every string ever) is a topological invariant because you cannot undo it, without the use of scissors, while the ends of the string are attached.

# Opposites Attract

Studies of electricity, magnetism and people tell us clearly: *opposites attract*. If there are two waves, a negatively-charged ELECTRON and a positively-charged POSITRON, circling *W* in opposite directions, those two waves will seek each other out. Opposites attract because the balance which such attraction seeks to attain is *energetically favourable*. This is a key concept in Unity theory, and in physics more generally, which offers, with regard to many if not all phenomena, an answer to the big question: why? Why does a ball roll down a hill? Because it is energetically favourable for a ball to be at the bottom of the hill. At the top of the hill, the ball has excess potential energy stored in it by dint of its position; it will release this if it can, turning it into kinetic energy: motion. Likewise, it is energetically favourable for a stretched elastic band to return to its natural length: extended, the band stores excess potential energy. If the band is held stretched, and it is not possible to release that excess energy, then no problem, the band will stay stretched for as long as needs be. However, all other things being equal, the band, as any other object, will realise its potential.

Empirically, particles with *like* charge, whose waves propagate in the same direction, repel, while, on the other hand, particles with *opposite* charge, whose waves propagate in opposite directions, attract. In other words, the superposition of matter waves going in opposite directions is *energetically favourable* compared to superposition of matter waves going in the same direction.<sup>11</sup> There is good reason for this in Unity theory—like charges twist the substrate doubly, while opposite charges don't twist the substrate at all—but a detailed discussion of it is beyond the scope of this book. The key fact is:

OPPOSITES ATTRACT, BECAUSE NATURE SEEKS BALANCE.

This dooms any protonic version of the electron. A wave circumnavigating the *X* dimension, which is one of the equators of inner space, has no God-given right to existence: if there is a lower-energy configuration available to it, i.e. an energy hill to roll down, then energetic favourability dictates that such a hill *must* be rolled down. And, for waves circumnavigating inner space, there *is* such a hill! Take

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<sup>11</sup>The concept of ENERGETIC FAVOURABILITY only makes sense once you move beyond the linear approximation inherent in e.g. the Schrödinger equation. By definition, two linear waves superpose perfectly, without any form of interaction, either attractive or repulsive. The energetic favourability of superposition comes from the ways in which such superpositions *depart* from perfect linearity.

half of our proposed  $X$ -electron wave and *reverse it*, by flipping the equator over the poles, i.e. split the bracelet into two thinner bracelets, and flip one around the tennis ball. The result must be energetically favourable, as we now have two opposite charges superposed, as opposed to two like ones. Hence, the “protonic version of the electron” cannot exist. Any single wave of such a description must immediately “roll down the hill”, to become a STANDING WAVE, which is the only configuration on such an equator with any chance of stability. How does the regular ELECTRON survive, then? It survives because it exists in a *single* circular dimension,  $W$ . The regular electron would like to chop itself in half, reverse half of itself, and reestablish itself as a lower-energy standing wave, but it cannot; that change is topologically forbidden. No continuous path exists between the one state of affairs and the other. Yes, there is a valley, over the hills and far away, into which an electron *could* drop, but it has no way of getting there; an infinitely tall mountain range stands between the electron and that lower-energy standing wave state. The ELECTRON, therefore, is infinitely *stable*.

## The Data

So, what is the Unity-predicted mass of the lightest periodic wave in  $X$ ? Simple. Compared to an electron in  $W$ , the rest-energy of such a particle must be scaled up by two factors:

- ① Wavelengths in the protonic inner dimensions are 137 times shorter than those in  $W$ ; so, since shorter wavelengths correspond to higher energy, the rest-energy must be scaled up by 137.
- ② In order to be even briefly stable, an  $X$  particle must consist of *two* waves propagating in opposite directions. While such waves do interact enough to generate stability (a small departure from linear superposition), they remain, to a good approximation, essentially two separate particles; so, to a first approximation, their classical energies *add*. Hence, the rest-energy is scaled up by 2.

So, our conjecture predicts a particle with mass, in units of energy,

$$m_{\text{predicted}} = 2 \times 137 \times m_e c^2,$$

where  $m_e$  is the mass of the electron. In the usual units of quantum physics, viz. millions of electronvolts, the rest energy of the electron is  $m_e c^2 = 0.511$  MeV.



The lowest-energy particle in  $(X, Y, Z)$  should then, according to Unity theory, have the following properties. It should

- be *short-lived*, because its constituent waves, on equators of the  $(X, Y, Z)$  3-sphere, are not topologically indestructible,
- be *spinless*, because the spins of its two waves should cancel,
- be *electrically neutral*, because its waves have no  $W$  component,
- have a *mass-energy* of around  $2 \times 137 \times 0.511 \approx 140$  MeV.

We now consult the data, and see that the proton-like particle with the lowest mass, as measured experimentally, is the spinless, NEUTRAL PION  $\pi^0$ , with an average lifetime of 26 nanoseconds, and a mass-energy, leaving out the  $c^2$ , of

$$m_\pi = 135 \text{ MeV}.$$

This is spot on. Indeed, it's even closer than it looks. Since the pion consists of two waves whose superposition is (just) energetically favourable, the combined energy should be (slightly) less than the sum of the individual components. This is the MASS DEFECT: the energetic favourability of opposite-charge superposition expressed numerically. This 4% difference is what keeps the two waves together, at least for a nano-while: it doesn't do so for long, because the mass defect is small. Our predicted value is, therefore, *exactly* as expected.

## The Old Paradigm View

The Standard Model (yawn), for all its proclaimed precision, has literally no explanation for the pion mass. And, in fact, the situation is *worse* than that. The neutral pion is supposed to be comprised of a quark-antiquark pair (correct; it's the STANDING WAVE idea), where the relevant quark and antiquark are either *up* or *down* (incorrect; there's only one mass involved). The Standard Model fudges the make-up, and the pion is variously quoted as up/anti-up  $u\bar{u}$ , down/anti-down  $d\bar{d}$ , or a combination of the two. As we will see, none of these options works. The masses are given as  $m_{\text{up}} = 2.01 \pm 0.14$  MeV and  $m_{\text{down}} = 4.79 \pm 0.16$  MeV. Note the accuracy, in the figures after the  $\pm$ . The Quarkers are pretty damn sure about the fact that the up quark (and so anti-up quark) has a mass-energy around 2 MeV and that the down quark (and so anti-down quark) has a mass-energy of

around 5 MeV. Now, *surely*, you might think, given the extraordinary splurge of time, money and environmental destruction that is the closed clique of particle physics, this confidence must yield a really accurate value for the observed pion mass-energy, that is to say, for the *most basic prediction of the up/down model*. After all, this is the very foundation of the whole system. We're looking for agreement with 135 MeV, remember. Here it comes, drum roll please...

$$m_{\text{quark-predicted}} = 7 \text{ MeV}.$$

Total garbage! Utter nonsense! Pigswill! The level of agreement with the observed value 135 MeV is abysmal!! I choose my number of exclamation marks carefully, because it is important to realise quite how lamentable this is. It is simply not acceptable that physicists have been permitted to suck the resources of the planet dry, occupy highly salaried positions, enjoy the praise and adulation of countless young and impressionable minds, while peddling such mediocre trash. Science is an admirable endeavour, especially if one doesn't have a clue what's going on, but only, only, *only* if one is honest about how much one knows. In this regard, the top brass have let everyone down. It must be laid at their door. The physics community, to avoid facing the *gargantuan* fallacies at the heart of its worldview, has exempted itself from MAKING SENSE. The question "What are the masses of particles?" has been surreptitiously removed from the syllabus by scholars with tricky minds and feeble hearts, so that everyone within the clique can go on, quite happily, only ever being presented with questions to which they already have peer-reviewed answers.<sup>12</sup> It's pathetic and worse than pathetic. As both Feynman and Einstein knew very well, to avoid such basic questions is a travesty of intellectual honesty, and the very opposite of "science".

The discrepancy above also exists, to a even greater degree, in the proton itself, whose experimentally measured mass-energy is 938 MeV. This is verified to many decimal places, so, when given to the nearest integer, that value can be taken as effectively gospel, as reliable as a fact of physics can be. But the mass, as predicted by the Standard up/down quark Model, which has a proton down as *uud*, is... another drum roll please...

$$m_{\text{quark-predicted}} = 2.01 + 2.01 + 4.79 \approx 9 \text{ MeV}.$$

Yes, that's 9 MeV versus 938 MeV. Allow me to polish up your Nobel prizes, oh you grand white-coated Ephors! Einstein would be horrified. By what right do

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<sup>12</sup>Mass questions are only ever asked behind layer upon layer of computer-based modelling. From such numerical algorithms, which can be tuned endlessly, the physicist can get any answer he likes

those who can't answer (and actively evade asking) the most elementary questions of their discipline seek and receive bewildering sums of money to further their "commitment to science"? None. These fakes and frauds have, in clinging to a Middle-Age worldview, bored holes in the beach kilometres deep, hoping to find castles in the Sand. But it's *right there*, plain to see: on the basics, the Standard Model is a bad joke. Now, I'm more than ready to stand corrected on my own details here; I have no problem with error, only with evasion. The facts are divine, but authors are human, and we all make mistakes. For instance, I may end up seeing the nature of the pion factor of two differently. But that's a minor detail. The evidence of experiment, in Humanity vs Up/Down, doesn't point to a 55 : 45 split decision. No. The data says, unequivocally, that the up/down quark model is wrong. Just totally, categorically **WRONG**. Unity will need refining, of course, but at least it's in the right ball park. And, more importantly, it's *honest*.

## Quark Dogma

It is worth considering the Standard Excuse given by the Quarkers for how terminally shite their model is. I'm talking about the *Official Reason*, sanctioned by the Establishment, no less, for the astoundingly large error in the quark model's predicted proton mass. This schoolboy excuse is, if such a thing is possible, even more fraudulent than the fact itself. Remember, as you read the following, that the observed value is some 10000% (yes!) too high. The Papal Bull, approved and used by all High Priests of the Sacred Collider, goes something like this. I am paraphrasing here, but without trying to do the explanation down.

"A proton consists of three main particles, two up quarks and a down quark. These have a combined mass-energy in the region of 9 MeV. The remaining mass-energy, some 99% of the total proton mass, is made up of *quantum chromodynamics binding energy*. This arises from the combined kinetic energies of a sea of virtual quarks and gluons (particles that bind quarks) that surround the three main quarks."

I have seen the above written more or less verbatim, i.e. dogmatically copied out without any understanding of content, in many places. It is possibly the worst explanation of anything I have ever heard. Please, if you value your Mind, don't be impressed by a clever phrase such as *quantum chromodynamics binding energy*. That

is just a set of words.<sup>13</sup> The fact that words have been written down (literally, their *Authority*) does not mean that they have any logical content. These ones do not. What the *Tale of the Sea Quark* says, when it is stripped of its fancy English, is one of two things. Bear in mind that the explanation is gobbledegook, so it takes work to pin down exactly what is wrong with it; that's the whole point of highfalutin language, of course. The story, as told, can only mean one of two things: either ① “Proton mass is binding energy” and/or ② “Proton mass is kinetic energy”. If anyone can find any deeper alternative, some nuance I have missed because of my idiotic lack of a Nobel prize, I will be glad to hear of it. Let's look at the options.

### “PROTON MASS IS BINDING ENERGY”

This is diametrically opposite to true. BINDING ENERGY is the mass defect  $\Delta mc^2$ ; it is an idea with a well-defined meaning. Stability of a set of waves stems from the energetic favourability of their superposition. Component waves stay together when their combined mass-energy, as a superposition, is *lower* than the sum of their individual mass-energies. “BINDING ENERGY”, therefore, refers to a *lowering* of energy in superposition; it's always a *negative* quantity. The quark mass problem goes in the opposite direction. A *positive* binding energy, as proposed in the Standard Model, should cause the *opposite* of stability. If a set of three separated quarks had mass-energy 9 MeV, and a set of three combined quarks had mass-energy 938 MeV, then the quarks would never combine. Energetically, it would be like trying to stand an elephant on a rain cloud.

### “PROTON MASS IS KINETIC ENERGY”

This is every bit as nonsensical. The idea “internal kinetic energy”, which is proposed here, has a name: TEMPERATURE. It is precisely what *blows things apart*. Heat a molecule enough; it disintegrates. Heat anything enough; it disintegrates. If, in a resting proton, there is a “sea of virtual quarks and gluons” with 929 MeV of kinetic energy, then those virtual quarks and gluons are trying to leave the proton any which way they can. “A localised area of exceedingly high temperature consisting of many components moving in different directions” isn't a description of a stable particle, it's a description of a goddamn *hand-grenade*.

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<sup>13</sup>It is perfectly possible to write a statement, such as “zippy oysters narrowly avoid bankruptcy”, all of whose component words have meaning, all of whose grammar is sound, but which is gibberish nonetheless. Explanations of “QCD binding energy” are on this level.

I've read questions by physics students regarding this nonsense. They ask, having tried to think for themselves non-dogmatically, "Shouldn't the binding energy go in the opposite direction?" They try, in other words, to think like a real physicist. And they are then corrected by some knowing physics elder, who either gives them a pageful of mathematical symbols they cannot possibly hope to digest, or else witters on polysyllabically about it having something to do with "confinement". The student goes away disillusioned, with the world making a little bit less sense than it once did. It isn't fucking good enough. If you are young and bright, if you are to be a student of physics, go forth! Be young and bright! But be prepared for the biggest of challenges: retaining your integrity. The world into which you are entering does not want you to do so. My advice is this: when the old guard lecture about "fundamental" physics, pay attention to the *mathematics*, which corresponds to Reality, but pay little heed to the *words*, which are attempts to shoehorn Reality into the world-image. Your own explanations, your own gut feelings, your own models regarding things like "QCD binding energy" are likely to make more sense than anything you're told.

## The Unity Proton

Having checked the fine-structure hypothesis, we can now consider the true structure of the PROTON. The mathematics, once again, is elementary, as with pion mass. We should not, however, expect it to give quite so precise a value. The pion *mass defect*, that is to say, the energy discrepancy between the sum of the pion's two constituent waves and the pion itself, is around 4%. This reflects the fact that the pion is only metastable. A larger mass defect corresponds to greater stability, because the energy valley in which the combined particle sits is deeper. The proton is the most stable of all composite particles. The pion, mass defect around 4%, falls apart in nanoseconds, which means that the infinitely stable proton must have a significantly higher mass defect. This will look like error (non-agreement between theoretical and observed values), but it isn't. The combined mass of the constituent parts of the proton must come to a sizeable percentage, in, say, the 10% to 30% range, more than the observed mass of the proton, in order to *agree* with observation. This is why the up/down quark model is such rubbish: not only is it off by a quantitatively vast amount, but it is wrong in the wrong direction! The Unity model doesn't have to do much to beat its

Neanderthal ancestor. The old paradigm has, following extensive training and the buying of very expensive shoes, set the high-jump bar at a mighty *negative* 10000%, i.e. buried in the Earth's mantle. To win gold, all we have to do is stumble blind drunk to the crash mat and fall over.

A PROTON, you will hardly be surprised to hear, is not a collection of three “quarks”, with that word taken in the Newtonian sense of “located particle”. The triplicate nature of protonic collisions, which has shown up so strongly at CERN and elsewhere, is an expression of the three-*dimensionality* of the inner ( $X, Y, Z$ ) space in which proton waves propagate. Interpreted properly, that is, outside the world-image, it's a reasonable piece of science; you just have to ditch the idea that quarks have locations in space. See quarks as three perpendicular *components* of a protonic mass vector and you're getting closer to the truth.

## Maximality

If you put two heavy balls in two different places on a trampoline, they will, irrespective of the details, end up touching. Why? Because that is energetically favourable. It is favourable for each ball to sink into the trampoline somewhat, because that reduces the gravitational potential energy; if an object can, it will seek proximity to the Earth. Two balls in different locations each sink a certain distance into the trampoline, doing their own work to stretch the material. But, if the two balls work side-by-side, then the work done by each benefits both. Together, they can sink further into the trampoline. The stability of composite particles such as the PROTON is *proverbial*:

MANY HANDS MAKE LIGHT WORK.

The MASS DEFECT, then, is the extra “sinking into the trampoline” that two waves can achieve if they work together. All FORCE is a manifestation of this idea. On the trampoline, you don't need to know how heavy the balls are, where they start, or how strong the springs are. There is only one stable configuration: with the two balls side-by-side in the middle. The total energy of this configuration is lower (sunk further towards the Earth) than any other, so, since nothing prevents it, it will happen.<sup>14</sup> And the *more mass* you can place on the trampoline, the *more stable* the resulting configuration will be. Suppose two balls, sitting in their depression,

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<sup>14</sup>This is the benefit of thinking in terms of *energetic favourability*: you can bypass the minutiae and see straight to the *why* of the thing. The quantitative, which does have its place, is vastly overrated.

get separated by a gust of wind. Three balls sit in a *deeper* depression. So, the same gust of wind wouldn't necessarily separate them. This is analogous to particle stability. To generate such increased stability, you have two options:

- ① MASS. You can increase the mass of each ball/wave.
- ② MULTIPLICITY. You can increase the number of balls/waves.

The first option works on a trampoline, but isn't an option with substrate waves. Matter waves are periodic in  $W$  and  $(X, Y, Z)$ , which fixes their frequencies. One could double or treble their frequencies, but this would make the individual waves unstable to decay. Such waves are not in the *ground state*, as it is known. Which leaves only option ②: increase the number of balls/waves. This option has two aspects, when it comes to waves. Remember that "balls on a trampoline" is an analogy: in Reality, quark waves don't sit side-by-side;<sup>15</sup> rather, they travel in *different inner dimensions*. You can visualise this with the balls on the trampoline being able to move through each other and superpose, as waves can. Clearly, the most stable configuration is when the balls are in *exactly the same place*.<sup>16</sup> Hence, the maximality idea, viz. "number of balls" corresponds, translated wave-wise, to DIMENSIONALITY. The proton is stable because it fills every dimension it can: its waves go in every possible direction, and are polarised as fatly as they can be. There is, you will be reassured to know, precisely one configuration which fits the bill. Not only that, it fits all sorts of bills at once. To analyse this configuration, we ask three questions:

- ① What is the *frequency* of the proton?
- ② In how many *directions* do a proton's waves propagate?
- ③ What kind of *polarisation* do a proton's waves have?

Each is simply answered (with due willingness to tweak factors of two in the future). In overview: *frequency* is fixed by the size of inner space, which we have already analysed with regard to the pion; the maximal number of *directions* of wave propagation is determined by the structure of inner space; maximal *polarisation* is then determined by the filling of whichever dimensions are left over.

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<sup>15</sup>The Stuff in Space paradigm forces this assumption about quarks, and it doesn't work. There are all sorts of theoretical problems, particularly in the identical behaviour of "up" and "down" quarks under electromagnetic bombardment, with the distinct *particle-ness* of quarks in the proton.

<sup>16</sup>Remember that *space* itself is an image. A zero-dimensional • location in space corresponds to, i.e. "contains", a five-dimensional substrate space.

## Frequency

The PROTON, to achieve *maximal stability*, must occupy all three  $(X, Y, Z)$  dimensions. Hence, its task is not as simple as the pion's, which only occupied one. As far as the pion was concerned, in frequency terms, the  $X$  dimension felt exactly like a circle. While the three-dimensionality of  $(X, Y, Z)$  dictated that the pion, to attain any stability, be a standing wave, it didn't affect the *frequency* of that wave. The pion frequency was simply 137 times that of the electron. But now consider *two* such circles, e.g.  $X$  and  $Y$ , on the face of the globe. Visualise the equator and the Greenwich meridian. Spherical structure dictates that two great circles meet *twice*, at antipodal points. On the globe, the circles of  $0^\circ$  longitude and  $0^\circ$  latitude meet once in the Gulf of Guinea, and again in the mid-Pacific. In the same manner, the paths of the constituent waves of a proton meet *twice* every circuit. So, they require *twice* the frequency of pion waves: they must loop twice as quickly in order to meet coherently at antipodal points.

## Directions of Propagation

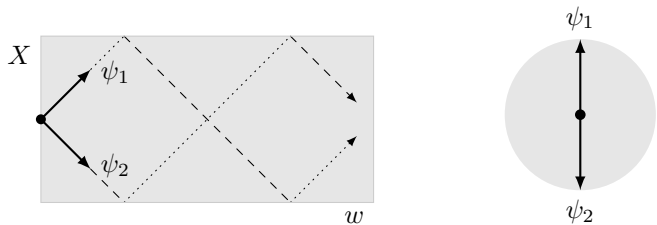
You might suppose that  $(X, Y, Z)$  offers *three* directions of propagation. But, in fact, we can do better. It is possible to squeeze *four* waves in. How so? Well, thus far, we have neglected one thing:  $w$ , the dimension of PROGRESS. And we know that  $w$  must be involved: in order to produce a quantised world-image, the whole show (made of proton waves) must progress in  $w$ ! This is what allows for thickness, for the *quantum*, for the production of classical materiality. It turns out that, using the  $w$  dimension, you can engineer *four* waves, all with the same component in  $w$ , all propagating symmetrically in  $(X, Y, Z)$ . The best way to see this is, as ever, by lower-dimensional analogy. I'll start with a  $(w, X)$  cylinder made of the dimension of PROGRESS  $w$  and one circular dimension  $X$  of INNER SPACE, and then add in  $Y$  and  $Z$ . At first, this will look, superficially, like the  $(x, W)$  cylinder. Note the upper-case/lower-case difference!

## One Dimension of Inner Space

With *one* inner dimension  $X$ , and *one* outer dimension  $w$ , you can engineer *two* coproggressing waves, propagating along the edges of a *square*. The two views below are of the same wave configuration: firstly "from the side", with progress rightwards; secondly "from behind", with progress running into the page. Once



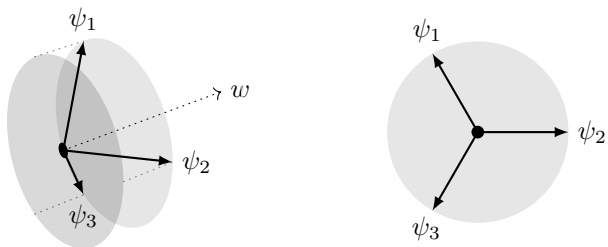
$w$  is projected out (as in the right-hand picture), the particle is a PION at rest, viz. a *standing wave* in  $X$ .



Two waves coprogessing in  $w$

### Two Dimensions of Inner Space

In *two* inner dimensions, you can engineer *three* coprogessing waves, using a *cube*, rather than a square. Imagine taking a cube, and looking along one of its space diagonals (the long diagonals inside it). You are looking in the  $w$  direction of progress. From the nearest corner, three edges splay out symmetrically. Direct a wave along each of these edges, and you have *three* symmetrical waves propagating periodically in *two* dimensions.

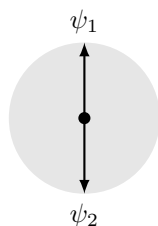


Three waves coprogessing in  $w$

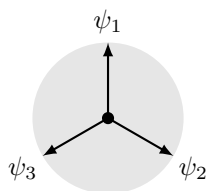
### Three Dimensions of Inner Space

In *three* inner dimensions you can engineer *four* coprogessing waves, using a four-dimensional *hypercube*. Now, this becomes rather harder to visualise, but you don't have to visualise it directly to understand it. All you need do is see that the process continues. This is the way to think in higher dimensions. With

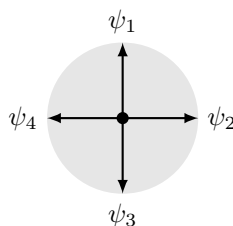
$(w, X, Y, Z)$  available, we can fit four perpendicular waves in. Leaving out the “side views”, as used above, just consider the view “from behind” in all three cases, looking in the positive  $w$  direction of progress:



Two waves in  $X$



Three waves in  $X, Y$



Four waves in  $X, Y, Z$

## Polarisation

We have filled the four dimensions  $(w, X, Y, Z)$  with directions of wave travel. What remains? We are left with  $(W, x, y, z)$ . These, then, are the available dimensions of proton *polarisation*. The electron is restricted, in its polarisation, to two of  $(x, y, z)$ , because it travels in the  $W$  dimension, but to the PROTON, the  $W$  dimension, being 137 times bigger than its  $(X, Y, Z)$  home, acts like another *outer* dimension. To the tiny proton, the electron’s home is a cavern! Hence, the proton’s waves can expand/contract *all four remaining dimensions*  $(W, x, y, z)$ . This doubles the polarisation dimensionality, when compared to the electron and the pion. Those waves were helices, polarised in two dimensions; proton waves are *doubled helices*, polarised in four dimensions. We needn’t worry about the details here; as previously discussed, to win high-jump gold, we need only collapse onto the crash mat.<sup>17</sup>

The structure is simple. The Universe has eight dimensions, and the proton fills them perfectly: a maximal four dimensions  $(w, X, Y, Z)$  of wave *propagation* and, at right angles, a maximal four dimensions  $(W, x, y, z)$  of wave *polarisation*, all superposed at a single location in space. You couldn’t engineer more symmetry. A stable proton requires one- and three-dimensional components, and, in this configuration, uses them flawlessly. Whatever the precise details, about which I remain interestedly undecided, this  $4 \times 4$  dimensionality is MAXIMAL: any other version is less stable, less symmetrical, less natural, less elegant.

<sup>17</sup>I discuss the nature of proton waves in more depth in UNITY THEORY.

## Predicted Mass

And what mass-energy does the above theoretical proton have? Well, to calculate it, we just collect up the scale factors. Take the electron energy  $m_e c^2$  MeV, and scale it by: 137 for the smaller dimensions, 2 for the antipodes, 4 for the number of dimensions of propagation, and 2 for the doubling of polarisation dimensionality. This gives

$$16 \times 137 \times m_e c^2 = 1120 \text{ MeV}.$$

The observed proton mass is 938 MeV. The MASS DEFECT, which is what gives the proton its stability, is around  $-16\%$ . This is... exactly as expected. It is worth, just to make it explicit how dreadful the up/down quark model is, comparing once again the predictions of the quark and Unity models for the proton mass, by laying out the mass defects next to each other, bearing in mind that a MASS DEFECT only makes sense at all if it is *negative*. They are:

$$\text{UNITY MODEL: } \frac{938-1120}{1120} \approx -16\%,$$

$$\text{QUARK MODEL: } \frac{938-9}{9} \approx +10000\%.$$

Once again, to be crystal clear, I'm not claiming that my description of the proton and derivation of its mass is perfect. It isn't. I'm not saying that the thing won't require (possibly major) revision in the future. There was a large target to aim at, and the Unity value was not a *pre* but a *post*diction. Any mass defect between 10% and 30%, perhaps even up to 50%, might have seemed sensible. Who knows. And it's very possible (this is always possible) that I've assigned a factor of two incorrectly. To visualise things beyond perception is hard, and ruling out error is downright impossible.<sup>18</sup> But, with all that in mind, consider the *alternative*: "The proton is three quarks in a space box". To denigrate the Unity structure for not being precise enough, and thereby to discount it as an alternative to the quark model, is to make a category error of the most grievous kind. In looking for a family pet to keep your children company, you don't reject a kitten because it looks a bit hairy and choose a boa constrictor instead. Lovely smooth skin, yes. The Unity proton structure is simple, certainly imperfect and gives the right kind of figure; the incumbent idea, however, is *irreparably* wrong.

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<sup>18</sup>This is not, contrary to what the falsifiability-drones would claim, a weakness of Unity theory. Every worthwhile theory must address the unknowable. *A priori*, we cannot know the Universe.

## Progress

And, again, you don't have to take my word for it! It turns out that Unity's proton structure permits *direct* empirical validation. The colliders have turned out to be useful for something, I guess, if only proving their own redundancy. Now, what I'm going to explain next is buried quite deep in the quantum field theoretic mathematics of the Standard Model, which is why few outside the groupthink-tank have ever considered it with perspective. But, again, don't be afraid of the complexity. The quantum field theory, proposed by Weinberg, is amazingly clever, yes. But the result that emerges from it is not. It is, of course,  $a^2 + b^2 = c^2$ . A result of crystalline simplicity appears in the theory of *electroweak unification*, the description of the electromagnetic and weak forces as aspects of one interaction, which validates, in one breath, both the existence of the **Wave** and the proton structure described above. Combined with the fact that the structure *also* gives the correct proton mass, this is emphatic.

## The Weak Mixing Angle

The relevant quantum field theoretic result is this. The photon of light,  $\gamma$ , is the particle that carries the electromagnetic force; a particle known as the Z boson carries the relevant weak force. But a strange thing happens when you (following Weinberg) link these forces mathematically. The  $\gamma$  photon and the Z boson are combined in terms of the WEAK MIXING ANGLE  $\theta_W$ , which is one of the fundamental constants of the Standard Model. This angle, like so many constants, has no physical meaning in the old paradigm; indeed, the fact that it exists at all is entirely mysterious. Speaking broadly, the result is:

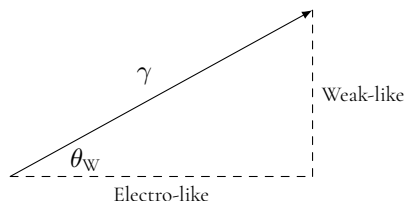
*All photons of light are inclined, in some sense, at an angle  $\theta_W$ .*

Most engaging! And how does this “angle of inclination” work? Well, it turns out that, in a process known abstractly as “the mixing of the vector boson plane”, the perceptible entities  $\gamma$  and the Z boson only emerge as a rotated combination<sup>19</sup> of two more fundamental entities known as B and W<sup>3</sup>. We needn't worry here about the nature of those waves; we need only consider the implications for *light* itself.

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<sup>19</sup>Technically, the “rotation” is only a redefining of coordinate axes. The redefinition, which is at the heart of what is known as *symmetry breaking*, is from fundamental Universe-centred axes to secondary cosmos-centred axes. Unity predicts that this must be done to yield a perceptible theory.

What we know is that every observable photon of light, such as moves through  $(x, y, z)$  space, is constructed of two components, which are perpendicular. This is pure empiricism independent of Unity theory: it is critical to the experimental verification of the quantum field theory of the weak interaction. The relevant Standard Model triangle, drawn to scale, looks like this:



Let's unpack this. In the Standard Model, it is theorised and verified empirically that every light wave has *two* components associated with it, which combine as in the triangle above. Most is an ELECTROMAGNETIC component, but a significant portion is made up of something different, which has more in common with the WEAK force. The weak force, which has subatomic range, cannot be described in any physical sense in the lab. To which substrate dimensions do these components correspond? Well, across the page is space  $x$ , obviously, in which the light-like component moves. And up the page? It can only be the  $w$  direction, host to the quantum and imperceptible to matter-based beings. These two form a plane, the  $(w, x)$  ocean plane across which the **Wave** sweeps like a swell.

## Light as a Surfer

Why does light come equipped with these two components? That's simple. A PHOTON must keep abreast with the **Wave**. So, the triangle above is simply a surfer's *velocity triangle*. If light, which, as a substrate wave, propagates at  $a$ , is to remain with the **Wave**, it must progress in  $w$  at speed  $b$  (weak-like), leaving speed  $c$  (light-like) for observed motion through space. So, what is the physical meaning of  $\theta_W$ ? The weak mixing angle  $\theta_W$  is simply the surfer-angle at which *all* substrate waves have to travel, "forward of space", in order to remain with the **Wave**. The existence and progress of the **Wave** *demands* that this strange angle exists! But that's not all, not by any means. Unity theory, in dictating that a maximal PROTON consist of four coproggressing waves propagating symmetrically, tells us, at least to a first approximation, at what *speed* the **Wave** must progress!

The mathematics is school-level geometry, with, naturally enough, an extra dimension thrown into the mix. If *two* waves coprogress, keeping *w*-pace with the **Wave** while propagating periodically in a single inner dimension *X*, then they must, as shown depicted previously, be aimed along the edges of a square, whose diagonal lies in *w*. Suppose the square has side length 1. By Pythagoras, the length of the *w* diagonal is then  $\sqrt{1+1} = \sqrt{2}$ . Chop the square in half perpendicular to *w*, i.e. along its *X* diagonal, and the component of each of the wavevectors in *w* is given by  $\frac{1}{2}\sqrt{2}$ . The two waves coprogress, therefore, at speed

$$b = \frac{1}{2}\sqrt{2}a.$$

As before, step the dimensions up. Now, consider *three* waves coprogressing, aimed along three mutually perpendicular edges of a cube. The long diagonal is now  $\sqrt{1+1+1} = \sqrt{3}$ . Chop the cube into thirds, and the component of each of the wavevectors in *w* is  $\frac{1}{3}\sqrt{3}$ . The waves coprogress, therefore, at speed

$$b = \frac{1}{3}\sqrt{3}a.$$

Now, step the dimensions up by one again. At this point, direct visualisation in space becomes impossible. Nevertheless, the calculation is identical. *Four* waves coprogress when aimed along four edges of a hypercube. The long diagonal is now  $\sqrt{1+1+1+1} = \sqrt{4}$ . Chop this into quarters, and the component<sup>20</sup> of the wavevectors in *w* is  $\frac{1}{4}\sqrt{4}$ . The four waves coprogress, therefore, at speed

$$b = \frac{1}{4}\sqrt{4}a.$$

In other words, the proton structure discussed above, already verified to a degree by its correct mass value, dictates a specific SPEED OF PROGRESS. Given that stable matter consists almost exclusively of protons, it is true by definition that the **Wave** progresses with them; it is, after all, only a slight approximation to think of the **Wave** as a protonic tsunami. And, according to Unity theory, at what speed does this cosmic swell travel? It must progress, in the *w* dimension, at half the speed of wave propagation through the substrate:

$$b = \frac{1}{2}a.$$

How elegantly the numbers fall out!

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<sup>20</sup>The relevant angles are:  $\arcsin \frac{1}{2}\sqrt{2} = 45^\circ$ ,  $\arcsin \frac{1}{3}\sqrt{3} = 35.3^\circ$ ,  $\arcsin \frac{1}{2} = 30^\circ$ . All three results can, working from left to right, be verified with elementary geometry.

## The Speed of Progress

The structure of the PROTON dictates that the **Wave** progress in  $w$  at half the local propagation speed of substrate waves. This immediately tells us what  $a$ , the true speed limit of the Universe, and  $b$ , the progress speed of the present, are. Good old Pythagoras, once again, gives

$$a = 346,000,000 \text{ ms}^{-1}$$

$$b = 173,000,000 \text{ ms}^{-1}$$

$$c = 300,000,000 \text{ ms}^{-1}$$

It turns out that the present, the world-image, the cosmos as a train carriage, is hurtling across the substrate of the Universe at astonishing speed! More than half the observed speed of light! But have no fear; it's a smooth ride. As we already know, the speed of progress is imperceptible. We circle the galaxy at breakneck pace too, but it makes no difference to experience. Unity theory dictates that the entire perceived cosmos, which is the world-image of the **Wave**, is a vast swell of the most extraordinary complexity, rippling through the protean substrate at a terrific 173,000 kilometres per second.

It is at moments like these that it is very tempting, if one has been trained in the old (dull) ways, to read paragraphs like the above as speculation. This is the defence mechanism of the old paradigm: a constriction of deep thoughts, so as to reduce all grand ideas to boring facts about perceived matter. I beg you, don't succumb to rejection of grandeur because it is beyond your culture's scope of thinking. What I am explaining is not mysticism; I'm not some snake-charmer seeking to sell something. What I am telling you is scientific, empirical, rigorous and logically consistent. I'm telling you the *truth*, or something a thousand times closer to it than what has hitherto passed muster. Let me show you. This is the nice thing about the Facts: they sell themselves. Think back to the *weak mixing angle*  $\theta_w$ , as described earlier. This angle, as I mentioned, is a fundamental constant of the Standard Model of particle physics. It is one of the big ones, along with the fine-structure constant  $\alpha$  and the speed of light  $c$ . And, in the old paradigm, there is no explanation whatsoever either for its existence or for its quantitative value. It is just a *number*: measurable empirically for use, but meaningless. Thousands of physicists use this number every day to make their theoretical models align with what is happening in their colliders, but they don't have a clue what it is, or why it is what it is. In the old paradigm, it just *is*.

We're beyond that now. Unity theory says that the quantum is the thickness of the cosmos, and that the world is the perceived image of a **Wave** progressing through the Universe. The need for *coprogression*, then, dictates that every stable particle, be it matter or radiation, must share a specific ANGLE OF PROGRESS. Every particle must have the same component of wave speed forwards in  $w$ , so as to keep abreast of the **Wave**; every wave must do as a surfer does, angle forwards to keep surfing. Hence, *light* must do so. Therefore, the weak mixing angle  $\theta_W$ , which is the angle known empirically to be associated with all light waves, can have only one physical interpretation:

THE WEAK MIXING ANGLE IS THE ANGLE OF PROGRESS.

Unity theory, according to a structure already validated via the proton mass, gives us a specific value for this angle. Cut an equilateral triangle, side length  $a$ , in half, and you get the component  $b = \frac{1}{2}a$ . So, the ANGLE OF PROGRESS predicted by proton structure is  $30^\circ$ . Hence, Unity theory makes a firm quantitative prediction for the value, to a first approximation, of the weak mixing angle, an angle utterly lacking in physical interpretation, even *qualitatively*, in the old paradigm. Unity predicts  $\theta_W \approx 30^\circ$ . And what is the measured value of the weak mixing angle?

$$\theta_W = 29.2^\circ.$$

When this most telling result emerged, quite unexpectedly, from the complexities of QFT, it brought a smile to my face. It confirmed what I knew must be true: the world is a world-*image*, and there are unperceived dimensions behind the scenes.<sup>21</sup> It isn't an isolated result, for which coincidence might be an explanation: this value emerges, as accurately as could be expected, from the same axiomatic structure that produces the Schrödinger equation, special relativity, the pion and proton masses, and a raft of other results. To ascribe them all to coincidence, as materialists and cowards are wont to do, just isn't scientific. If the Universe isn't, at least to some approximation, this way, why do these results emerge? A dyed-in-the-wool old paradigmmer would say I'm just retrofitting a story to known numbers, and making no new predictions. But that simply isn't good enough. The current way of thinking doesn't even have qualitative explanations for *any* of these facts. Ask: "Why does the photon even *have* a mixing angle?"

The answer is nothing but silence.

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<sup>21</sup>And, *ipso facto*, that I, as the Universe witnessing material life, am immortal. Woop!



## De Omnibus Dubitandum

Doubt all of Unity theory, doubt the results, doubt the explanations, doubt the algebra, doubt the logic, doubt the rigour. Doubt the lot. But please, please, please, please, *please* do the doubting YOURSELF. Check the mathematics. Check the logic. If you can tear it apart, go nuts, tear it apart. Tell me why I'm wrong, I beg you. Write a better theory; I'd love to read it. Just don't do what so many have done: assume, out of tacit deference to Authority—"the greatest enemy of truth", as Einstein said—that the powerful minds of the West, the makers of the Zeitgeist, know what they are talking about. They don't. They are wrong, wrong, oh so very wrong. This is the end of a Dark Age, and most clever people are Automaton of Material Darkness, caged chickens who don't want to roam.

"But *how* could they have got it so wrong?"

Yes! Ask this question a thousand times. It is crucial; it holds the key to liberation; it demands asking again and again. But just because its answer makes a lot of grand and intelligent people look dull, hypocritical and silly, don't let that stop you. A person thinks; Establishments *agree*. This is why cleverness is so overrated: a group of clever people is all the more adept at finding ways to pat itself on the back. If you value yourself, *disagree*.<sup>22</sup> Don't let those with small minds cheat you of your grandeur; don't let those who have shrunk their worlds to match their stunted hearts tell you the size of *your* world; don't, for God's sake, become yet another casualty of the biggest error in human history, grubbing around in delusional greed for tawdry scraps of status and gain. All that shit is worthless. It's a poor consolation prize (read "consolation drug and millstone") for those who have failed the true test of courage: realising quite how *magnificent* it all is. You are a creature of many dimensions, a child of the divine, a source and spring of immortal knowledge beyond the material world, and only one course of action chimes with the Facts.

Live life as the infinite being you are.

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<sup>22</sup>The trick is to think the opposite of what everyone else does, *just so you know you can*. It won't last, of course; nothing does. The same applies in music, I have learned the hardest way. A bad musician, perhaps very talented, gets frustrated at practice when he can't replicate a prior good performance. The good musician, however, perhaps less talented, knows that true practice is exactly that: finding ways to *depart from every prior performance*, without having the whole thing fall to pieces. That's the Radiance of Drift and Doubt, happiness, the joy of spontaneity. It's the whole point of music.

# 18

## THE INTERACTIONS

When we feel ourselves to be sole heirs of the universe, when 'the sea flows in our veins ... and the stars are our jewels,' when all things are perceived as infinite and holy, what motive can we have for covetousness or self-assertion, for the pursuit of power or the drearier forms of pleasure?

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*Aldous Huxley*

In physics, there are four FUNDAMENTAL INTERACTIONS. As you might have guessed, they aren't all that fundamental! But it's a good scheme, which describes our cosmos well. Interactions, or behaviours, or "notable occurrences", whether in the lab or the street, can be classified, in order of decreasing familiarity, as either ① *gravity*, ② *electromagnetism*, ③ *the strong interaction*, or ④ *the weak interaction*. The first two are forces, in the everyday sense of push/pull, and we, the everyday we, are very good at modelling them. We need to be in order to live: things fall to Earth (gravity), but stop when they hit it (electromagnetism). The third is also a force, but more deeply hidden: it holds proton waves and protons together on the nuclear trampoline. And the fourth isn't a force at all, or at least it isn't in the old paradigm; it's responsible for radioactivity and all things Mysterious.

- ① GRAVITY is the weakest of the forces, by many orders of magnitude, but, because it has limitless range and is always attractive, its cumulative effect is by far the dominant effect at scales larger than the human. It is a lunar, planetary, stellar, galactic and intergalactic force, responsible for holding the large-scale structures of the cosmos together.
- ② ELECTROMAGNETISM is also strong, and has potentially infinite range. But, because it both attracts and repels (this is its characteristic feature), it is negligible on large scales. Lightning storms and the Earth's magnetic field are about as big as it gets. It is an atomic, molecular force, responsible for most of chemistry. Humans can do without gravity, at least for a while; without electromagnetism, however, one's body would simply disintegrate.
- ③ The STRONG force is, unsurprisingly, the strongest, and it has a very short range. It is an intra-nucleonic force, acting at and below the proton level. It is the strong force that is responsible for holding the component waves (broadly quarks) of protons together. It is an expression, in the language of force rather than energy, of the  $-16\%$  proton mass defect.
- ④ The WEAK INTERACTION is the odd one out. It doesn't *move* things around; it *destroys* them. It allows meetings between electrons and the mysterious NEUTRINO. The weak interaction has a very short range, essentially zero, and is much weaker than electromagnetism. It remains stronger (although, since the word "force" barely applies to the weak interaction, this is a rather nebulous idea) than gravity.

## What Happens in an Interaction?

It is not explained, in the old paradigm, what these interactions actually *are*, that is to say, what the *physical* processes are by which they do what they do. Each is very well described in mathematics, with much empirical validation, but in no case, not even (despite what its proponents think) that of gravity in general relativity, does the mathematics allow for a consistent physical interpretation.<sup>1</sup>

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<sup>1</sup>I do not, as yet, understand force fully; there are many questions I couldn't answer fully. But that's okay; I will never understand physics fully, nor will anyone. In this chapter, I only hope that you will understand force to at least the same extent as I, because, if you do so, you will have cracked open the space-box and cured yourself of the materialistic disease. And that is the goal of all physics.

- ① GRAVITY is not understood. Einstein's general theory is rightly seen as a masterpiece, but, despite its empirical success, it remains a "fitting to data", without a *raison d'être*. Ask "Why do objects attract?" and the answer is "Gravity is a manifestation of the curvature of spacetime." Mathematically accurate, yes, but, in the end, unsatisfying. Since six-year olds aren't very good at Riemannian tensor geometry, this, according to Einstein's edict,<sup>2</sup> doesn't qualify as understanding.
- ② ELECTROMAGNETISM is described *mathematically* to spectacular levels of precision.<sup>3</sup> But if you ask what a magnet actually *is*, i.e. what the *physical* process is behind the magical repulsion between like poles, the answer will be an abstract one: "the magnetic field", or "the magnetic potential". If you ask, "And what *is* the magnetic field?", there is no answer; the magnetic field is **B**, a piece of pure mathematics, which derives algebraically from the magnetic potential **A**, another piece of pure mathematics. The old paradigm can give you amazingly accurate directions from **A** to **B**, but can't tell you which planet the two towns are on.
- ③ The STRONG interaction is said to be carried by "gluons". But, once again, this yields no satisfying explanation. If one asks an old paradigmmer "*How* do gluons hold quarks together?" the answer comes back "Consult the QFT." Six-year olds find  $SU(3)$  symmetry and Dirac spinors just as hard as tensor algebra, so this isn't *understanding*, it's *description*. Despite the claims of the Establishment, who are very good at the latter, they aren't the same thing.
- ④ The WEAK interaction, with no push or pull, is even more opaque. In the old paradigm, there's no sense, except in (very complicated) mathematics,<sup>4</sup> as to what the weak interaction is at all. "What does what to what?" has no answer. Electroweak theory, which one must tune in all sorts of abstract ways with e.g. the weak mixing angle, produces laboratory numbers, and that's it. No explanation emerges, none. It's all put down to "inherent probability", as if there is such a thing. Ask "Why do particles decay?" or "What actually *happens*?" and one gets only grumbles or silence.

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<sup>2</sup>"If you can't explain it to a six-year old, you don't understand it yourself."

<sup>3</sup>Feynman called QED the "jewel of physics". Its prediction of the *anomalous magnetic moment* of the electron, to 10 significant figures, is the most accurate prediction in the history of science.

<sup>4</sup>Some (most) say "Mathematics is the language of physics. Mathematical explanation is, therefore, both sufficient and necessary." Trash. I'm a good enough mathematician to disagree with this entirely. Algebra is a language, and if you can't translate it into others (pictures, analogies, English, Swahili) then you haven't understood the important thing: *the content to which the algebra refers*.

## The Physics and the Mathematics

It's a fine old shambles. Physics is supposed to be *physical*, after all. What's the point in precise mathematical description if you can't explain it? What have you achieved? Who cares, frankly, what the sixth decimal place of the probability of neutron decay is? What is that information worth if it doesn't explain what is actually *happening*? That's what this chapter is all about. As such, mathematics doesn't feature. The Riemannian tensor geometry of *general relativity* (GR) and the quantum field theoretic algebra of *quantum electrodynamics* (QED), *quantum chromodynamics* (QCD) and *electroweak theory* (EW) are formidable, and even to *read*, let alone understand, the languages in which they are written requires much training. But no matter! The algebra is just mathematical icing on a deep Cake. I'll explain what force *is*, qualitatively.<sup>5</sup> Such qualitative explanations, of the type Einstein recommended, are what is profoundly lacking in the old paradigm, which is why students who ask naive questions such as "What does that mean?" are told to "Shut up and calculate!" When we've done with this chapter, you'll have a better understanding of what these forces actually *are*, i.e. how nature shapes the Reality we live in, than all the quantum field theorists in the world. All you have to do (and I know this is hard, given the history) is set aside the idea that the lab is reality, and recognise that the world is a *world-image*, that is to say, a dimensionally reduced projection of Reality constructed of variation-data. Since force describes "What happens in the world-image", this change of perspective has major implications; as ever in Unity theory, it simplifies things dramatically. The resulting idea, which is a generalisation of Einstein's in GR, can, in fact, be expressed in a single sentence. I'll spend the rest of the chapter unpacking it.

FORCE IS THE EFFECT OF UNSEEN SUBSTRATE CURVATURE.

To understand this statement is, as with so much in this book, to understand the Western error. If you can maintain a DUALITY of models, one for perceived reality and one for the deeper Reality that underpins it, you can understand anything. Most pertinently, you can understand *yourself*. And that, whatever the goobers say, is the true task of all science.

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<sup>5</sup>This is the boon of having a correct (or a *more* correct) view of Reality. Things make sense. And there is such sense available *at every level*, including, crucially, the non-mathematical. Folk keep telling me that, in order to work on my theory, I should be at a university. But I disagree. Restricting one's attentions to people who already have advanced mathematical training *limits* the development of ideas. Unity theory is not for the few in mathematics; it is for the few in *courage*. And most of them do not have extensive mathematical training. I hope, in some degree, to be able to give it to them.

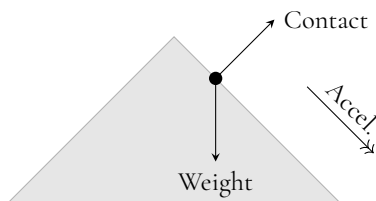
## Mountains in the Substrate

Once you work on the correct level of Reality, the so-called “fundamental” interactions, such as we observe on the stage of space, reveal their true nature. The mysterious “force-ness” falls away, and an answer to “*What is the force?*” emerges. Magnets, for example, become comprehensible physically, without reference to an abstract magnetic field or potential. To gain such an understanding, all we have to do is take Einstein’s big (colossal!) idea, that the curvature of space generates gravitational force, and *broaden* it, applying the same idea not merely to space, but to the underlying SUBSTRATE. Einstein’s idea is a special case in Unity theory.

A classical FORCE is something that causes an object to depart from steady motion. In other words, force causes acceleration, according to  $F = ma$ . And what makes the force? How come objects accelerate in space, apparently pushed by magic forces? Well, magic, whether in the disappearance of a rabbit or in the fascinating battles between magnetic poles, always points to something *unseen*. There’s more to the magician’s art than what’s on stage, and there’s more to Reality than space.<sup>6</sup> If an object, like the Moon around the Earth or an electron around a proton, is experiencing a force, then, according to the Unity model, all that is happening is that, behind the scenes, *the substrate isn’t flat*.

## The Skier

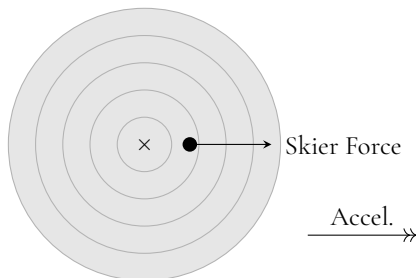
Picture a skier, skiing down a friction-free snowy mountainside. Gravity pulls downwards, and the contact force between slope and skis then pushes the skier up-and-sideways. The *combination* of gravitational attraction (weight) and electrostatic repulsion (contact) results in a net force down the slope. This causes the skier to descend, as represented by the acceleration arrow.



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<sup>6</sup>That’s what mystery is, and why people like both magnets and magicians. These things give us a thrill, because they remind us of the most important fact of conscious life: *the world is an image*.

Now, imagine yourself as an orbiting satellite, watching said skier from a bird's-eye view. From high above, you can't see the height of the mountain; it looks flat to you, like a map. Nevertheless, despite the fact that the driving force of skiing, namely *gravity*, acts in a direction (now into the page) that you can't perceive, you can still see the skier accelerating *along* the "ground".



What do you, as the satellite, make of this? Well, if you *really* don't have access to height information, then, in Satellite Perception, you can only read the motion as resulting from a sideways *skier force*. All skiers on this "flat" (as far as you can tell) snowy plane are pushed sideways, away from the point marked  $\times$ , by something unseen. To a bystander, that force is due to a combination of gravity and electromagnetism; but, in your satellite's two-dimensional projection, such an analysis is not available. Now, think of the whole thing in *ENERGY* terms. From the point of view of a bystander versed in Newtonian mechanics, a skier descends the mountain (and so is pushed sideways) because it is *energetically favourable*, in gravitational terms, to do so. But, to the satellite overhead, the impression that comes across is, instead, that there is a *skier potential* that makes it favourable to be away from the point  $\times$ . Note that *energetic favourability*, the idea, applies in both the two-dimensional satellite and three-dimensional bystander views; it requires an explanation, which I'm getting to, but we can see the effect of *PROJECTION*, i.e. flattening by dimensional reduction, regardless. In 3D, we see *gravity* and a *contact force* between skier and snow. These have (some) physical interpretation. In 2D, however, the "skier force" is all abstract. It's the horizontal component of the contact force between slope and skis, but there is no way of visualising that on a plane, other than in pure mathematics. The contours of the mountain, which are, from a broader perspective, visualisable and real, become, in plan view, the contours of an abstract potential. The key point is: *the more dimensions are projected out by the filters of perception, the more abstract the forces get.*

All is not lost, however! Once we know about the filtering process, models can be applied, adding those dimensions back in. Every such addition undoes a filtering process, making the forces more comprehensible and more physical. So it is in the new paradigm. The four “fundamental” interactions can be understood in terms of *mountains in the substrate*. At the substrate level, things are fully Real. But, by definition of a force, the substrate mountains involved rise in *imperceptible* dimensions. Hence, what can be described, at the substrate level, as a physical process, has to be described, in the world-image, as an abstract field. Once again, you can see the inversion of values brought about by the Western error: it is, in fact, not the perceptible laboratory fields, erroneously “reified” for centuries now because they *appear* to be concrete, but rather the imperceptible substrate that is the physically Real entity. The shallow materialist avidly maintains the opposite stance, but to move from the imperceptible to the perceptible is to take a step *away* from Reality, not towards it.

The Facts are unequivocally on our side. It became obvious (albeit not in its implications) to the physicists of the 20th century that, for the purposes of doing practical physics, if you use classical *fields*, which are perceptible, you find yourself worse off, in the most pragmatic terms, than if you use POTENTIALS, which are imperceptible. In the view of 20th and 21st century physics, these potentials were (and are as yet) taken, by all but the best, to be “nothings but”, that is to say, elements of abstract mathematics without any need for physical interpretation. But it’s the underlying potentials that are real; they are *descriptions of the substrate*. The classical fields are satellite projections, “nothing but” pictures in a picture show. Feynman, thinking aloud in a notebook on the imperceptible magnetic potential **A** and the perceptible magnetic field **B**, wrote, brilliantly:<sup>7</sup>

“**A** is as real as **B** – realer, whatever that means.”

**A** describes the mountain, **B** merely a map. Open your mind; see the mountain. When magnets repel, when they meet without meeting, when it looks like magic, it **is** frickin’ magic! Force is an expression of the deep Mystery of perception. Magnets, as we see them, aren’t objects at all; ~~around~~ *as part of* each there is ~~magic force~~ *a global distortion of the  $(x, W)$  cylinder*. If a matter wave is an ocean swell, rolling in towards shore, then force is the Sand which rises beneath: a global configuration, Real in the substrate, unseen until it works its “magic”. So, no need to cry for the late Easter Bunny; magnets have all the Mystery you need.

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<sup>7</sup>This is proper thinking; the words of someone actually *listening* to the facts as they present. It is exactly the kind of thinking required of a *genuine* physicist, as Feynman certainly was.



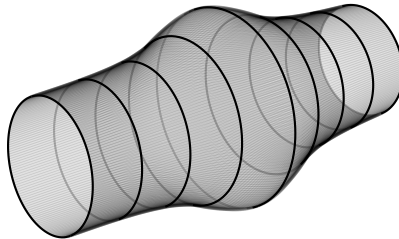
# Gravity

GRAVITY is the most basic force. This is something we have an intuition for, the effects of gravity being plain to see in everything we do. Things fall. And, in Unity theory, there is a duly basic answer to the question “What is gravity?” or, equivalently, “Why do things fall?” Describing the relevant substrate mountains, we can work, once again, on the  $(x, W)$  cylinder. Gravity isn’t, of course, limited to either  $x$  or, in fact, to  $W$ , but those dimensions nevertheless tell the story well.

As we found during the Schrödinger derivation, the energy of an electron wave is dictated by  $\mu = \frac{mc}{h}$ , the rate required for periodicity in  $W$ . The smaller the inner dimension, the shorter the wavelength, the higher the energy of the wave. This is analogous to a violin sounding a high note and a cello sounding a low one, or a bass drum being big and snare drum being small; it’s also why singing high notes is more tiring than singing low ones.

*A **smaller** inner dimension means **more** work for wave-particles.*

Suppose then that, relaxing our earlier assumptions, the  $(x, W)$  cylinder *doesn’t*, in fact, have constant size. Suppose instead that there’s a neighbourhood at which the  $W$  circle is *bigger* than elsewhere. We already know that the substrate can stretch like this, as long as some other dimension contracts as a trade-off. In fact, it is  $x$  that contracts when  $W$  expands. We don’t need to worry about the  $x$  contraction, however, as it’s a secondary gravitational effect; it doesn’t affect the rest energy directly.<sup>8</sup> All we need, to visualise gravity, is to imagine a snake that has swallowed a hog, i.e. an  $(x, W)$  cylinder with a bulge in it.

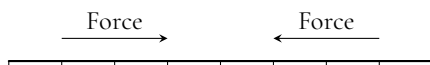


Inner expansion: a gravitational well

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<sup>8</sup>This is equivalent to saying that the contraction of space in gravity doesn’t feature in *Newtonian* gravity, which is by billions of times the main effect. It does, however, feature in *Einsteinian* gravity, which renders Newtonian gravity more precise.

Consider a resting electron in two alternative locations: circling the bulge, or circling somewhere else. On the bulge, the circumference is bigger, hence  $\mu$ , the twist-rate in  $W$ , i.e. the MASS, is smaller. So, the rest energy of the electron is smaller. Historically, this hasn't been *described* as mass reduction; physicists take the mass as fixed and call changes from baseline gains or losses in *gravitational potential* (there's the abstraction with dimension loss), but what's going on under the bonnet is a reduction in frequency. An electron has slightly lower mass at a  $W$  "hog-bulge" than elsewhere. And how does this manifest in perception? Well, the  $W$  dimension is imperceptible to matter-based beings such as ourselves, so there is no way of seeing Hog-Bulge Mountain. Despite its bulge, the cylinder still looks, to material beings, exactly like a number line. Space remains space. Only the *effect* of the bulge is seen. That is *acceleration*, which, in Newtonian terms, we read as evidence of a *force*. But the force is a "skier force". In fact, nothing is "applying" a force. Fundamentally, there is no push. The electron's waves simply follow the local curvature, heading for the region of relaxation.<sup>9</sup>



And, if the inner dimensions are enlarged as a whole, then *all* massive particles seek the bulge in the same fashion, because each has its mass-energy identically scaled. Therefore, as discovered by Galileo, modelled by Newton and remodelled by Einstein, everything falls at the same rate in a gravitational field. It doesn't matter whether you are a proton or electron, pion or positron, if the set of inner dimensions, *as a whole*, are enlarged, then you'll feel a relaxation in proportion to your mass.<sup>10</sup> Gravitational acceleration,  $9.8 \text{ ms}^{-2}$  on Earth, ends up constant.

So, what causes gravity? A *physical* thing. Standing up on Earth, the inner dimensions are bigger at your feet than they are at your head. In other words, the imperceptible circles which *create* the images of your head and your feet have different circumferences. By a minute amount, the mass of a foot-electron is less than the mass of a head-electron. But electron waves move at the speed of light, so

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<sup>9</sup>In the technical terms of general relativity, this is the following of *geodesics*, which are the shortest paths on a curved surface. On the curved surface of the Earth, the equator, the Greenwich meridian and all other great circles are geodesics. They are the shortest paths from one place to another. When a transatlantic flight from London to New York heads via the Arctic, the pilot is following a geodesic.

<sup>10</sup>Particularly, gravity does not distinguish between MATTER and ANTIMATTER, which rotating in the opposite direction. An inner enlargement has no sense of direction, merely one of magnitude, so, electrons and positrons are attracted just the same. This is a falsifiable prediction of Unity theory.

it still hurts if you fall over. Things fall because there is an inner hog-bulge. Not, therefore, merely because “space is curved”. That general relativistic fact, which is mathematically true, doesn’t give the full story. Space *is* curved, yes, because expansion of the inner dimensions must be matched by contraction of the outer dimensions, but that just adds some relativistic nuance to gravity. It doesn’t *cause* gravity. What causes gravity is, very simply, an *inner enlargement*. How elementary!

## And What Makes a Mountain?

The other side of the coin is: why do such enlargements occur at all? Why are the inner dimensions broader in the vicinity of a planet or star? An answer comes straight off the bat. The mountains appear because the substrate is **NONLINEAR**,<sup>11</sup> i.e. because every disturbance of the substrate involves *feedback*. Now, we used a **LINEAR** approximation (no feedback) throughout our analysis of QM,<sup>12</sup> and this approximation is accurate under many circumstances. But nothing is as simple as the modelling of it. As Einstein discovered, contra Newton, the Universe is no Absolute bystander. Anything that occurs in the substrate will produce changes *for its own energetic benefit*. Therefore, since it is favourable for an electron to *find* a part of space with enlarged inner dimensions, then, to some degree, the electron itself will *enact* such an enlargement. The effect is utterly minuscule, of the order of  $10^{-40}$ , because, to enlarge the inner dimensions, the electron has to contract space, thus dragging the Universe itself inwards. One hell of a job! Nevertheless, *natura non facit saltus*, and, since she is jump-free, Nature is capable of vanishingly small gradations of change. So, because an enlargement of the inner dimensions is favourable, *it will happen*, albeit on the smallest of scales.<sup>13</sup> And gravity’s weakness relative to the other forces, electron to electron, doesn’t stop it having a colossal *cumulative* effect. When an entire planet’s worth of particles is sitting on the energy trampoline, the trampoline bends a lot. Every particle wants to be where the party is, and, of course, every particle *brings* a bit of the party. So, matter groups together. That’s gravity, folks!

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<sup>11</sup>A *linear* process is one in which small input changes yield small output changes, e.g. throw a ball a little harder, and it goes a little further. A *nonlinear* process is one in which small input changes yield arbitrarily big output changes, e.g. drive a car a little faster, and you might come off the road.

<sup>12</sup>The *wave equation* is linear, as is the Schrödinger equation. There, (linear) differentiation permits *pure* superposition, where two waves pass through each other with literally zero interaction. In Reality, this is never quite true. Fixed coordinate backgrounds, e.g.  $(x, W)$ , are themselves approximate.

<sup>13</sup>Think of a mountain the breadth of the Solar System, whose height is subatomic.

# Electromagnetism

From here, things get more precise. Gravity, which is enlargement of the inner dimensions *as a whole*, is the broadest brush; the other interactions are then the finer detail. They, unlike gravity, are tied to *specific* imperceptible dimensions. ELECTROMAGNETISM, which is responsible for the key fact that material things don't pass through each other, is a description of global alterations to the biggest and most easily accessible inner dimension,  $W$ , which hosts the mass of electrons. The inner space dimensions ( $X, Y, Z$ ) aren't involved at all. As hinted by the name, electro-magnetism has two key features.

- ① ELECTRIC CHARGE expresses, in different units, the wave *rate of change* in  $W$ . We have already named this. Fundamentally, an electron doesn't "have" two properties charge  $q_e$  and mass  $m_e$ ; an electron's charge is its mass.<sup>14</sup> The two concepts describe the same Reality. For an electron,<sup>15</sup> then, the charge  $q_e$ , mass  $m_e$ ,  $W$ -momentum  $m_e c$  and rest energy  $m_e c^2$  are descriptions of the exact same wave activity. The tangible effect ELECTRICITY, then, which is a flow of charged particles, is the spatial movement ( $x$ -momentum) of waves which have such  $W$ -momentum.
- ② MAGNETISM, on the other hand, is a description of *torsion* or dimensional rotation. A bar magnet is an  $(x, W)$  cylinder, a portion of which has been twisted. To visualise this, take a hold of your left forearm sleeve with your right hand, and rotate it upwards and away from you. That's a bar magnet right there. Magnets, as localised twists, always come with North and South poles because "What Goes Up Must Come Down": you can't enact torsion of a cylinder without getting a pair of sweet-wrapper twists.<sup>16</sup>

The *electric* part of electromagnetism is momentum in  $W$ , which interacts with its *magnetic* part, torsion of  $W$ . This interaction led Maxwell to produce his unified theory of ELECTROMAGNETISM. Where the  $(x, W)$  cylinder is twisted, the

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<sup>14</sup>In the early 20th century, following Thompson's discovery of the electron, many suspected that electron charge and electron mass are the same thing. This fell out of fashion, but it's spot on.

<sup>15</sup>It's different for a proton, whose mass lives in  $(X, Y, Z)$  and whose charge lives in  $W$ . To a proton,  $W$  is a large outer dimension. Hence, to a proton, electric charge is a *classical-style* momentum: a proton has electric charge because it travels, as a classical particle, in the positive  $W$  direction.

<sup>16</sup>Incidentally, this solves the mystery of the nonexistence of "magnetic monopoles", for which many have searched fruitlessly. The *topology*, viz. fundamental structure, of Unity theory dictates that every North pole must have a South, and vice versa. This is another direct prediction.

effective circumference experienced by charge ( $W$ -momentum) differs. Torsion affects energetic favourability, which draws charges towards or away from the twist-mountain. And, due to the nonlinearity of the substrate, electric charges must also *generate* such torsion. Hence, not only do electromagnetic fields affect charges, but charges produce electromagnetic fields.

The precise details of these processes are beyond the scope of this book, and you won't, I imagine, end up with a full understanding of the substrate physics of electromagnetism from this short section. Indeed, I myself wouldn't claim such an understanding; I very much hope that someone will understand the substrate mechanics of electromagnetism more deeply than I have, and will explain it to me. But it's important to note, once again, that this doesn't represent weakness in Unity theory, merely humanity in its author. The old ways, while mathematically precise almost beyond belief, don't *explain* the physics of electromagnetism at all. Charge is simply a *Number That Particles Have*. In this short chapter, the point I'm making, as I am duty bound to make everywhere, is that this is no longer good enough.<sup>17</sup> I'm encouraging you, if you are to be a next-generation thinker, that the days of physics hiding in forests of abstract mathematics are gone. You can do better—so speaks a mathematician!—and I very much hope you will.

## Attraction and Repulsion

Let me sketch out this new way of thinking, re *attraction* and *repulsion*. This is the essential distinction between gravity and electromagnetism: the former is cumulatively attractive, while the latter is attractive and repulsive. This basic fact demands explanation, and we can now provide one.<sup>18</sup> ELECTROMAGNETISM comes equipped with a direction, while *gravity* does not, for the simple reason that ROTATION around a  $W$  circle, whether in the form of electric  $W$ -momentum or magnetic  $W$ -torsion, comes equipped with a direction, while the *size* of a  $W$  circle does not. Magnetic twisting of the  $(x, W)$  cylinder affects electrons and

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<sup>17</sup>It will be very difficult to break down the walls of this particular fortress of dogma. Mathematics is a such a tempting redoubt. A narrow rationalist hates to be forced into considering the Reality to which his mathematics refers, because the coherence of his worldview requires that that Reality has no Reality other than as mathematics. It's a defence mechanism, and a very powerful one.

<sup>18</sup>Physicists of the old guard, who overvalue mathematical explanation, will say that this distinction is "explained" by the fact that electric charge has a  $\pm$  sign, while gravitational charge does not. But, as with so much "explanation" in old-paradigm physics, this is simply a restatement of the question in a different language. The explanatory structure of the entire field PHYSICS needs fixing. That's why, I think, the task has fallen to me, as a non-physicist.

positrons differently, because such a magnetic twisting *parallel to*  $W$  has what electrons and positrons have: a  $\pm W$  direction. Gravitational expansion, on the other hand, affects electrons and positrons identically, because expansion **of**  $W$  is effectively *perpendicular to*  $W$ . In other words, while electromagnetism describes *longitudinal* disturbances in  $W$ ; gravity describes *transverse* disturbances of  $W$ . Hence, the (inner, outer) structure of Unity theory dictates that there should be both attractive/repulsive and purely attractive forces. Furthermore, since signed torsion and unsigned expansion are the two major transformations that a circular dimension such as  $W$  can undergo, and since the  $W$  dimension is (by 137 times) the largest inner dimension, this explains why the two major force players, on human scales, are ELECTROMAGNETISM, which has a  $\pm$  structure, and GRAVITY, which does not. Simple as that.<sup>19</sup>

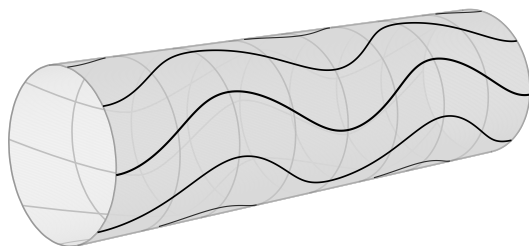
## Light

The analysis above, elementary as it is, offers us an understanding of that most familiar and poetic of all phenomena: LIGHT. What is it? Well, in the old paradigm, light is, following Maxwell, classified as an *electromagnetic wave*, that is to say, an undulation of the electric **E** and magnetic **B** fields. And, on one level, that is correct. But there are other levels accessible. In fact, the laboratory fields are perceived images; the underlying *potentials*, despite imperceptibility, are, as Feynman so rightly said, *Realer* than the fields. LIGHT is an *electromagnetic wave*, yes, when that adjective refers to fields; in the mathematics of the underlying potentials, however, light is a wave of **only** the magnetic potential **A**, not the electric potential. A light wave isn't electrically charged. So, there is a misnomer, well worth correcting. For obvious reasons, Maxwell and those following him thought of light as an electromagnetic wave—at that classical stage, the lab, with its fields, was taken to be the full extent of reality—but, at a deeper level, light

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<sup>19</sup>When I consider the beauty and depth of the Universe, I feel a kind of gentle grief for those who have felt compelled, by history, culture or a lack of courage, to subscribe to and work in the *World As Physical Object* view. In physics and in all walks of life, it makes for such misery; how arbitrary and meaningless it all is. The world is abstract numbers, shallow  $\pm$  signs in algebra, with no thought ever given as to *why*. The symbols are signs and nothing more. In such a view, there is no perspective or poetry, the whole show's just a cobbled melange, a collection of random shit lumped together to build the High Castle of Applied Mathematics, a thunderous edifice bristling with hostility. It seems extraordinary to me that anyone would be willing to put him or herself through such intellectual self-abuse for the sake of propping up a paradigm that brings, in the end, only pain, depression and darkness. Such, however, is the fear of God.

is simply a *magnetic* wave, with that adjective taken to describe potentials, i.e. the state of Reality, rather than perceived reality. All of which means that light is simply a torsion wave on the  $(x, W)$  cylinder: the propagation through the substrate of a “twisting disturbance”. One can imagine each individual hydrogen fusion process in the Sun as grabbing a hold of the end of the  $(x, W)$  cylinder, and giving it, in oscillatory fashion, a series of hard twists. Then, picturing the  $(x, W)$  cylinder as the string of a tin-can telephone, those vibrations travel to us. On arrival, our epidermis cells are duly shaken, and, with the transfer of energy, we feel the warmth of a June day.



LIGHT: a torsion wave on the  $(x, W)$  cylinder.

Note that the sinusoids above don't represent foreground waves travelling against a background of the  $(x, W)$  cylinder, in the manner in which we pictured our matter waves  $\psi_{\text{seen}}$ . Rather, the lines above show disturbance *of the cylinder itself*.<sup>20</sup> Depicted are the very gridlines of the squared  $(x, W)$  paper which we rolled up in the first place. It is this nonlinearity, the fact that all disturbances of the substrate disturb the very coordinate systems with which we model them, that generates *interaction*. This is how light, and magnets, come to exert FORCE. The sinusoids shown in the diagram are, in mathematical terms, undulations of the magnetic potential  $\mathbf{A}$ ; in physical terms, they are tiny hillocks in the substrate; they actively *move* electrons they meet. And this is why opposites attract: North and South poles untwist each other, North and North poles twist and twist.

<sup>20</sup>It is a fact of major significance for advanced physics beyond the scope of this book that such twisting disturbances—I call them SHEAR WAVES—do not involve any expansion or contraction of the substrate. This is what allows light (and of the nuclear electron) to be described with spinless, sinusoidal,  $\mathbb{R}$ -valued mathematics rather than spinful, helical,  $\mathbb{C}$ -valued mathematics. With closed, circular dimensions, it is possible to disturb the substrate in two ways: with expansion/contraction or without. This difference produces the key distinction, central to quantum field theoretic mathematics, between *fermions*, modelled with the complex mathematics of  $\hat{E} = i\hbar \frac{\partial}{\partial t}$ , and *bosons*, modelled with the real mathematics of  $E = \hbar\omega$ . This distinction has no physical explanation in the old paradigm.

# The Strong Interaction

The counterpoint to electromagnetism, dealing with the rest of the inner dimensions, is the STRONG force, whose potentials describe the curvature of *inner space* ( $X, Y, Z$ ). The electron, winding its way around  $W$ , doesn't feel this, and doesn't contribute to it. In the Unity model, there are four inner dimensions ( $W, X, Y, Z$ ), split into  $1 + 3$ , and each has its own force:

$W$	$X, Y, Z$
ELECTROMAGNETISM	THE STRONG FORCE

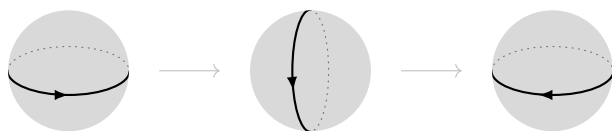
The two have one major aspect in common: *directedness*. The equivalent concept to electric charge a.k.a. momentum in the  $W$  dimension is COLOUR CHARGE, as it is called in quantum chromodynamics. In the Unity model, colour charge is momentum in ( $X, Y, Z$ ): specific colour charges are waves or wave components circling specific equators of inner space. Translating from QCD to Unity theory, RED is  $X$ , GREEN is  $Y$ , BLUE is  $Z$ . Opposite charges, just as in EM, correspond to waves circling the equators of inner space in opposite directions. And, just as in EM, two opposing colour charges, such as the red and anti-red “quarks” that make up a pion, superpose readily, while two like colour charges, say a green and another green, don't. This produces the same energetic favourability as we see in EM, leading to the same attraction and repulsion behaviour. That, however, is where the similarity ends...

## Confinement

There is one key difference between  $W$  and ( $X, Y, Z$ ), which we've already discussed with reference to the standing waves of the pion.  $X$ -charges (quarks), unlike  $W$ -charges (electrons), can *turn into their antiparticles*. This lends attraction and repulsion between  $X$ -charges a singular effect, setting the strong interaction apart from electromagnetism. EM is a *classical* force, that is to say, a force in *space*: when two like  $W$ -charges, e.g. electrons, are in proximity, they don't like it. Left to their own desires, they leave the building space-wise. This, then, is observed as causing classical acceleration  $a$ , and has been observed so for centuries. It is readily observable because the  $W$  dimension is *solitary*; given repulsion between two like charges, motion in space is the only way out. But the strong interaction has other options. It still “accelerates” things, yes, but the acceleration isn't *spatial*.



When two like  $X$ -waves, i.e. two red quarks, are in close proximity, the quickest way off the energy hill is for the waves to accelerate by *changing direction in inner space*. That way, they can instantly fix the problem, without resorting to spatial acceleration, which takes longer to achieve the same goal. This is why the strong interaction has, as far as space-based beings are concerned, no long-range effects. The phenomenon is known as CONFINEMENT. The word refers to the fact, lacking any explanation in the old paradigm, that ~~quarks~~  $X$ -waves cannot be isolated. In Unity theory, the confinement of ~~quarks~~  $X$ -waves is just the “bracelet on a tennis ball” fact: circles on spheres can be reversed locally.<sup>21</sup>



CONFINEMENT puts the strong interaction, unlike EM, beneath *two* layers of abstraction. In EM, electrons roll down their energy hills, and we observe the resulting motion in the lab. As satellites seeing projected images, we are removed from the substrate *to a first degree*: we can't see the **A** mountain, but we do see the **B** skier. In the strong interaction, however, we don't even have the satellite view. The show happens on the Dark Side of the Moon, removed *to a second degree*. A quark rolls off its energy hill, and one type of imperceptible wave, a red quark  $r$  moving positively in  $X$ , becomes another type of imperceptible wave, an anti-red quark  $\bar{r}$  moving negatively in  $X$ . In the lab, nothing goes anywhere. Hence the two layers of abstraction, and the hitherto inexplicable short range.

## The Stability of the Proton

The strong interaction does, in fact, have a classical force aspect, albeit a very short-range one. This is the force that stops the waves of a proton drifting apart. It is readily understood in terms of **ENERGETIC FAVOURABILITY**. For the same broad reasons as groups of objects gravitate, proton waves hold together in space. If you're a matter particle, it's better to be where the bulge is. The reason that the strong force is so much stronger than gravity, at its short ranges, is that it involves no expansion/contraction of *space*. There is no “hauling in of the Universe”. The

<sup>21</sup>The “bracelet around the tennis ball” rotation involves, in the language of QCD,  $r \rightarrow g \rightarrow \bar{r}$ . An  $X$  equator rotates to a  $Y$  meridian and back to a reversed  $X$  equator, all at a point in space.

exchange occurs, almost certainly,<sup>22</sup> between  $(X, Y, Z)$  and  $W$ . While this makes little difference to electrons in the  $W$  dimension, which is 137 times bigger, it makes a *big* difference to the proton waves in  $(X, Y, Z)$ . Because every individual quark proton wave wants to be where the party is, the three  $(X, Y, Z)$  dimensions stay full, and the proton is stable. This aspect of the strong force, which involves expansion but no twisting, is an “intra-inner dimensional gravity”. Each wave expands inner space, which benefits every (proton) wave present. Hence, the waves are better off sitting close together than far apart. Indeed, they are best off sitting directly *on top* of each other. That scenario is impossible in the old paradigm, in which the components are lump-like quarks each with a location in space; it is, however, entirely possible (and exactly what happens) in the Unity model: the waves are in the same place space-wise, propagating at right angles to one another in  $(X, Y, Z)$ . This is what keeps a proton together.

## Baryons and Mesons

This analysis follows through into the mathematics of QFT, as it should. But, more importantly, it also provides resolutions of the big *qualitative* questions of protonic physics. We have already dealt with confinement: simply, equators on 3-spheres are reversible. Another aspect of the same question, then, is the fact that, among HADRONS, viz. proton-like particles that interact strongly, there are two families: BARYONS, from *baryos*, heavy, and MESONS, from *mesos*, middle. The reason for this categorisation of hadrons into heavyweights and middleweights is yet another blank in the old paradigm. In the Standard Model, every strongly interacting particle consists of either precisely three quarks, making it a BARYON, or a quark/antiquark pair, making it a MESON. No reason is given, however, as to why these particular configurations are the only ones permitted any stability by Nature, except the single word “confinement”. But that only passes the buck.

It comes back, of course, to the fact that perceived reality is not Reality. To squeeze the physically real, albeit imperceptible, INNER SPACE into *space*, its three dimensions  $(X, Y, Z)$ , which are as physically Real as anything is, must, as per the Materialist Diktat, be trampled, flattened, spatchcocked like chickens.

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<sup>22</sup>This remains conjectural. However, any other option, such as expansion in  $(X, Y, Z)$  trading off with  $w$ , makes significantly less sense to me. While an effect on the electronic  $W$  dimension might seem a little strange, it's worth noting that no electron can be observed directly unless it is in the presence of a proton. Hence, the baseline mass for the electron is calculated “in the vicinity of a proton”, i.e. it already takes this effect into account.

As Plato described, in his Allegory of the Cave, this is a category error of the most basic kind. Such a misunderstanding of the domain of Reality renders the three  $(X, Y, Z)$  *dimensions* as three *particles*: red, green, blue quarks. It's a hell of a blunder. Squeezing three dimensions into none is akin to boiling the entire cosmos down to a single dot. What vandalism of concept! And, needless to say, once inner space has been put through Newton's mangle, all hope of making sense of it is gone. Ask an early 21st century physicist to explain categorisation into baryons and mesons and the answer comes back: "Colour neutrality. Isolated colour charges cannot exist." These are just abstract words; they masquerade as an answer, but are, in fact, nothing but a repeating of the question. Ask the question in Unity theory, however, and it's a different matter. "Why must every stable or metastable set of  $(X, Y, Z)$ -waves either fill all three dimensions symmetrically, or else fill one with a standing wave?" Unity theory gives a genuine *answer*. It is due to the topology, i.e. the structure of inner space. Since equators in  $(X, Y, Z)$  can rotate, the only stable or metastable configurations are those energetically *unaffected* by such rotations. These fall into two families:

- ① MESONS, such as the pion, consist of two opposing charges superposed. In quark language, these are  $r\bar{r}$ ,  $g\bar{g}$ , or  $b\bar{b}$ . There is symmetry between them, so overall rotation (bracelet around a tennis ball) of the pair makes no energetic difference. And rotation of an *individual* wave is energetically unfavourable, because any such change reduces the amount of superposed opposite charge. Hence, mesons are, at least for a while, stable.
- ② BARYONS, on the other hand, such as the proton, have three symmetrically distributed charges. A proton is  $rgb$ , with no antiquarks involved. So, as with the mesons, overall rotation makes no difference, because the proton *fills* the inner space dimensions. And individual rotations are not possible, as exactly the same rotations would be favoured by all three component waves.<sup>23</sup> The fact that, unlike with mesons, no equator is picked out means that no individual wave can benefit from changing direction.

Hence, strongly interacting hadrons can only be stable if they either fill *all three* of the  $(X, Y, Z)$  inner space dimensions, or, otherwise, if they consist of a *standing wave* in one of them. These are precisely BARYONS and MESONS, as seen in the lab.

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<sup>23</sup>To be more precise, as discussed with reference to the proton mass, the three colour charges are the  $(X, Y, Z)$  components of four waves moving in  $(w, X, Y, Z)$ .

# The Weak Interaction

It has long been clear that the WEAK INTERACTION is rather different from the other interactions. In the old paradigm (and I know I've said this a thousand times, but please, for the sake of your sanity, retain your capacity for thinking it unacceptable) there is no explanation as to WHY. Yes, the theory is precise in the unnatural domain of *Smashing Shit Together Really Hard*. Yes, when a collider experiment measures weak boson mass to be 0.1% off its previous value (this is going on as I write) salaried physicists twitter excitedly about, I quote, "ruffled feathers" and the possibility of "the dam bursting". Yes, the Standard Model has *maaarvelous* mathematics. But, to a real scientist (Feynman or Einstein) it is the height of absurdity to make a song and dance about one part in a thousand of a theory of the weak interaction if you can't answer the question "What is the weak interaction?" It's like finding an alien living in your garden shed and thinking

"Oh wow! Now, the first thing I must do is measure its *height* very carefully. Jenkins next door has one too, and he has measured his as  $241 \pm 2$  cm. He lost an arm in the process, because the thing has a ray gun and a temper, but a fundamental scientist must be brave. I can measure mine in *millimetres*!"

Who cares if the mass is 0.1% off? Next to the elephant in the room, viz. *nobody having a damn clue*, what does it matter if the minutiae need tweaking? Do the work; pipe down and tweak them. Why should anyone give a shit? The alien's height isn't the point; it's light-years from the point. It's irrelevant, and (again) *worse* than irrelevant. It distracts the interested, snarls up the debate, and—this is what, behind all the posturing, the dumbest physicists *really* want—reduces the whole exercise to pencil-pushing. Well, no more. If a bunch of grunts claim to feel excited at the possibility of the "dam bursting", then that's great. I'm all for excitement and the bursting of dams. They just better realise that their quaint little House of Newtonian Cards stands at the foot of the concrete wall; the walls of space are about to crack, and they'd better be ready to get fucking *soaked*.<sup>24</sup>

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<sup>24</sup>If you're interested in the ruffling of feathers, why not try these on for size? Humans are eight-dimensional waveforms; there was no Big Bang singularity; quantum entanglement is a myth; the Universe is the conscious witness of life; there will be infinitely many cosmos; the proton used to be lighter; there are epochs with no such thing as matter; the Second Law of Thermodynamics has limited validity; the cosmos formed as a musical note does; in a black hole, matter itself breaks down;

So, what is the WEAK INTERACTION? It has two key aspects. These are known technically as the *neutral current* and the *charged current* interactions. I refer to them here as the Z INTERACTION and WEAK DECAY. The former is the (only very occasionally observable) process, mediated by a Z particle, by which neutrinos scatter from electrons; the latter is the process by which neutrinos and electrons are emitted, together, in radioactive decay. To speak of these interactions in the first place, we need to know what on Earth a NEUTRINO is.<sup>25</sup>

## The Mysterious Neutrino

Again, this is a situation (they really start to pile up, don't they?) in which the old paradigm sneaks into the garden shed and pulls out its trusty tape measure. There's been much careful *measurement* of neutrinos. But the long-suffering alien, Shakespeare in one hand, blaster in the other, keeps on saying:

“Seriously, man, what the fuck are you doing? Get that tape measure outta my face. I'm here to help. I'm 2.4139915612 metres tall, if you really want to know, but I do have a ray gun, and you're being a penis. Look, I know I look a bit funny, being eight-dimensional and all, but I've actually got the Elixir of Life. Yeah, really. Immortality, the works. It's on my ship. I'll give you a bottle. I just need to tell you a story first. Have you seen *A Monster Calls*?”

NEUTRINOS travel through space at the speed of light  $c$ , which means, in mainstream theory, they should be massless. But they aren't. This has posed a major conundrum for physicists, which they have not been able to solve because, for the uh... *zillionth* time, their model of reality doesn't include the realm in which the solution lies. In Unity theory, it's clear, with some detective work, what a NEUTRINO is. Let's run a little thought experiment, with the substrate imagined as water in a pond. Consider the configuration that makes up an ELECTRON, looping around the  $W$  dimension. Take a snapshot of it: you have a static picture of a disturbance of the pond. Run the tape, and that disturbance propagates as an electron. But now do something different. Envisage (in a stylised version of radioactive decay) the pictured electronic disturbance popping into existence *all*

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the Universe periodically turns inside out; dark matter clouds are virtual particles; superfluidity is rippling of the substrate; the top quark is a second-order proton; distant stars may, in fact, be only metres away from us. Damn right, interstellar space travel! Haha, wooop!

<sup>25</sup>More accurately, neutrinos aren't on Earth, they're *orthogonal* to it!

at once, at a certain location in space. This is the equivalent of dropping a rock into the pond. If the rock was already in the pond, steady, it would create no ripples. If, as a configuration, it *comes into existence*, however, being formed with a Bang like a drum beat is, then it sends ripples out. As all radiation does, these must travel at the speed of light. The ripples are, of course... NEUTRINOS. Take an electron-like disturbance, which is effectively a twisted Möbius belt of expansion/contraction around the  $W$  dimension. Then,

- ① propagate it in  $W$ , and you have an ELECTRON  $e$ ,
- ② propagate it in  $x$ , and you have an ELECTRON NEUTRINO  $\nu_e$ .

In the quantum field theoretic mathematics, these two particles,  $e$  and  $\nu_e$ , appear as perpendicular components of a vector because...

Take a moment to remind yourself that, despite what the prevailing lunacy says, every aspect of empirically verified mathematics in physics must correspond directly to a *physical* aspect of Reality.

...the wave-particles  $e$  and  $\nu_e$  are *literally* perpendicular. The concept ELECTRON describes expansion/contraction waves on the  $(x, W)$  cylinder, propagating in the circular  $W$  dimension; the concept ELECTRON NEUTRINO, then, describes expansion/contraction waves on the  $(x, W)$  cylinder, propagating in the outer  $x$  dimension. It's quite straightforward, Really.

## The Great Counterexample

NEUTRINOS have played merry havoc with the old paradigm. The reasons for this are twofold. Firstly, neutrinos sit on the fence of perceptibility, barely interacting, only measurable by probability, impossible to control in a meaningful way. You can't put a neutrino in a box. Secondly, neutrinos are (and this is direct disagreement between Unity and old physics) a *counterexample to special relativity*. Boring people find both of these facts tricky, and the second even trickier than the first. Special relativity is thought of as sacrosanct, as one of the only "safe havens" remaining to scholars of physics.<sup>26</sup> Let me pop that bubble explicitly: there are no safe havens. That's the great danger of using mathematics, or any tool of thought, without *understanding* it: one has no way of knowing when one

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<sup>26</sup>It is the classic mark of the mediocre mind to hold to some corner of Permatruth, assuming that, simply because an idea or theory is well verified somewhere, it won't end up unverified elsewhere.

has overreached. This is exactly what happened to old Europe, when Rome used Greece as a tool for domination. Attached to one thing and one thing only—the head at the expense of the heart—there’s no safety net, so you have to hold on ever tighter and tighter. But the special theory, taken by too many as Eternal Fact, gets blown out of the water by  $\nu_e$ . With the correct perspective, we can see why.

- ① ELECTRONS obey special relativity, because they are periodic in the inner dimension  $W$ . Any departure from pure circumnavigation at spatial rest, that is to say, any acceleration in  $x$  requires a “tilting of the unicycle”, and, therefore, an increase in energy by the Lorentz factor. Hence, no electron can reach the speed of light, because infinite energy would be required.
- ② ELECTRON NEUTRINOS do not obey special relativity, because they are not periodic in  $W$ , other than at the moment of their generation. A neutrino has mass, yes, because, just like the electron, it has *variation* in  $W$ . The two are created by the same initial disturbance, the same rock dropped into the substrate pond. But the waves that ripple away in  $x$  have no dimension to define a period, hence no fixed wavelength. This is only possible for waves travelling (almost exactly) in  $x$ . Hence, neutrinos are massive, with a continuous spectrum of mass, and move at (up to) the speed of light.

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<sup>26</sup>What second-rate scholars find so hard to process, and why they are so determined to shoot down any real attempt on the truth, is that their primary question, asked of any theory, is “Will this theory permit me to keep doing physics?” In other words, “Is this idea a tool I can *use* in my career?” Hence, it is deeply disturbing to a scholar to discover that a concept such as MASS has a *limited domain of validity*, and that, in the end, the Universe will never fall to description by physics. This is the Western problem with REIFICATION, which has reared its ugly head ever since Aristotle corrupted the legacy of Heraclitus. Whenever science, or Western thought more broadly, reaches an impasse, the reason is always the same: addiction to a particular concept. The favoured mode of thought of Establishment people, full of ambition but lacking in courage, is to manipulate *what already exists*, walking well-worn grooves, free from the risks undertaken by a Plato, a Nietzsche, an Einstein, or by you and me. Such second-rate minds toil under glass ceilings. Those ceilings, unseen and unsuspected, are their concepts. Every theory fails. But scientists are often very clever. So, if there is a way to fix the problem within the model (and all too often even if there isn’t), they will find it. They will spend a great deal of money and burn a shit-ton of crude oil finding it. There will be humble acceptance speeches, and much back-slapping. But, in the end, the endeavour achieves nothing. Hobbled by addiction to the concrete, it all goes round and round in circles. The proud precision of the scientific West, the endless tinkering, much lauded by all, with fractions of fractions of fractions of fractions, is a gump’s errand. We think we are wise, because we work so hard. But, upon finding the front door smashed in by burglars, only a fool points to the triple-locked, blacked-out windows and says proudly: “Well, at least they didn’t get in that way.”

## How To Catch A Neutrino

Why are the little blighters so elusive? The reason neutrinos are so difficult to pin down is that, to achieve any interaction with electrons, the waves have to line up *perfectly*. When a rock is dropped (neutron decay), waves go anywhere they can. You always get ripples in both  $W$  and  $x$ , just as you always get circular ripples on a pond. The production of *one* electron and *one* neutrino in neutron decay is then true by choice of nomenclature: any generated ripples are forced into perpendicularity by the physical distinction between energy that is inner-periodic (MATTER) and energy that isn't inner-periodic (RADIATION).<sup>27</sup>

What about the *reverse* process, then? Getting an electron and an electron neutrino to meet and interact is easier said than done. A neutrino, after all, has *no location*. Getting a neutrino to meet an electron isn't like throwing two snooker balls at each other.<sup>28</sup> Neutrino interaction occurs when ripples *converge*, rolling inwards rather than outwards, conspiring to meet at a  $\bullet$  location, thus to send a single drop skywards. This barely ever happens! If you watch squillions of ponds for squillions of hours, however (as is done in vast neutrino detectors buried in mine shafts), you will eventually see a particular set of waves do the trick. That's how you catch a neutrino. And, because it is only ever *observed* at a single location, we physicists find it incredibly hard not to think of a neutrino as, therefore, a well defined "thing" moving through space. This is the old error of REIFICATION: the assumption that the way one sees things is the way they are. But them's not the rules. If you catch regular glimpses of a particular stranger on Platform 14b, this does not for a moment imply that said stranger lives on Platform 14b.

## Nonlinearity

INTERACTION of wave-particles is, by definition, *nonlinear*—I'll unpack the word—because interaction requires a *feedback process*: not only must wave A affect wave B, but also vice versa. By definition, this sets up a feedback loop. That's

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<sup>27</sup>The neutrino also blurs the boundary between MATTER and RADIATION.

<sup>28</sup>It requires real effort to stop this conception—the neutrino as a discernible "object" to which one could point—entering one's head. That just isn't the way things are. The word NEUTRINO corresponds to a certain *type of wave*. That's it. Such waves, like circular ripples on a pond, have no particular location. In neutron decay, the directions of travel are  $W$  for the electron and *all three of*  $(x, y, z)$  for the neutrino. A neutrino is a spherical ripple of arbitrary radius, quantised only (and perhaps not even then) by the thickness of the present.



precisely what *inter*-action is. NON-INTERACTION, on the other hand, is *linear*. If you model waves using the linear wave equations of QM, as I have in much of this book, they pass through each other without batting an eyelid. The two waves superpose, adding in effect, but *neither is changed in the adding*. By analogy with ocean waves, the key distinction is that, while gentle (hence linear) swells pass through each other unharmed (don't interact), savage (hence nonlinear) storm waves actively smash into other (interact), throwing up spume. In the substrate, NONLINEARITY is a specific, mathematical fact:

- ① If waves only disturb single dimensions of the substrate at any one time, that is to say, if they are LINEAR, then they *cannot* interact.
- ② Reversing the logic, when disturbances expand *more than one*<sup>29</sup> dimension of the substrate at a time, the mathematics becomes NONLINEAR. This is the literal meaning: something LINEAR is like a line, and has one dimension, while something NONLINEAR has more.

Now, we know that, to an excellent approximation, electron and neutrino waves *are*, in fact, linear disturbances in the substrate. And, as a result, unlike electrons with light, they almost never interact. The above fact tells us, however, that the (exceptionally rare) interaction between  $e$  and  $\nu_e$  must involve *more dimensions* than those disturbed by the individual electron and neutrino waves, when they aren't interacting. How to model this? Well, electrons (and thus neutrinos) are modelled with helical waves polarised in two dimensions.<sup>30</sup> As an electron wave passes by a location, a linear exchange takes place:  $x$  expands,  $y$  contracts, then vice versa. Overall, density is maintained, according to the substrate equation. But, at interaction, we need more. We need the two almost linear waves  $e$  and  $\nu_e$ , each of which expands only one substrate dimension at a time, to expand their dimensions *simultaneously*. This produces and requires a PLANAR, as opposed to LINEAR, expansion (and duly a planar as opposed to linear contraction). This is a higher-order exchange, in which *two dimensions of expansion* trade off against *two dimensions of contraction*. This logical necessity—nonlinearity requiring that neutrino interaction involve *four* dimensions of the substrate—is why the weak interaction is so mysterious.

With four dimensions required, we run out of *space*!

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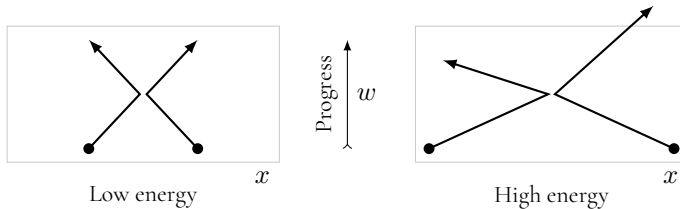
<sup>29</sup>Not counting the automatic *contraction*; it is impossible for *exactly* one dimension to change size.

<sup>30</sup>These two dimensions of polarisation remain *linear* because only one of these two dimensions is expanding at a time. The other is contracting in response.

## The Z Interaction

In the Z interaction, electrons and neutrinos meet, interact, and then go their separate ways unharmed. It's an *elastic collision*, in that the electron and the neutrino return to their original shapes after interaction: nothing gets destroyed. In this case, the extra polarisation dimension involved (the fourth beyond the three of space) turns out, I'm almost certain, to be the  $w$  dimension of progress. This is the front-to-back dimension of the **Wave**, the dimension which houses the thickness  $\delta w$  of the cosmos, appearing in the lab as  $\hbar$ . At low energies, such as we see on the street, this dimension is completely imperceptible.

Let's visualise LOW-ENERGY, classical matter, e.g. cars, as a set of pool balls (matter) moving around on a pool table (space). In this image, where is the fourth  $w$  dimension? It is the extra dimension that, most of the time, doesn't feature in the game at all.<sup>31</sup> On a pool table, where the green baize is  $(x, y, z)$ , the  $w$  dimension is *vertical*. HIGH-ENERGY matter, then, is what you get when you hit the white ball really hard. Suddenly, the  $w$  dimension of progress (the air above the baize) is not so irrelevant. The balls jump off the table. This is why the Z particle is only observed in colliders; colliders probe the extra degrees of freedom, such as front-to-back on the ocean swell, available at high energy.<sup>32</sup>



This ties in with our analysis of the *weak mixing angle*  $\theta_w \approx 30^\circ$ . The photon of light  $\gamma$  is precisely the wave on the electroweak plane that surfs abreast of the present, as the matter particles in the left-hand picture are doing. Moving at  $30^\circ$  forward of the **Wave**, a photon keeps pace with the cosmos. It registers, then, as a stable wave in the world-image. Hence, we are familiar with light  $\gamma$ , and

<sup>31</sup>The point being, you can smash two cars together as hard as you like, and, while you might get them to jump off the road, you won't get them to jump out of the world-image altogether. What I'm saying, however, is that this is *exactly* what happens in a high-energy collider.

<sup>32</sup>This is all the more reason why it is so counterproductive to interpret the results of collider experiments in terms of Newtonian perception, viz. as being housed in space. Colliders are, in fact, the *only* environments in which the extra dimensions of the Universe become actively involved. In a collider, the backdrop broadens: the pool balls jump off the baize.

not the least bit familiar with the Z particle: Z waves, being at right angles to the observable photon  $\gamma$ , are at right angles to the world-image. The *vector boson plane*, in which the electromagnetic  $\gamma$  and weak Z interactions unify mathematically, is a  $(w, x)$  plane consisting of the dimension of progress  $w$  and any dimension of space  $x$ . Elastic collision between electrons and neutrinos requires activity in this extra  $w$  dimension, for nonlinearity and therefore interaction. To catch a neutrino, then, not only must a circular ripple converge to send a single drop skywards, but it must converge to send a single drop out *beyond* the dimensions of perceived reality! No wonder the thing is elusive!

The PHOTON of electromagnetism carries energy in space  $x$ ; the Z PARTICLE of the weak interaction carries energy *at right angles* to space  $x$ , in the direction of progress  $w$ . If  $\gamma$  is a surfer keeping abreast of the wave, then the Z particle is a jet-ski piling straight ahead. The photon is stable because it carries energy within the **Wave**; the Z is unstable in perception (lifetime  $\approx 10^{-25}$  seconds) because it attempts to carry energy out of the world-image altogether! Look down on an ocean swell, from a sea-bird's point of view, and the two forces are plain to see: electromagnetism runs sideways along the wave, the weak interaction, however, runs *forwards*:



The thing has rightfully been shrouded in mystery! How on Earth could anyone hope to make sense of such an idea while imagining the perceived world to be the extent of Reality? How can one picture energy moving at right angles to the lab if the lab is taken to be A Physical Thing? It is the same issue as with MASS: squeezed through Newton's mangle, everything is homeless.

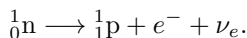
Dimension	Energy	Particle
$W$	Electromagnetic mass	$e$ electron
$(X, Y, Z)$	Strong mass	$p$ proton
$w$	Weak mass	Z boson
$(x, y, z)$	Kinetic energy	$\gamma$ photon

The above classification explains the fact, most curious in the old paradigm, that the cosmos would get along perfectly well without the weak interaction. This

redundancy, which seems almost profligate of Mother Nature, is not the case for the other three. Unity explains this simply. The Z interaction governs all the ways in which the **Wave** *isn't* a perfectly coherent wave. It governs the ways in which the pool balls “jump off the table”, and subsequently return. Remove  $(x, y, z)$  and the world disappears; remove  $(X, Y, Z)$ , and protons disappear; remove  $W$ , and electrons disappear. Now, try to remove  $w$  *entirely*, and the quantum disappears, taking with it the world and all the laws of physics. However, it's not the *presence* of  $w$  that the weak interaction describes: the **Wave** does progress in  $w$ , the cosmos does have a finite thickness, and the quantum  $\hbar$  does exist. The weak interaction governs *departures* from progress in  $w$ . And a **Wave** in which every part progressed in literally perfect sync would be perfectly viable. The world-image would be virtually identical to the one we see today. Protons would be protons, electrons electrons and photons photons. All that would change would be that neutrinos, instead of *almost* never interacting, would *never* interact. A few curmudgeonly theorists would moan, perhaps, but life wouldn't miss a beat.

## Weak Decay

The other aspect of weak physics is RADIOACTIVITY. In *beta decay*, a free neutron decays “spontaneously” to a proton, releasing a fast electron (historically known as a *beta particle*) and a neutrino.<sup>33</sup> Without reference to the up/down quark modelling error, we can represent<sup>34</sup> BETA DECAY as:



Let's look at the thing with new eyes. A NEUTRON consists of a PROTON bound to a NUCLEAR ELECTRON. As discussed, a nuclear electron is an electron-like wave, resonating in  $W$  but with a different polarisation, sinusoidal in inner space rather than helical in space, and a consequently (I won't go into why here) slightly higher mass. This gives the nuclear electron sufficient energy to *escape* its host proton, under certain circumstances, and thus repolarise to a normal electron. This “drops an electron rock into the substrate”. And, since an electron wave emerges into existence, not magically with a sprinkling of Tinkerbell's quark-dust, but rather *physically*, in a repolarisation of charge, a disturbance is created that propagates both in  $W$  (ELECTRON) and  $x$  (NEUTRINO).

<sup>33</sup>This tends to be thought of as an “antineutrino”, but we needn't bother with the distinction here.

<sup>34</sup>Remember, as with any formula, that this is approximation. It never happens the same way twice.

Why do these decays come about? Well, consider a NEUTRON, i.e. a proton with a nuclear electron bound tightly to it. The two want to stay superposed, because they have opposite electric charges. It is *energetically favourable* for them to remain together, in the configuration known as a neutron, because together they cause no torsion of the *W* dimension. The cylinder's sweet wrapper is unwrapped when both are present, and each party likes it so. This is why, on average, a free neutron survives for a particle-aeon: 15 minutes. During that time, the neutron has countless minor interactions, as it surfs its way along the **Wave**. Why does it decay, then? It decays because its nuclear electron sits on an energy hill; at the bottom of that hill is a *regular* electron. And, given the chance, things descend. Imagine the NEUTRON as a raft (a PROTON) to which a fish bowl (the proton's substrate mountain, i.e. its electromagnetic force field) is securely attached. In the fish bowl is a goldfish (NUCLEAR ELECTRON). The situation is stable. Indeed, it will withstand a good deal of weather; the raft may roll about copiously, but the fish stays where it is; its water gets disturbed, yes, but afterwards it returns to flat. Nevertheless, if the raft is at sea *for long enough*, eventually a wave will break over the fishbowl, sluicing the goldfish out of it. Once this happens, there is no turning back; raft and fish go separate ways.

Such fluctuations in the substrate produce the probabilistic nature of weak decay. Physicists often talk, nonsensically enough for it be rather embarrassing, of “inherent probability” governing such events. There is literally *nothing*, according to a certain breed of Western worker drone, that causes a neutron to decay. As the physicist wouldn't say, because it sounds so absurd, particles decay because... wait for it... *waaait for it...* they decay! Now that is solipsism worthy of the Age of Enlightenment Materialistic Delusion. The concept of PROBABILITY, to those honest enough to consider it as more than a tape measure for aliens, is only ever an expression of a *lack of information* regarding some process. It is preposterous to imagine that, when one tosses a coin, there is an “inherently probabilistic” process going on. Rather, it's difficult (though not impossible) to tell how the coin is going to land, so the quantity  $\frac{1}{2}$  is *assigned* to each outcome, to facilitate mathematical work. Einstein, thinking clearly as ever, was right:

GOD DOES NOT PLAY DICE.

How grimly revealing that many modern authors, dimwit minnows next to a titan like Einstein, twist his criticism in pernicious phrases like “Quantum physics is so extraordinary that *even* Einstein couldn't bring himself to believe it.” The real meaning of this idiot statement is “I'm cleverer than Einstein, honest. I know this,

because I have managed to jump through a good many Establishment hoops which Einstein didn't. And I've written a book. It's available in all good bookshops. Oh, and it's available in all the shit ones too, because I really want a new car." Over two millennia ago, the genius author of the Gita understood such fools:

"They assert that the world has no deep truth, that it has no basis, no grounding in Reality, that it does not proceed according to physical laws of cause and effect. You ask: how else is it caused? By *results*, they say."

In Reality, there are, *of course*, physical processes that lead to the decay of neutrons and other metastable particles. In the end, it's simple; space just isn't the flawless Newtonian backdrop it was once taken to be. This doesn't mean, however, that the vacuum is, as is often said in quantum field theory, a "writhing sea of virtual particles popping in and out of existence". That's just a misunderstanding, a naive reading of the physics, like spotting a shoal of flying fish and exclaiming:

"Amazing! See how the shiny birds pop in and out of existence! See how the waves produce them in an inherently probabilistic fashion! Quick, quick! Call my agent! Even Einstein couldn't have imagined such an incredible thing!"

We must do better. Space is a perceived image, and, underlying it, sustaining it, is substrate. There's no sense in which the substrate is fixed. Below the surface of the world, ripples of every possible scale and depth pass this way and that, propagating kinetically in space, propagating massively in the inner dimensions, propagating weakly in *w*, colliding, interacting, forming, reforming, in a dance of infinite complexity. The axiom of Unity, while it is as simple as any philosophical axiom could be, produces, in the eight dimensions of the substrate, more protean variety of possibility than all of the materialistic theories of the world *ever* could. The Universe is CONTINUOUS. There are half-waves, quarter-waves, eighth-waves, billionth-waves; there are fractional waves of every description. The Universe is an eight-dimensional ocean, and no part of it is ever still. How could it be? Look at the sea, or a lake, or a swimming pool: high-energy or low, *everything* moves. Stillness is only ever an approximation. And so it is with the SUBSTRATE. The vast majority of waves don't register in perception, because, in order to do so, they must *interact with matter*, whether metallic or retinal. And matter perceives what matter permits. Watch a neutron move through space, and you are watching the white foam on the crest of a wave. The wave itself—this cannot be seen—is

*infinitely detailed*. Below the scale of the “neutron”, below the scale of wave shape are infinitely many wavelets, ripples in the fabric of the Universe. These occupy the same dimensions as the neutron wave, and all the others besides. Nothing probabilistic “just happens”.

Indeed, taking the logic to its conclusion, there must be EPHEMERAL waves, the most ghostly of all, responsible for those isolated incidents, unpredictable in every sense, when the laws of physics *really* go up the spout. Such waves do not coprogress, not even approximately. These are waves outside the cosmos. Outside the cosmos, yes, but *real, physical, genuine*, waves every bit as “concrete” as those that make up protons and electrons. Some of these waves (infinitely many!) travel negatively in *w*, like lifeboats bursting out through the surf. Barely a one interacts, of course; they are many orders of magnitude less observable than the neutrino. Most shine right through the quantum glass of the present. But there are little waves and Big Waves. We know for a fact that our cosmos, our imaged **Wave**, is very stable by the fact we are here to observe it, but that doesn’t rule out—and here’s another breath of wind to ruffle the feathers of mind-caged chickens—*local violations of cosmic law*. MIRACLES, if you will. This term, it turns out, has rigorous mathematical meaning. In the grubby logic of the old West, with the world-image mistaken for Reality, we were quite right, within our pettifogging *Modèle des Cons*, to rule out violations of the laws of the cosmos. As many have rightly said, if a physical law can be violated, it isn’t a law. But the *domains* have changed. The laws of the world-image are, in the end, summaries of emergent phenomena, and there are aspects of physical Reality that simply *do not belong to the cosmos*. These phenomena are physical and obey UNIVERSAL law, but the Universal domain is *broad*er than the cosmic. A one in a squillion wave, meeting the **Wave** head on, must violate *all* the laws of physics. And Jung’s carving knife goes *Bang!*<sup>35</sup>

How small are those who dismiss such things.

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<sup>35</sup>Jung, whose work is far too deep to have been absorbed by the Twitterati, told a story—forgive me if I butcher this in the telling, I can’t remember where I read it—of a carving knife he owned which, while inside a bread bin, *exploded* into pieces. The phenomenon was extraordinary enough that Jung consulted a metallurgist to find out whether there was anything unusual about the chemical makeup of the knife. There was nothing. The metallurgist said the phenomenon was, put simply, impossible. There can have been no cause. Now, you can, of course, claim that Jung made the thing up. But no one who has actually studied Jung would do such a thing. He was by no means perfect (who is?), but he was deeply honest. The phenomenon broke the emergent laws of the cosmos. According to Unity theory it didn’t, however, break the laws of the Universe. Miracles aren’t real, but they are Real.

# 19

## GENERAL RELATIVITY

The essence of your mind is not born, so it will never die.  
It is not an existence, which is perishable. It is not an  
emptiness, which is void. ... Your end, which is endless,  
is as a snowflake dissolving in the pure air.

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*Zen parable*

Here, we move from the small to the Large.

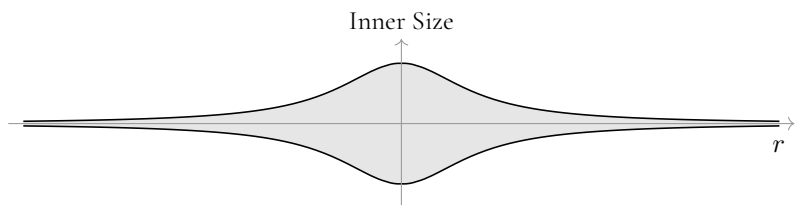
We now have an understanding of what MATTER is, and how it makes its transition of levels in construction of the world-image. The Universe, of eight dimensions, is one substance, and the perceptible cosmos, of three dimensions, is an image built of the data, concerning variations in the substrate, that is available to material beings. The world-image that then presents itself to Joe Public doesn't include the four microscopic INNER DIMENSIONS ( $W, X, Y, Z$ ), which, broadly speaking, host mass and force, nor the macroscopic OUTER DIMENSION  $w$ , which hosts the progress of the **Wave**, the weak interaction, and the quantum  $\hbar$ . Only the  $(x, y, z)$  dimensions of space, which host *behaviour*, are left to perception. Eight dimensions of Universe becomes three dimensions of cosmos, and we see what we see. Those not thinking clearly then view the world as a physical object.



We have all done this. But we are now moving beyond the Western error. And, in this new conception, we are free to explore not just the femtoscopic world of the quantum but also the distant reaches of space. And *beyond!* We are now in a position to address, free of the delusions of old White Men, the cosmos on its grandest scales, and the Universe on yet grander ones.

At these scales, the dominant force is GRAVITY. Indeed, to an extremely good approximation, the *only* force is gravity. The strong force is confined by the structure of inner space, the weak interaction has no cosmic component, and long-range electromagnetism is rendered irrelevant by the neutrality of planets, stars and galaxies. Only GRAVITY, the most directly perceptible of forces, is left as we make our way out into the cosmos. And we now know precisely how it works. A gravitational *energy well* (the opposite of an energy hill), such as surrounds a planet, star or galaxy, is a local, albeit very broad and gentle, expansion of the inner dimensions at the expense of the outer dimensions.

Consider our Sun. Within and around it, the inner dimensions are enlarged, because the large amount of energy located there (broadly, hydrogen atoms) can relax under such an enlargement. The overall *behaviours* of electrons and protons remain the same, but quantities such as electron MASS are changed slightly. This is seen, in satellite projection, as a difference in gravitational potential. And, since the Sun has spherical symmetry, so does the potential. The enlargement (and consequent contraction of space) must diminish, away from the Sun, at a rate that depends only on radius. This is the Sun's gravitational "field". In fact, there is no magical "field". The Sun's gravitational field is the image of a physical configuration: an unseen mountain in the substrate.



Inner size against radial distance from the Sun

If we visualise inner-dimensional size as *height*, then there is a broad mountain, smooth-capped at the Sun, that slopes away slowly in all directions. It is still sloping away beyond the heliopause. At one more level of abstraction, then, this generates a gravitational *well*, deep and smooth-bottomed at the Sun. The "field"

is then a slope-map of the the mountain/well, whose value is a *gradient*, i.e. an expression of “how tightly the contours are bunched”. There is no “spooky action at a distance”, as Einstein called anything that seems to (or rather *erroneously modelled to*) affect the faraway instantly. If, with a wave of a magic wand, you removed the Sun—*woosh!*—then the gravitational well would still exist here for 8 minutes, the time taken for waves in the substrate, whether they carry photons, neutrinos or, in this case, *seismic gravity*, to reach the Earth. The tsunami from such a cataclysm would propagate towards us just as light does from its tiny, electron-sized photoemission cataclysms. Nothing is fixed. The only reason that the Sun’s enlargement of the inner dimensions is so *steady*, then, is because the Sun itself is so: it has been in more or less the same state for some billions of years. Hence, the Solar System’s well is semi-permanent. But GRAVITY isn’t a “force exerted by the Sun”; rather, we are on the long, shallow slopes of a physically Real and physically mobile mountain.<sup>1</sup>

## Iterations

Historically, the modelling of such wells has come in two major iterations: Newton’s *universal gravity* and Einstein’s *general relativity*.

- ① NEWTON’S THEORY, published in 1687, was the first mathematical analysis of gravity. In it, he famously used the same formula to describe the orbit of the Moon around the Earth, and (according to legend) the fall of an apple.
- ② EINSTEIN’S THEORY, published in 1915, extended Newton’s, including it and showing, in the same breath, when and why it breaks down. Universal gravity ignores the “relativistic” gravitational effects: the *contraction of space* and the *slowing of clocks*. These can be precisely measured in, for example, the orbit of Mercury.

Unity presents a third iteration. Its structure allows for an extension of Einstein’s theory, including it (and thereby Newton’s) as a limiting case and showing, in the same breath, when and why Einsteinian gravity fails to hold. This, as it turns out, is *often*. Indeed, not only does general relativity break down, but it breaks down *completely*. That’s why cosmology is in such a mess. Denied an alternative by

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<sup>1</sup>The entire mountain, as a substrate configuration, is propagating in *w* with the **Wave**. Indeed, the macroscopic structure of the **Wave**, on a supra-cosmic scale, may be thought of as gravitational.

adherence to a fallacious worldview, cosmologists of the old paradigm have been using a quality tool far beyond its proper domain. As we will see, the majority of 20th century cosmology is just wrong, wrong to the same extent as *geocentricity*, as disproved by Copernicus. God didn't create Man in seven days, the Sun doesn't go around the Earth, and the cosmos did not begin in a Gigantic Space Kablooie.<sup>2</sup> What an awakening must come, and how hard some folk will fight it. Again, no insult to Einstein; he was a giant. But his *magnum opus* has been grievously misused by the pond-gnomes. They have taken his Mona Lisa, ripped it off the frame, and hung strips of it on their fishhooks as bait.<sup>3</sup> Among theories of physics, Einstein's general relativity is at once the most elegant and the most *misused*. We need to set the record straight.

## Isaac Newton

Newton's law of gravity, which stood unchallenged for over two centuries 1687-1915, states that the gravitational force between two masses  $m_1$  and  $m_2$  is, in terms of the Cavendish constant  $G$ ,<sup>4</sup> and distance  $r$  given by

$$F = \frac{Gm_1m_2}{r^2}.$$

Newton's proof, in his 1687 masterpiece the *Principia*, was his derivation of *Kepler's laws* of planetary motion, which had stood (very much like the quantum equations of the 1920s prior to Unity theory) verified but without theoretical justification for the best part of a century. Kepler had produced his laws, relating the shape, size and speed of planetary orbits, in the 1610s. Universal gravity stood up very well to experimental testing across of variety of scales. It was, as a result, rapidly taken to be Permatruth; Newton's law *became* gravity. That was an error, of course: *every* theory breaks down. The validity of Newtonian gravity is not, as Einstein showed, "universal". The law holds (approximately) for static, low- to medium-strength gravitational wells. It doesn't hold where gravity is high, nor does it hold

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<sup>2</sup>How modern and clever we believe ourselves to be! How firmly do we place ourselves *after* the crease of history, when every moment is on it! Little do the grunts realise that the Big Bang will soon seem as laughable as the Garden of Eden. In fact, much more laughable, since the Garden of Eden is a *myth*, profoundly useful and of relevance to psychology, while the Big Bang is just an asinine blunder.

<sup>3</sup>There is, alas, no masterpiece of endeavour that cannot subsequently be abused by those who want to "do academia", by which I mean "be admired for the letters either side of one's name".

<sup>4</sup>It was Cavendish who, in 1798, performed the first laboratory measurement of this tiny constant using heavy globes and a delicate torsion balance. It may be viewed as the *strength of gravity*.

when the masses producing the wells are changing. It holds for golf balls, tennis balls, footballs, cannonballs, moons, planets and galaxies. This, of course, includes all domains accessible to classical physicists. But it wasn't only extensive empirical validation that lent an air of "final truth" to Newton's gravity. It also *made sense*. There is, as the Western world seems amazingly proud to have forgotten, a lot to be said for that. Consider the ingredients of the formula:

$$F = \frac{Gm_1m_2}{r^2}.$$

The numerator  $Gm_1m_2$  *makes sense*: it is the statement "Gravitational force is proportional to mass", which, albeit in different terms, Galileo had discovered pre-Newton. Newton's contribution was the  $r^2$  denominator and the algebraic tool, *calculus*, with which to analyse it all. Away from a central mass such as the Sun, at a distance  $r$ , the force is spread out over a sphere of radius  $r$ . Such a sphere has a surface area proportional to  $r^2$ . Spread the force out over that area, and you divide the force by  $r^2$ . The law is intuitive. Nevertheless, it breaks down, and the reason why is now obvious. In Unity theory, as in GR, there could never be *instantaneous* interactions,<sup>5</sup> which means that information about changes in distribution of mass cannot percolate immediately, as was implicitly claimed by Newton. Mathematically, this is the fact that the Newtonian force law makes no mention of the SPEED OF LIGHT, while both GR and Unity do.

## Albert Einstein

A significant piece of evidence used by Einstein in both construction and proof of GR was the *precession of Mercury*. PRECESSION is the process by which the long axis of an elliptical orbit rotates slowly around the Sun. The orbits of the planets are predicted to precess in Newtonian gravity, due to inter-planet effects, and so they do. But it became clear, as astronomy burgeoned in the 19th century, that there was a discrepancy, small but not negligible, between the value predicted by the Newtonian theory and the observed value. Mercury wasn't behaving as expected. This led to what should by now be recognised as a pattern in science. Even though Mercury was major evidence against the eternal truth of Newtonian theory (although not against its *approximation* to the truth), the classical theorists

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<sup>5</sup>*Quantum entanglement*, which is claimed by more than a few scholarly and blinkered folk to be an instantaneously "nonlocal" occurrence, is, in fact, a non-phenomenon, as I explain in UNITY THEORY.

of the day turned somersaults attempting to fix the problem. One approach was proposing unseen planets closer to the Sun than Mercury. These were a pet for decades; discussions were had; debates raged. Many astronomers kept probing, hoping to be the one to find a “dark planet” and so gain a place in the history books.<sup>6</sup> Needless to say, no magical dark planets emerged. Instead, Einstein did, publishing general relativity in 1915, after a decade of intense effort. The great triumph of his theory was that it generated, in precise quantitative form, the anomalous precession of Mercury. This was an extraordinary achievement. But you should remember, as we look at GR, that, while it is a masterpiece, it is also *incorrect*. Of course! This fact, expressed two different ways, is:

- ① General relativity is limited in its DOMAIN OF VALIDITY.
- ② General relativity is a CLASSICAL THEORY of space and time.

In other words, despite the fact that Einstein, as a truly maverick thinker, did a great deal, more perhaps than anyone else, to shake the erroneous foundations of the Western edifice, he *didn't* bring the building down. In GR, space became *flexible*, yes—this was epic thinking—but it yet remained the backdrop. MATTER, likewise, remained stuff. This is why, *a priori*, GR has a limited domain. Before one even considers its content, its *language* is limited. With only  $\frac{4}{9}$  the requisite number of dimensional variables, it doesn't come close to modelling the Universe! While its mathematics is certainly valid in the appropriate domain, its *conceptual* basis, i.e. the ways in which its mathematical concepts are expressed, explained and understood, remain of their day. They are classical and *space-centric*, which is their weakness.

## Contraction and Dilation

We already know why, as described by Einstein's *special* theory, a particle would require unlimited energy to approach the speed of light. According to Unity theory, this is a consequence of the cylindrical wave structure of matter, which we have visualised on the  $(x, W)$  cylinder. This structure necessitates, with no need of further philosophical assumptions (relativity), the quantitative form

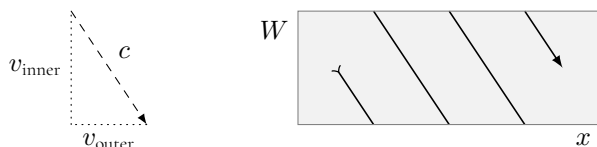
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<sup>6</sup>Thank the Lord Tech for modernity! I mean, imagine proposing *ad hoc hypotheses* to shore up a theory that fails to match evidence! What a bunch of Stone Age morons! How very lucky we are to live *now*, in the intelligent present day, unlike all those silly wankers who bumbled around in the past!

of the *Lorentz factor*  $\gamma$ , which predated the special theory and forms its central mathematical content. Let's run through that argument again, but this time with an eye on "time dilation". I write "time dilation" in inverted commas, not because it doesn't correspond to an aspect of physical Reality—it does, as experiments with atomic clocks have shown—but because, as an *idea*, it is outdated. As with so much 20th century thinking, the mathematics is good, but the words are not; the *concept* "time dilation" has confused things. Once again, to be clear:

TIME doesn't slow down; CLOCKS do.

Nothing happens, in fast-moving particles, to a metaphysical entity called "time". Time cannot be observed directly; it can only be inferred by physical change in oscillating objects such as clocks. When a clock whose battery is running out slows, that altered performance, obviously, doesn't affect "time". And exactly the same is true of the high-speed/gravity behaviour of clocks. At high speed, *clocks* slow down, yes. But this is simple physics.<sup>7</sup> This happens because, from a fast-moving particle's point of view, its own internal processes slow. As a particle accelerates towards the speed of light, its "unicycle" tilts forwards. Speed through space  $v_{\text{outer}}$  increases, which means less of a component of speed  $v_{\text{inner}}$  is now rotating around the inner dimensions:



Pythagoras's theorem then produces the reciprocal Lorentz factor

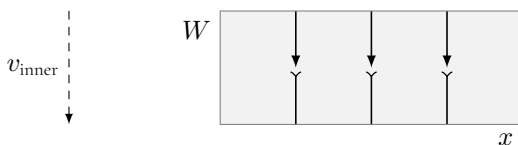
$$v_{\text{inner}} = \sqrt{c^2 - v_{\text{outer}}^2} = c\sqrt{1 - \frac{v_{\text{outer}}^2}{c^2}} = \gamma^{-1}c.$$

Despite this reduction in inner speed by factor  $\gamma^{-1}$ , MASS is maintained, because the *decrease* in  $v_{\text{inner}}$  by factor  $\gamma^{-1}$  is matched by an *increase* by factor  $\gamma$  in the frequency of the wave. These effects cancel exactly in energy terms, which is why the MASS and CHARGE of a particle are both invariant under acceleration. Indeed,

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<sup>7</sup>By "physics", here, I mean physical physics, not the mystical netherworlds of pure idea from which schizophrenic rationalists decry all... mystical netherworlds of pure idea.

this is why we talk of **the** mass and **the** charge of an electron. But the effects *don't* cancel in terms of TIME. From the particle's point of view, motion in  $x$  is nonexistent; every particle, just as every human being, seems stationary to itself. In its own *frame of reference*, then, the particle is identical to a stationary particle in every respect *but one*: its inner speed is lower than it was. The previous diagram, from the perspective of the particle itself, looks as follows:



This is exactly like a stationary particle, except for the fact that its *internal engine* (speed in the  $W$  dimension) is running slow. Scale this effect, which occurs symmetrically in all matter, up to macroscopic machinery, and there you go: you have ~~time dilation~~ a slow-running clock.

It turns out that ① *high velocity* and ② *high gravity*, despite their apparent differences, have much in common. This is why ① the SPECIAL THEORY of fast motion and ② the GENERAL THEORY of gravity have both ended up with same epithet “relativity”.<sup>8</sup> Consider a GRAVITATIONAL WELL, such as that around the Sun. Closer to the Sun, the inner dimensions are larger, which offers energetic favourability to orbiting matter and thus exerts a gravitational force. But such an enlargement also has two *other* effects, unmodelled by Newton. Together, they form the mathematical contact of GR, and can be used to calculate (correctly) the anomalous precession of Mercury:

- ① SPACE CONTRACTION. According the substrate equation  $R_8 = 0$ , any *enlargement* of the inner dimensions must come with a *contraction* of the outer dimensions. The former is modelled by Newtonian universal gravity; the latter is modelled by Einsteinian space contraction.
- ② SLOWED CLOCKS. If the inner dimensions are *large*, substrate waves take *longer* to circumnavigate them. An increase in inner circumference has the same effect (on the *measurement* of time) as a reduction in inner speed. Hence, gravity has exactly the same effect on clocks as high speed does.

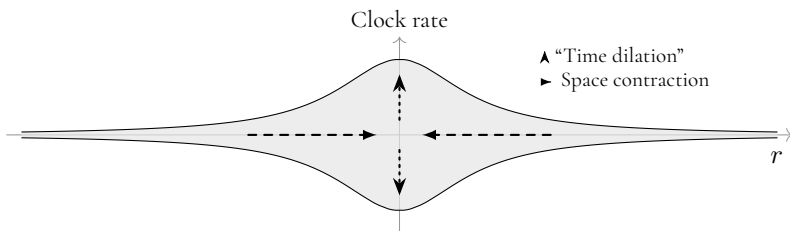
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<sup>8</sup>The Big Idea “relativity”, following the Death of God, was all the rage in the late 19th and 20th centuries, and it was one way (not a good way, it turns out) to explain things. To understand Einstein’s theories, the first thing is to forget all about the word “relativity”.

Therefore, near the Sun, *space is contracted* and *clocks run slow*. You can see why the special and general theories are thought of (as they were by their author) in the same breath. But none it has anything to do with “Lorentz symmetries”, “frames of reference”, “equivalence principles”, or, in fact, any of the philosophical concepts used by Einstein. I’m talking about simple *physical* processes. Nothing spooky. Time doesn’t slow down near the Sun, matter-based clocks slow down near the Sun. In the old paradigm, including in GR, these two statements were considered to be equal, because matter was thought to be a primary entity. We now know better. In strong gravitational fields, it is the physical processes that *generate* the phenomenon MATTER that slow down.

## The Schwarzschild Metric

The SCHWARZCHILD METRIC is a solution to the *Einstein field equations* of GR, modelling the curvature of spacetime around a static central mass such as our Sun. Virtually all testing of GR is based in this scenario.<sup>9</sup> The metric lays out, in a quantitative manner, the qualitative arguments above. From it, one can calculate the anomalous value of the precession of Mercury.<sup>10</sup> I won’t go into the mathematics here; as Einstein himself said, tensor algebra is hard. However, it’s worth taking just a quick *look* at the Schwarzschild metric, because it relates our earlier picture to the Empirical Facts. Consider once again our earlier graph of inner enlargement around the Sun, but now with “Clock rate” on the vertical axis. This time around, we also know that a general spatial contraction has occurred on the  $r$  (radial distance from the Sun) axis:



<sup>9</sup>It’s possible that this “virtually” is, in fact, “all”. I have yet to come across (I’m not saying such data doesn’t exist, and would be glad to hear of it) any evidence for GR’s validity that doesn’t stem from the Schwarzschild-style curvature around planets, stars or galaxies.

<sup>10</sup>Einstein, in fact, used a numerical approximation in his proof of GR; Schwarzschild wrote to Einstein in 1915 with the metric, in response to Einstein’s publication.



A *metric*, then, is a formula encoding the precise relationship between spatial and “temporal” changes  $dr$  and  $dt$ . The information in the Schwarzschild metric, and thus virtually all of the information in GR, is no more and no less than the fact, as necessitated by the AXIOM OF UNITY, that a change in the size of the inner dimensions (Newtonian gravity and the slowing of clocks) must be matched in the outer dimensions (space contraction). In spherical coordinates  $(t, r, \Omega)$ , where  $\Omega$  represents a spherical shell, the metric  $g_s$  has two relevant<sup>11</sup> terms:

$$g_s = - \underbrace{\left(1 - \frac{r_s}{r}\right) c^2 dt^2}_{\text{Inner}} + \underbrace{\left(1 - \frac{r_s}{r}\right)^{-1} dr^2 + r^2 g_\Omega}_{\text{Outer}}.$$

The constant  $r_s$  is known as the *Schwarzschild radius*, which, for the Sun, is around 3 km. The solution breaks down entirely unless  $r \gg r_s$ , i.e. it is only valid at a decent distance from the Sun, that of e.g. Mercury or the Earth. The key thing is the pair of reciprocal factors

$$\left(1 - \frac{r_s}{r}\right) \text{ and } \left(1 - \frac{r_s}{r}\right)^{-1}.$$

In the language of GR, these are descriptions of *time dilation* and *space contraction*. In the language of Unity theory, they are descriptions of *inner size* and *outer size*. The statements are equivalent. In empty space, where the Schwarzschild metric applies and GR takes its validation, GR is simply the equation  $R = 0$ , where  $R$  is the Ricci scalar encoding “overall expansion of spacetime”. This equation is satisfied by the metric  $g_s$  because the reciprocal factors above multiply to give 1. Hence, the same metric  $g_s$ , broadened appropriately, is *automatically* a solution to the SUBSTRATE EQUATION  $R_8 = 0$ . This is a most significant result! Unity theory explicitly *contains* the Schwarzschild metric, and hence predicts, in the sense so beloved of physicists, exactly what GR does with respect to e.g. Mercury and the gravitational lensing of light. In short, Unity theory *contains* GR as a limiting case, just as GR *contains* Newtonian gravity:

$$\text{NEWTONIAN GRAVITY} \subset \text{GENERAL RELATIVITY} \subset \text{UNITY THEORY}.$$

This is key. The inevitable (given the state of our culture) criticism that has been and will no doubt continue to be levelled at Unity is this: “The theory concerns

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<sup>11</sup>The last term  $r^2 g_\Omega$  is a bit of a non-entity, in fact, and we don’t need to go into it here. It encodes the spherical symmetry and is only there to say “I’m not doing anything!”

the unseen; it makes no quantitative predictions.”<sup>12</sup> But this simply isn’t true. It isn’t close to true. Unity theory makes the same predictions as GR does in its domain of validation, and GR is taken as validated. Indeed, Unity theory makes the same predictions as SR does in *its* domain of validation, and SR is taken to be validated, the same predictions as QM does in *its* domain of validation, and QM is taken as validated, and the same predictions as QFT does in *its* domain of validation, and QFT is taken as validated. And I haven’t even mentioned the *many* results, e.g. the pion and proton masses, the spin-statistics theorem, the weak mixing angle, spin, antimatter, baryons and mesons, confinement, violation of Bell’s inequalities, cosmological expansion, the existence of the quantum, the symmetries of the Standard Model, dark matter haloes, the Higgs mechanism, neutrino mass, the Valley of Stability, and God knows how many more mysteries, for which Unity theory provides explanation, yet for which the old paradigm has either no explanation or worse. And all of this, the myriad results in myriad fields, the mathematics, the empirical testing, rests on the most *rigorous* axiomatic structure—the Universe is one substance—that it is possible for an idea to have. In short, anyone who, thinking themselves an Archduke of High Rationality, claims that Unity “makes no quantitative predictions” is, frankly, spouting bollocks.

## And Onwards!

The brilliance of Einstein’s achievement does not imply that GR *is* gravity, just as the brilliance of Newton’s achievement didn’t do the same with the inverse square law. Even though GR was proposed over a century ago, Einstein’s theory remains validated empirically in only a limited domain, more or less the Solar System of the present day. It does not have an *empirical* basis beyond this specific scale and epoch. And, founded as it is on an erroneous system (spacetime taken to be the backdrop of reality), neither does it have a *theoretical* basis. This is not Einstein’s fault; to produce the equations in the first place was Herculean work. But it is *everyone else’s* fault. The assumptions, and so limitations, inherent in Einstein’s equations have gone, for more than a century, unanalysed, unnoticed, and even outright *ignored*, even when the evidence of experiment has yelled, just as the precession of Mercury did before, “General relativity doesn’t apply here!”

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<sup>12</sup>This statement, I have noticed, emerges from the mouths of physicists *automatically*, without the slightest consideration as to whether or not it is true. It is a classic defense mechanism of the shallow-minded: a knee-jerk fending off of the great Unknown.

Instead, GR has been wielded by those whose desire was not science but *gain*. One could be forgiven for thinking that, compared to war, poverty or rectal prolapse, this is a minor thing. “If some cosmologists want to throw Einstein’s equations about and make erroneous conclusions about the ancient past, then so be it. Each to their own. Who cares?” Hold the phone; stop right there; that, exactly *that*, is the problem in a nutshell. We should all care *deeply*. A *CULTURE* is the stories it tells. A civilisation lives and dies by its myths, by the explanations it gives, by the power of its narratives. And 20th century cosmology, due to the laziness of nobodies, has left us with an ugly, ramshackle, paradox-ridden and appallingly depressing view of our place in the Ages. In the last two hundred years, clever and much lauded folk have stripped away the religious myths that came before—“Good!” you might think—and have replaced them with... what? As far as modern physics is concerned, the universe began in an inherently random fluctuation and will end in *total heat death*. This is what we (never out loud, because we would be sickened by speaking such things) implicitly teach our children:

“Beyond a certain point in time, the universe will *die*. Life will *die*, then the Earth will *die*, then the Sun will *die*, then all the Suns will *die*, until all that’s left of the universe is a vacuum full of the skeletons of stars. From then on, until an end of time which will never come, it will be unceasingly cold. Only *dead* things will remain.”

Fuck me, but that is bleak. It’s the most contemptible piece of blackguardry. And what’s worse, materialists are *proud* of this view. Russell clocked this a while ago:

“In the modern world, if communities are unhappy, it is often because they have ignorances, habits, beliefs, and passions, which are dearer to them than happiness or even life. I find many men in our dangerous age who seem to be in love with misery and death, and who grow angry when hopes are suggested to them. They think hope is irrational and that, in sitting down to lazy despair, they are merely facing facts.”

The reason for this *anger at the suggestion of hope*, even more widespread now than in Russell’s day, is as follows. Materialists who have bought into the Western error (there are a great many scientists among this group) have been forced, in order to maintain their worldview, to spend a lifetime convincing themselves, against all the evidence, that the deeper aspects of life, those aspects addressed by religion, music, poetry and philosophy, do not correspond to reality, but are make-believe and childish superstition. Once you go down this road—Route 66: the American

dream—it is *very* difficult to backtrack. Imagine having sacrificed your soul's deep hopes, your nobility of purpose, your deep Oneness with the Universe, *everything*, indeed, that could have made you happy, for the sake of material goals, because you were taught, and readily believed, that those material goals were the only “real” ones. Imagine the trained thickness of the walls of denial surrounding such a lost heart. To such a person, the voice of hope is pure *menace*. Such a voice says:

Hope yet lives, yes. Hope of bliss and love in the Infinite. But that hope, which is available to you, is only so upon recognition that you have made, in your inner decisions, in *Who You Decided To Be*, the biggest mistake of all. Everything you have done and thought was the opposite of what you should have done and thought. You have, for decades, been painting yourself into a corner of misery.

This is why the hopeless, those hard-eyed rationalists with crusted souls, try so hard (quietly, cleverly, *world*-admirably) to hobble the young, to cut down the courageous, to reduce everyone's world to the size of theirs. They are clinging onto a rising balloon, and don't want to look down. They don't want to imagine, *even if it would bring them eventual joy*, that they have missed the point, missed life, missed love, and that all the time, when they were winning prizes, trying to shore up their castle walls, they should have been roaming free. And this is the lesson. If one is to live a real life, one must go beyond *all* theories. The truth of Reality cannot be expressed in numbers, nor in concepts, nor in words. Words are their own scientific models; they exist only insofar as they correlate to minds; the very word “gravity” is a model with a limited domain. The Universe is an ocean of limitless variety, and it brooks no entities, save One. This is true, *contra* many who call themselves scientists, even of the so-called “fundamental” (ha!) particles. No two *protons* are identical. Understand that, and you are on the way to understanding. Protons are like snowflakes, ripples clothed in smaller ripples. How ludicrous, then, to take any theory (Unity included) as the end of the road. “Man” Nietzsche wrote, “is something to be surpassed.” You want to attain true Western enlightenment?

Read the books, then go beyond them.

Understand the science, then leave it all behind.

Study the theories, then make your own.

Find the answers, then forget you ever knew them.

Write it all down, and give it all away.

# 20

## GOLDEN PYRAMIDS

The King of Darkness caught sight of the world of Light from afar, on the border between the Darkness and the Light, as a fire on the summit of high mountains, as stars shining in the firmament... He pondered in this heart, fell into a rage... and said, "If there is such a world, what is to me this habitation of darkness? ... I will rise up to that luminous earth and make war upon its King.

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*Mandaeen parable*

Boundless and bold are the reaches of space!  
And myriad the sights and wonders therein!

How beautiful, yes, how very poignant are the deep-field images that filter through to us from the Hubble and Webb telescopes. As are the *clues*. To read those, it turns out, you need understand very little astronomy. What you need is a mind free of theory, a courageous mind, a mind unclouded by dogma, and... well, that's it really. Welcome, once again, to the by now oh-so-familiar story. In cosmology, as everywhere else in the culture of the White Man, simple and vital truths have been buried under mounds of obfuscating complexity, all because the droning drones of the West do so like to be *important*. You'll see what I mean.

There are, at the scale of galaxies and above, disagreements most glaring, both qualitative and quantitative, between astronomical data and cosmological theory. In other words, the theories, which are supposed (as purported “science”) to be based on the data, are, by definition, incorrect. *Shite* is probably a better word. By now, this will come as no surprise. After all, how could Dark Age cosmology, the Big Bang and all that, which makes no mention, in either its broad structure or quantitative mathematics, of the proven (that’s right, until something better comes along, empirically *proven*) inner dimensions, possibly be accurate? How could a cosmogonic model which views the perceived image of a **Wave** as a *physical object* possibly be correct? How could a cosmogonic model of three substantial dimensions, which errs, in terms of informational capacity, by a factor of... yes, that’s right, *infinity*, possibly describe the fullness of the Universe, which has at least eight substantial dimensions? These are category errors of the most basic kind. And, just as we saw down at the picoscopic quantum level, the falsehood of the materialistic paradigm shows up loud and clear in the grand terascopic reaches of the cosmos. The myriad and (let us not beat around the bush) *total* failures of the cosmic theories of the 20th and 21st centuries speak immediately, to those who still have ears to hear, of the existence of unseen dimensions, of hidden depths, of infinite timescales, of the total fallacy of the White Man’s paradigm, and of the end of our sickness, with its worship of All Things Dull And Pitiful. They speak of our SALVATION, in other words.

*La cosmologie, ç’est devenu un carrousel de cons bavards.*<sup>1</sup>

I swear with purpose, because I will not abide the stuffiness of academia, which thinks *thinking*, if armoured with citations enough, to be clean, pristine, apart from instinct, above bestial things, beyond sex and dirt. The lack of poetry! The arrogance! The hubris! With a song in my heart, I refuse to play that scholarly game of citations and recitations, publications and republications, argument and deathly dull counterargument, which amounts, all told, to nothing but a merry-go-round of statistical frottage. Those days are over. Welcome back to Planet Earth, dear scholars! Here is joy and redemption calling.

As it stands, most cosmologists really don’t deserve to be called “scientists”, because continuing to use a model when it patently doesn’t work is not science, it is mysticism, superstition, paganism, delusion, occultism and outright lunacy. I’m not talking about minor departures, in the third or fourth decimal place, of

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<sup>1</sup>Cosmology, pardon my English, has become a carousel of gibbering arseholes.

the motions of planets from those predicted by an otherwise solid model. Ha, not even close! I'm talking about *all-pervading* discrepancies, *catastrophic* failures, *almighty* errors in the theoretical interpretation of astronomical data at scales of the galaxy and above. A great and vital duty has been neglected. Yes, a *duty*. If one claims to be a "scientist", taking whatever salary and kudos comes with that respected word, then one is literally a guardian of the truth. This is part of the job description. The word "science" is from *scire*, to know or understand. Science is, literally, *knowledge*. A scientist makes an implicit claim to be beholden to the evidence, to be skeptical of hypotheses (even those dear to him), to be willing to address the Facts in a dispassionate way, probing and testing in order to discover aspects of the truth. Most importantly, a "scientist" is clear and forthright about the state of his non-knowledge. There is a great deal to admire in this philosophy. And we all like being admired. But it doesn't come for free. NOBLESSE OBLIGE, as *Les Intellectuels* seem to have forgotten. You can't call yourself a scientist unless you actually live the method; one who uses his stature as a holder of keys to lock the truth *out* is a hypocrite of the very worst kind.

## The Potency of Magnitude

Consider the Egyptian pyramids.

We are rightly astonished that an ancient people can have had the grandeur of purpose, the technological capacity, the organisational skills and, indeed, the sheer callousness regarding human suffering required to construct such things. Their magnitudes are such that, among scholars of the era, arguments have raged for centuries as to how the ancient Egyptians actually did it. The pyramids are *extraordinary*, yes. But what they are not is *incredible*. The stones are vast, certainly, but they are still of a comparable size to human beings. With imagination, one can see how, given the resources, it could have been done. This is why modern people, upon seeing a pyramid, don't think, as the Egyptians presumably wanted folk to think, "The gods must have built that." We recognise that, while the pyramids *stretch* the imagination—and they do stretch it a long way—they do *not* break it.

But there are (hypothetical) pyramids that *would* do so.

Suppose, in some uncharted corner of the Sahara, we came across a pyramid of solid gold the size of Everest, each of whose individual building ingots was the size of the Sphinx. Such evidence, regardless of the details, would require

a major restructuring of our worldview, because it is not just extraordinary but categorically *impossible*, according to our picture of the world and humanity, that a historical human civilisation could have constructed such a thing. In the distance, *sheer magnitude* counts for a lot. Small discrepancies, percentages, factors of two can often be fixed within a model; if an observed quantity is a few percent higher than theory dictates; well, that might be something (as with the precession of Mercury) or it might be nothing. But an *overwhelmingly vast* error is different. Gold ingots the size of the Sphinx simply could not have been mined, smelted, found or carved by humans, much less raised to sit atop a pyramid the size of a mountain. The point is, even in the absence of quantitative modelling, when the magnitudes involved are *big* enough, the paradigm *must* give way.<sup>2</sup>

#### SHEER MAGNITUDE CONQUERS DOUBT.

You don't have to know the average height of the ancient Saharan; they could all have been eight feet tall with biceps like rugby balls. You don't have to know their administrative capabilities or have decoded their hieroglyphics. The simple fact is, truly *gargantuan* magnitude bypasses all of that. A golden pyramid is a flat *contradiction*, whatever the theoretical details. And so it is with the COSMOS. It is very difficult (more difficult than is generally admitted) to draw any conclusions in cosmology. Astronomical data, by definition, is limited to what arrives from afar, and the further away, the harder the process gets. As the scales involved get larger and larger and the objects under study bear less and less resemblance to direct experience, more and more theoretical assumptions must be made. This is why the 21st century addiction to *quantitative* data over *qualitative* reasoning (a value judgement which is in vogue now, but won't be for long if I have anything to do with it) is so counterproductive. With regard to the far reaches of the cosmos, analysis of the minutiae of quantitative models is pointless; it is the death-rattle of Lord Kelvin's worship at the Altar of Number, a certain fallacious Victorian meta-theory of "How Science Should Be". If all one is doing is phenomenology, why bother? What does any of it tell you? Nothing. Cosmologists have been very stupid. They have painted themselves into quantitative corners, bickered loudly

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<sup>2</sup>This is true even if there is no quantitative theory available as an alternative. Such is the addiction of scholars to the comfortable home stadia of theories, it is barely ever mentioned in science (and never in cosmology) that, as Ashvaghosha pointed out eloquently, a fallacious theory is *far* worse than no theory at all. In the long history of humankind, the lack of a theory has never, ever, *ever* been a problem. Nobody has ever killed anyone else because of the lack of a theory. But, oh my God, the numbers who have died under the swords and bombs of the opposite.



over irrelevant details (and convinced themselves, in the process, that doing so is a good idea), in order to avoid having to deal with the huge qualitative questions, viz. the GOLDEN PYRAMIDS, the elephants in the room that might actually matter. In the corner of the room, they have built extraordinary telescopes to study the fleas on the elephant's back. They have Grand Theories of Fleas, and now, wearing the wreaths of intelligence, are so obsessed with Flea Science that they can't see the elephant at all. It has become grey backdrop. It can no longer be described, cannot even be *considered*, because it cannot be classified as a species of Flea.

Now, as a teacher, I never ridicule a student for saying something silly. As far as I am concerned, a student can never say something silly, because he or she is trying to learn. One studying may err and should err constantly. Even the very "silliest" comment, which may seem hopelessly naive to others, is often the most useful of all, because it points to a misconception. Hence, it is essential that those *learning* be allowed to make all the mistakes they possibly can, without the slightest fear of criticism. This doesn't apply, however, to those in the business of *lecturing*. A lecturer tells people how it is. And that may be worthwhile, if folk need information the lecturer has. But the world does not need the information the lecturers of physics have. Indeed, precisely the opposite. When it is *dogma* being sold, antipodal to the truth, then the lecturer is no better (and less honest) than a fire-and-brimstone demagogue. The students are paying in praise, and the Establishment figure is a leech, sucking the vitality of youth.<sup>3</sup> Love, such as mine for physics and physicists, tolerates no such hypocrisy. I ridicule the status quo, in trenchant and unrelenting terms, not because I hate its proponents, but because I love them. To allow the continued fraud of a fraud is the very greatest *disservice* one can do him. In standing back meekly, in deferring to Authority, one is tacitly saying: "I don't believe you are better than this. I agree with your tragic conclusion that you are a meagre-hearted hypocrite, and am willing to watch you sell your inheritance for the sound of applause." The West, this ship of new barbarians, is chock full of frauds. And what do they believe?

Tosh.

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<sup>3</sup>Once again, I am no conspiracy theorist; they sit on the other side of the Table of Idiots. There are no scientific Politburos discussing how to snuff out opposition; the people involved aren't interesting enough for that. The whitecoats believe they are doing the world a service. That's why it's stupid to hate them for it. Laughing at them is right! The deception is *self-deception*. The White Man, in most cases, is incapable of thinking, and this is truest where minds are cleverest. A stupid hypocrite constructs low-IQ arguments to convince his low-IQ mind that he is superior to others; a smart hypocrite constructs high-IQ arguments to convince his high-IQ mind of the same thing. Which the more dangerous? The latter, by a country mile. The stupid hypocrite convinces only himself.

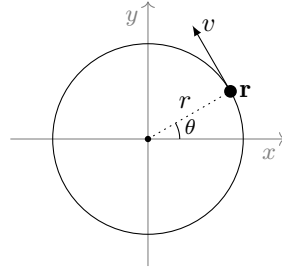
# Galactic Rotation Speeds

The first of the two golden pyramids addressed in this chapter is that of *galactic rotation speeds*. Put simply, the blighters are spinning too fast. *Far* too fast. Look at just about any galaxy in the night sky, and, according to current theories of matter and gravity, the stars in the outer reaches of those galaxies are like twirling dancers the instant after letting go. By all accounts, the stars at the edges of galaxies should be flying off and out, away into the voids of intergalactic space. But they aren't. Most definitely. The effect is ubiquitous and huge; since the galaxies we see (almost) all display the same effect, regardless of age, regardless of type, the configuration must be, on a very large timescale, stable. In other words, this pyramid is solid GOLD. Its mathematics is straightforward.

## The Mathematics of Orbits

The phase function  $\phi[t]$  describes rotation at speed 1 around a unit circle. A general circular motion, then, at any radius  $r$  and speed  $v$ , may be modelled by the complex-valued position  $\mathbf{r}$ , as follows:

We set  $\mathbf{r} = r\phi[\omega t]$ , where  $\omega = \dot{\theta}$  is the (constant) *angular speed*, i.e. the rate at which angle  $\theta$  is changing. This produces rotation at speed  $v = r\omega$ . So, setting  $\omega = \frac{v}{r}$ , we have a rotation:  $\mathbf{r} = r\phi\left[\frac{vt}{r}\right]$ .



Using  $\dot{\phi} = i\phi$ , we can calculate the velocity as the rate of change of position:

$$\mathbf{v} = \frac{d\mathbf{r}}{dt} = \frac{d}{dt} \left( r\phi \left[ \frac{vt}{r} \right] \right) = r \times \frac{v}{r} \times i\phi \left[ \frac{vt}{r} \right] = v \times i\phi \left[ \frac{vt}{r} \right].$$

The factor  $i\phi\left[\frac{vt}{r}\right]$ , being a product of scale-free phase rotations, has magnitude 1; therefore, by design, we get the correct speed  $v$ . Differentiating again, we get a second factor of  $i\frac{v}{r}$ . This yields  $r(i\frac{v}{r})^2$ , which simplifies as below, giving the acceleration as

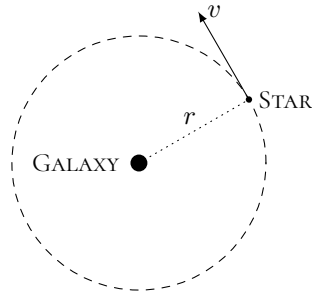
$$\mathbf{a} = \frac{d^2\mathbf{r}}{dt^2} = \frac{d^2}{dt^2} \left( r\phi \left[ \frac{vt}{r} \right] \right) = -\frac{v^2}{r} \times \phi \left[ \frac{vt}{r} \right].$$

The above confirms a standard result of mechanics: the acceleration, in circular motion, is towards the centre of the circle (the minus sign) and has magnitude

$$a = \frac{v^2}{r}.$$

In the outer reaches of galaxies, where gravity is exceedingly weak, the effects of space contraction and the slowing of clocks are entirely negligible; tens of thousands of light-years away from their peaks, the slopes of gravitational energy mountains are vanishingly shallow. So, on such scales, both according to the old paradigm and Unity theory, Einsteinian general relativity reduces to Newtonian universal gravity. So, we can model a GALAXY as a huge, fixed, central mass  $M$ , being orbited in stable circular motion by a star of mass  $m$ . Travelling through space, the only force acting on the star is gravity. So, in  $F = ma$ , we can use the force law of *universal gravity*. Furthermore, the star is moving in a circle, so the acceleration is given by  $a = v^2/r$ .

Newton proved that, to a distant STAR, a GALAXY can be modelled as a central mass. The result only applies if (almost) all of the mass  $M$  of the GALAXY is *more central* than the mass  $m$  of the STAR.



Newton's Second Law gives  $\frac{GMm}{r^2} = m \frac{v^2}{r}$ .

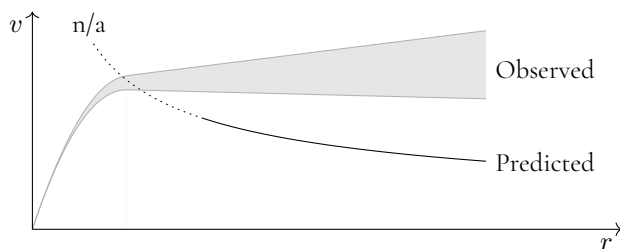
Divide both sides by  $m$ , the mass of the star. Physically, this is the result first described by Galileo: mass doesn't affect gravitational acceleration. We can also multiply by  $r$ . This gives the speed  $v$  in terms of the Cavendish constant  $G$ , the galactic mass  $M$  and the distance to the galactic centre  $r$ :

$$v^2 = \frac{GM}{r}.$$

Now, in any galaxy,  $G$  and  $M$  are constant, so this predicts a simple relationship between how far out a star is,  $r$ , and how fast it is going,  $v$ . Taking the square root of both sides, the speed of an orbiting star around a central mass should, at sufficient distance, be inversely proportional to the square root of distance from the centre:  $v \propto r^{-\frac{1}{2}}$ . Sorted. Except, when you look at the data... it isn't!

## Data and Discrepancy

The evidence of experiment says, emphatically *à la* GOLDEN PYRAMID, that  $v \propto r^{-\frac{1}{2}}$  is not the functional relationship between  $v$  and  $r$  for stars in the outer reaches of galaxies. The true relationship is fuzzy, of course, since galaxies vary in all sorts of ways both measurable and immeasurable (and measurement itself is very far from perfect) but, nonetheless, the data is golden enough to rule the above relationship out entirely. In fact, in most observed galaxies, speeds do not tail off towards zero, as would be predicted by the above relationship, but remain approximately *constant* as radius increases. This is shown in the much simplified schematic below. If one plots a graph of  $v$  against  $r$ , the curve doesn't descend towards 0, as predicted by theory, but remains more or less flat, somewhere in the shaded region. The right-hand end of this graph, i.e. far from the galactic centre, is the relevant part:



Galactic Rotation Curves, Predicted and Observed

There is one way of making sense of the data. The predicted curve is only predicted if the stars in question are in the *outer reaches* of the galaxy, i.e. if the majority of galactic mass is more central than them. It is this assumption that allows modelling, according to mathematics proved by Newton, of the galaxy as a *central* mass. This can be seen where the graph is marked  $n/a$ : one cannot apply the model “all mass acts as if at the centre” if one is close to the centre.<sup>4</sup> Hence, the data *do* make sense if the visible stars in the apparent “outer reaches” are, instead, in the middle reaches of a much bigger *parent* Galaxy. Such a Galaxy could then have outer reaches of its own which *would* obey an inverse square root curve, while ensuring that the smaller *galaxy* rotating at its centre would not.

<sup>4</sup>The dotted part of the graph would predict *infinite* speeds at the centre of the galaxy. In fact, the model breaks down, as all of the mass is symmetrically distributed *outside* the relevant point.

## Fairy Dust, Anyone?

According to Dr. Billy “Citation” McRigor, galactic rotation curves are flat because the majority of galactic mass is made up of something called FAIRY DUST. Every galaxy has a halo of this rationally acceptable *fairy dust*, whose necessary and grudgingly postulated mass far exceeds that of its observable stars. *Fairy dust* has never been observed in the laboratory, because it is, according to the Unison Choir of Paradigmatic Drones,<sup>5</sup> empirically magical and invisible. This has been proven by the data-driven data of Professor R.E.Search-Grant of the University of Trite and Impossible Fictions. In his rich, polysyllabic words:

“the distribution and nature of the *fairy dust* is exactly what it needs to be to match observed galactic rotation curves and my entrenched opinions. There is, among clones of myself, a longstanding precedent going back years for the many elegant and content-free sentences I have been paid to write and will continue to be paid to write, as long as  $\rho_{\text{doctorates}}$  remains high and someone with good breasts and bad self-esteem can sort out my midlife crisis. The hard data of the James Webb Space Telescope show unequivocally the need for a new jacuzzi at my chalet in the Swiss Alps.”

Now, I’ll explain precisely what FAIRY DUST/*dark matter* is shortly. In the Unity model, it is a simple and obvious thing, predicted and explained in natural terms, and needing no ad hoc hypotheses. But, before we get to that, it’s worth lingering a while in the old paradigm, because the problem of flat galactic rotation curves, and its accepted “solution” in dark matter shines such a bright light (ironically) on the schizophrenia of our civilisation, and the materialistic creed “Falsifiability Above Everything”. It shows that creed to be a thought-virus: not rational, not admirable, not clever, not wise, just a *superstition* of the oldest school, a modern philistinism of the soul.<sup>6</sup> The cosmologist maintains:

- (A) “Despite its non-falsifiability and non-observability by direct means, *dark matter* is real.”
- (B) “Due to their non-falsifiability and non-observability by direct means, *dimensions* beyond the three of space are not real.”

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<sup>5</sup>In this most respected choir, one must sing exactly the same tune as everyone else.

<sup>6</sup>A rule of thumb: the longer the word, the likelier it is to be bullshit. This is particularly true in English. The conquest of the *logos* can be seen in the dictionary. If you want to make your English *wiser*, take out the Latinate polysyllables and replace them with Anglo-Saxon folk words.

This is the Western error in every-cosm. Because it is a long way away, and thus non-threatening in a psychological sense, DARK MATTER is permitted a sort of grudging reality. Since it is quite impossible to explain the golden pyramid of galactic rotation curves without it,<sup>7</sup> the so-called “rational” circles of academia stuff the cosmos full of something magically invisible which has absolutely *none* of the properties they demand of other schools of thought: of religion, of philosophy, of poetry. The cosmologist maintains:

- Ⓐ “*Second-hand* perceptibility, i.e. empirical data needing mathematical interpretation, qualifies as empiricism. Therefore, flat galactic rotation curves prove the existence of dark matter.”
- Ⓑ “*Second-hand* perceptibility, i.e. empirical data needing mathematical interpretation, doesn’t qualify as empiricism. Hence, the Schrödinger equation doesn’t prove the existence of inner dimensions.”

If there is one thing that gets my goat, it is *hypocrisy*. The truth is, the physicist, in almost every instance, wants first and foremost to keep his career going, which requires, as far as his ego can imagine, that *his* version of physics survives each new onslaught. He is not really interested in the truth, he is interested in *being a physicist*. He was scared of the depth of Reality as a child and is still scared of it now; he likes his comfortable lab with its comfortable fictions, and he will use, even at the cost of hypocrisy, even at the cost of his very *soul*, all of the weapons in his arsenal—“Show me the evidence!”—to combat those who apparently threaten his status, his income, and, most importantly, the inner primacy of his ego. The cosmologist maintains:

- Ⓐ “The simplest theory which matches the data should be accepted as scientific, even if it requires the existence of elements of reality that are imperceptible. So, *dark matter* is scientific.”
- Ⓑ “The simplest theory which matches the data shouldn’t be accepted as scientific, if it requires the existence of elements of reality that are imperceptible. So, models that *broaden reality* aren’t scientific.”<sup>8</sup>

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<sup>7</sup>If you want to **see** the evidence for dark matter, look up the *Bullet Cluster*.

<sup>8</sup>This claim is most damaging. I have yet to come across an activity in which broadening one’s *concept* of that activity doesn’t yield positive results. Doing what some might see as a menial job remains menial and unpleasant, so long as one has a precise concept of it. Once the job becomes part of the broad sweep, however, that unpleasantness drains away. This is why egotists are such arseholes: because they live for the complexity of their self-concept, they cannot abide doing simple things.

## Below the Quantum

According to Unity theory, the default state of energy in the Universe is, contrary to everything Old Man Falsifiability believes, IMPERCEPTIBILITY. This is because, to achieve the packet-size encoded in the quantum  $\hbar$ , a substrate wave must have a certain extent. Particularly, it must extend the full thickness  $\delta w$  of the **Wave**. But this doesn't, of course, rule out the existence of wavelets that fail to make the grade—*natura non facit saltus*—it merely rules out their perceptibility. There are undoubtedly *incomplete particles* or WAVELETS, as I call them: waves that, while eminently Real, do not contain a full quantum of energy, i.e. that cannot, by emitting a full photon of light, shine, either directly, as the Sun, or secondarily, as the Moon. They are the waves that don't quite make it, having not attained the requisite mass to pass the *Particle Entrance Exam*.<sup>9</sup> In particle physics, there is copious and incontrovertible evidence for these sub-quantum wavelets. Their effects appear, albeit always at second hand, in every calculation made to describe happenings at high-energy colliders. Feynman diagrams are full of them, fizzing and buzzing; the quantitative predictions of quantum electrodynamics, the most accurate in the history of science, would be quite impossible without them; they make quantum field theory what it is.

In QED, these sub-quantum wavelets are known, in another misreading of the nature of things dictated by the Western error, as “*virtual electrons*”. Tarred with this nomenclature, incomplete particles occupy the same schizophrenic and uncomfortable sub-existence as so many concepts in self-proclaimedly “rigorous” scientific thinking. In the old paradigm, sub-quantum particles, which obey none of the Laws of the Cosmos, not even special relativity, are allowed “virtual” lives in realms of mathematics, while being denied physical reality by their very title.<sup>10</sup> Describing Big vs Small particles, the distinction between which is perceptibility and nothing more, with the caste-like taxonomy of metaphysics “Real vs Virtual” is antithetical to unified thinking, and, along with almost everything else the West values highly, actively promotes mental ill-health. This distinction is exactly as

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<sup>9</sup>The most readily visualisable sub-quantum wavelet, which can be taken to resolve the whole issue on its own, is an *incomplete electron*. This can be visualised as an electron wavetrain uncoupled and split. In other words, consider an electron that only occupies the *w*-front half of the **Wave**. In fact, since the overwhelming majority of the *luminous* mass in the cosmos is baryonic, it is likely that the overwhelming majority of the *imperceptible* mass in the cosmos is also baryonic. Nevertheless, you can appreciate and understand the full argument in reference to the *incomplete electron*.

<sup>10</sup>The *divine*, that crucial and eminently Real aspect of Life which our civilisation has lost the guts to address, is likewise tarred to nonexistence with “supernatural”. It's a meaningless word.

unwarranted as using “real” for the counting axis, “real-time” to describe events relayed over video, or “reality” to describe that emergent image we call *the world*. Again, let me be a staunch empiricist: so-called “virtual electrons” are a key aspect of the mathematics of QED, and must correspond to an aspect of *physical* Reality.

“Virtual particles”, whose physical existence is proved by collider data and QFT, occupy exactly the same borderland of existence and perceptibility as “dark matter”, whose physical existence is proved by astronomical data and GR. In both cases, the phenomenon is necessary, beyond all doubt, for any feasible explanation of the empirical data, and in both cases, the phenomenon is not classifiable in the world-image terms of the laboratory. Neither virtual particles nor dark matter can be described in terms of particles. This is because they are phenomena of the SAND. How does one phrase the question “Is this pile of SAND a sandcastle?” in the language of sandcastles? By definition, it is impossible. By using the language of sandcastles, we assume that everything is built of sandcastles; the words leave us powerless to speak of the SAND.

It is, as you may have guessed, not an *analogy* between virtual particles and dark matter that I’m describing. No. I’m describing an *equivalence*. According to Unity theory, a gravitational well is an enlargement of the inner dimensions; hence, Unity predicts that massive virtual particles, which are physically real but don’t make it over the quantum threshold, should gravitate; they should respond to and generate inner enlargements in exactly the manner that complete particles do. And, since the default state of energy is INCOMPLETENESS, we should expect that the majority of energy in the cosmos be in the form of sub-quantum mass, which has not summoned up the strength to become fully-fledged matter. Such mass, according to Unity theory, doesn’t shine, but nevertheless does gravitate. Remind you of anything?

DARK MATTER consists of *massive virtual particles*.

*Massive virtual particles* are DARK MATTER.

Both of these are Real. That’s the thing sorted. Two of the great mysteries of physics, each irreconcilable within the  $\mathbb{R}$ -cloistered “reality” of the world-image, settle to resolution in the  $\mathbb{C}$ -open Reality of the substrate. What joy there is in the depth of things! But to *understand* it, oh, to think about it at all, one must enact, as everywhere in Unity theory, a total inversion of the value judgements of the White Man, still, for all his so-called adulthood, living his mother’s game of peek-a-boo. In order to understand the question of DARK MATTER, one must ask it from the right perspective. One must see imperceptibility, unknowability,



unconsciousness, Mystery, the deep unfathomability of the Universal Mind, as *the default state*. This takes such elemental courage as few have. To reverse one's value judgements and read the information *behind* the world as Reality, one must summon the loftiness of spirit to see, comfortable in the contradiction, both one's infinitesimal place in the Universal scheme, and, in the same paradoxical breath, the Infinite grandeur of one's inner inheritance. No worldly person can do this. Hence, a paradigm-bound thinker, without a thought for the shibboleth of all physics, viz. self-knowledge,<sup>11</sup> gives implicit causal precedence to the observable matter in stars. Thinking it a courageous attempt on a Big Question of Physics, thinking it an admirable approach to the UNKNOWN, he asks:

*“Why does dark matter appear in halos around galaxies?”*

But this question fails as it is spoken. It doesn't have a satisfactory answer in any paradigm, because it is the wrong question. Its causal structure is backwards. It's as wrong as asking “What caused those flowers to arrange themselves underneath those bees?” or “What caused that tent, in all this wide open space, to erect itself exactly over those two campers?” To ask such a question is to guarantee that no understanding can be had. But, if we *invert* the value judgement, recognising that the larger Galaxy of dark matter is the *default* entity, then the question becomes:

*“Why do dark matter Galaxies have matter galaxies at their centres?”*

And *this* question, like so many in Unity theory, answers itself. PERCEPTIBILITY, i.e. having a full quantum of mass-energy, is a test that waves must pass, if they are to be perceived. That test can only be passed where the density of classical energy is high enough to generate *complete particles*. And where else would the density be high enough than at the centre of Galaxies of gravitating waves? Matter galaxies form at the centre of dark matter Galaxies because, of course, that is the only place they could possibly form. It is a breathtakingly simple resolution of all the nonsense: it takes a dark matter Galaxy to *make* a galaxy in the first place!

- ① ENERGY gravitates to form Galaxies of sub-quantum *dark matter*.
- ② DARK MATTER gravitates to form galaxies of quantum *matter*.
- ③ MATTER gravitates to form *luminous stars*.

Haha, beat that, O Servants of Darkness!

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<sup>11</sup>This is what Einstein meant when he said that “Science without religion is lame.” Without a sense of the deep, even the scientific *questions* one asks begin to bind one's thoughts.

## Structure on the Largest Scales

Having resolved, explicitly and without logical contradiction, the mystery of DARK MATTER, we can address another piece of abysmal idiocy. “Idiocy” is the kindest word I can use here: the hypocrisy is (remarkably enough) even worse here than it is with fairy dust. What passes as scientific thought regarding the *largest-scale structures* of the cosmos is, despite a great deal of dandy mathematical clothing, little more than a pack of lies.<sup>12</sup> The next GOLDEN PYRAMID, which gives its own lie to the Big Bang theory, is as follows.

The largest structures in the cosmos are known as FILAMENTS. These are structures, consisting of many superclusters of clusters of galaxies of stars, on a quite unimaginable scale. The Hercules–Corona Borealis Great Wall, the biggest of the lot to date, is estimated at 3 gigaparsecs long, which is around 1000000000. That’s big. The issue is that, with current estimates of cosmic age standing at a (remarkably overconfident) 13.7 billion years, there hasn’t been anything like enough time for these structures to have formed under the influence of gravity. Performing a thoroughly “back of an envelope” calculation, if we assume that a spherical region condensed to such a Wall in the  $4 \times 10^{17}$  seconds since the purported Big Bang, then the accelerations involved are of the order of

$$a \sim \frac{3 \text{ Gpc}}{(4 \times 10^{17})^2 \text{ s}^2} \approx 6 \times 10^{-10} \text{ ms}^{-2}.$$

Gravitational accelerations of that size are found in the outer reaches of *galaxies*. The gravitational accelerations predicted on the scales of FILAMENTS are many (think double figures) *orders of magnitude* weaker. Factors of trillions. I believe that's known as a shitload. Now, the calculation above is deliberately hasty, but there's no need for you to work out how much of a pinch of salt (it's quite a lot) to take it with, because the problem is a GOLDEN PYRAMID. The orders of magnitude involved are so overwhelming that it doesn't matter what the details are. Indeed, it's important not to pay them too much mind. The situation is flat impossible. There hasn't, according to the Big Bang theory, been *nearly* enough time for what we see empirically to have formed under the action of gravity.

<sup>12</sup>This may seem harsh. But one must call a spade a spade. When an alcoholic tells himself "I'm just a social drinker", it is a lie. It is not an *unforgivable* lie, of course, being an understandable self-defence against the very real pain of inner division brought about by... yes, the failures of his culture, but it is what it is. If someone sets aside the facts and, to the great cost of himself and others, fabricates a story for the purpose of maintaining his own self-image, what else should you call it?

## The Cosmic Web

As proponents of the Gigantic Space Kablooie see it, the big solution (steel yourself for yet more nonsense!) is: “the FILAMENTS of observable matter exist because they have been gravitationally attracted towards a cosmic web of dark matter, which... is arranged in filaments.” This is such guff. The COSMIC WEB does exist, yes, and it is certainly made of dark matter, yes, but it doesn’t answer the goddamn question! To propose such an “explanation” is to claim that the golden pyramid *could* have been made by the ancient Saharans after all, because all they had to do was paint gold leaf over the SILVER PYRAMID that was already there. Oh, of course!!! Silly me!!! It’s “QCD binding energy” all over again. Establishments can never resist a Big Lie, an idea laid out loudly with such Authority that is so ludicrous, so contrary to logic, so antithetical to any reasonable dialogue that the listener cannot help but feel *stupid* reading it, wondering if he or she has missed something. You aren’t stupid, and you haven’t; this is just where we are.

There is no indication, in the Big Bang theory, of how the COSMIC WEB itself formed. Nor is there any recognition of the fact that, since the cosmic web, which is made of DARK MATTER, is undeniably real, its existence demands *exactly* the same level of explanation as that of galactic filaments. This is such an obvious point that it almost seems absurd to put it in English. But that’s the state of play. When dealing with the evasive nonsense of a child or an addict, one must engage with the content only insofar as to say plainly:

*“that just isn’t true.”*

The Western scholar is an *addict* through and through. He is always wanting to calculate things, to predict things, to control things, to describe things, and he feels an abject sense of dread—the fear of God wrenches in his stomach—when the foundations of his theories start showing cracks. He cannot see that *hope itself* lies in the widening of those very cracks; he cannot picture what might grow back beyond The Addiction. All addicts think in this way: they define themselves by the next hit.<sup>13</sup> Fierz, expressing the mainstream view, asked Wolfgang Pauli:

“We [physicists] explore nature ... in order to control it—technically.  
That is certainly true. But with you that was never the motive. What  
it is then?”

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<sup>13</sup>The Western scholar, submerged in his concepts, thinks that if one learns, it is to *employ*; that if one writes, it is to *publish*; that if one sings, it is to be *heard*; that if one loves, it is to be *loved*.

Pauli, who was as smart as they come, replied:

“Why [do] we in physics explore nature? Alchemy says, ‘in order to redeem ourselves,’ as expressed through the production of the *Lapis Philosophorum* [philosopher’s stone]. Formulated in Jungian terms, this would be the production of a ‘consciousness of the self.’ ... Now this is not only light, but also dark, and must as a totality also contain ‘the will to power over nature,’ which I interpret as a kind of evil backside of the natural sciences, which cannot be eliminated. But the answer to [your] question will always remain that which to the rationalist is an odious expression, the ‘way to salvation’ [*Heilsweg*], ... against which man struggles in vain.”

Let me save you, you who are young and bright, from a lifetime in chains. With science, with drugs, with philosophy, with books, with sex, with sport, with poems, with music, with any of the myriad tools one may use to free one’s mind and learn of the Layers: one must *learn*, and *learn*, and *learn*, and MOVE ON. One must spend limitless time, focused, undeviating, sacrificing all, overcoming all, pouring heart and soul into the art, the science, the performance, the words... and then one must *let it go*. Retain no attachment. Expect nothing in return, love the *doing* itself. Tragic are the fools who learn a theory such as quantum mechanics, thinking that, in doing so, they have attained a *Tool For Use*. No. If one clings to what one has learnt in this manner, if one *elides* oneself with one’s learning, then, by the inevitable turning of the Great Wheel, that learning becomes a ball and chain. So physics has been to its adherents. Even GR, that loveliest work! It’s wrong! Of course it’s wrong! How could it ever have been right? What kind of canyon vision, underwhelmed with possibility, fails to recognise the falsehood of *every* idea, of *every* word, of *every* type of conceptualisation? All genius comes when one flattens the grooves. Words are just words, mathematics mathematics. Good old Zhuangzi said it:

“The radiance of Drift and Doubt is the sage’s only map. He makes no definition of what is Right but instead entrusts it to the everyday function of the thing. I call this the *Illumination of the Obvious*.”

If the concept-addicts of the West could but see the deep well of meaning beneath this statement, so much unnecessary pain could be avoided. In particular, the tragedy of the Age of Materialism, born of the sickness of European men and

now most obvious across the pond, could be cured. There is so much to be cured! It is no coincidence that America has, all by a long chalk, the most money, the most physics, the worst physics, and the worst mental illness. All of these come hand in hand. The nation of those Puritanic men who tried and failed to cure their Europeanism by *outer* motion now epitomises the Western error, more so than even old England (and that's saying something).<sup>14</sup>

How tragic is the man who loves his theories.

And what has this tragedy done to *true* love? What has this tragedy done to *woman*, who was before honoured to be loved, honoured to love, honoured to carry the image of the soul owed to God? Alas, reduced her to a concept of man, a pink-caked pygmy caged in tropes of equality. Woman, whose nature was never to be so, never to be equal to man, never to stoop so fucking *low*, never to fly so *high*, but rather to move in a different dimension, PERPENDICULAR to man. Why else all the preposterous wrangling about gender? Who but an unhappy fool gives a shit? Grow up, I say. Be stronger than that. The identity wranglings are an acute symptom of the greatest disease ever to strike our species: the disease of *words*, addiction to theory, such as reduces an individual, a glorious peculiarity of time and space, to a group, to a comprehensible set of rules in projection, in *linearisation*, in the trampling to death of strange beauty.

Woman, in the cathedral where her heart beats, gives not a fig for theory. She *feels* the world in a way that man refuses to; she loves and hates deeply. Oh yes, you Scientific Men, you are good at logic, at algebra, at knowing. And yet, for all your mighty intelligence, you have no idea why she looks straight through you. I'll tell you why. She's bored of your mind-cage, your insipid taming of all spirit and prowess, your dutiful professionalism. Women understand, way deep down, in a way that cannot be said, only sung, that theories make for fools. The heart brooks no theories. To love, one must live with an *open* heart, radiant, aware, welcoming all things, welcoming joy, pain, death. As a man, one must use words to overcome

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<sup>14</sup>In America, English addiction to concept—our tongue is a prison of its own—has been distilled and refined to an active *choice*: an intoxicating liquor, the World in a Shot, at first so refreshing, so full of zest, but soon so empty, soul-dry, bereft. It is no coincidence that Big Science, Big Pharma, Big Government and the Big Military all take their most extreme forms in the US, and that that is where the *ailments* of the world—addiction, hate, mental illness and greed—are most starkly displayed. They are two sides of the same coin. Increasingly, the story of physics is the story of American physics, and it is far from a happy tale. Oh, how I love Americans! And how I decry the commercial machine that grinds them daily into dust. It is there where the derision of inner things is loudest, where the split between the levels of reality is starkest, where the psyche of the White Man, his terrible arrogance, his pride, his status and his job-petty scragging have become crystallised to fortified tenure.

words, science to overcome science, logic to overcome logic, until one reaches a state beyond all models. In this state, life can no longer be controlled. There is no plan. Thoughts come and go, actions come and go, and all is Bliss. And love? Love becomes the only thing worth a damn.

Aphrodite sees you then. Why? Because all those stories, all those myths, all those pieces of life and love that the matter-sick wish to shove to one side, they were *right*. Einstein was right; Pauli was right. Seek the Holy Grail! Seek her, yes! Without expectation, without fear, without want. Live with love, with courage, with nobility, with laughter, with unswerving loftiness of purpose, making so many “errors” that one’s whole life is error, and you will find love. It won’t be what you wanted—why should she condescend to be so *known*?—it won’t be what the magazines told you you would find; it might be the boy next door or the girl beyond, the man below or the woman above, but you will find it. She may not love you, he may die, but you won’t care. You will know, in the place beyond words, that *you* love her.

And, when love is true as that, it matters not what happens.

# 21

## THE UNIVERSE

All material beings return to me at the end of a cosmic cycle, and, at the beginning of a new cycle, I emit them once again. Enduring in my own nature, aeon after aeon, in each epoch I generate this great throng of creatures, according to physical law. And these actions do not bind me, Dhananjaya. Witnessing all as a neutral, I am free.

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*The Bhagavad Gita*

Happily, the Universe is *far* older than, as claimed,  $13.7 \pm 0.2$  billion years. It's surprisingly good news, as I'll explain. That number has, with laughable (or lamentable) precision, emerged from one erroneous idea, namely the conversion of general relativity from a theory of GRAVITATION, which it most certainly is, into a theory of COSMOGONY, which it most certainly isn't.<sup>1</sup> Even Einstein, bless him, fell into that trap. GR has no empirical validation in the distant past. Yes, that's right, precisely *zero*. So, while 13.7 billion years, as the age of the cosmos *according to GR*, is accurate to one decimal place, it is nevertheless, as an actual value, completely false! There's a thing. You see, the oh-so-diligent error bounds

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<sup>1</sup>Cosmology is the study of the cosmos; cosmogony is the study of its beginnings.

of cosmology (and numerical-statistical thinking in general) never point out the *real* information, concerning the very significant, almost guaranteed likelihood that *The Model Doesn't Apply At All*. The age of the cosmos is  $13.7 \pm 0.2$  billion years, yes, but the number also has a 99.9% probability of being absolutely nowhere near that. That's the thing with quantitative theory: it doesn't work. Yes, that's right, it just doesn't work. Scholars toil away for decades, squabbling and citing, discussing and disproving, tinkering with the third and fourth decimal places of an algebraically rigorous model until, at some later date, along comes Copernicus, and all that boring calculation is blown away in the blink of an eye. Just think how much has been built on GR! Just think of how much work there was in a hundred years of study at every university in the world. And it was all wrong. GR simply isn't a model of cosmogony. It *can't* be. It makes no mention of five of the dimensions of the Universe, and its characteristic treatment of "clock rate", modelling it as a physical axis, only applies when analysing weak-field gravity. It isn't a Universal theory; it isn't even a *cosmic* theory. So, let me put it bluntly: *all* quantitative analysis of the ancient past (20th and early 21st century cosmogony) is bogus, without scientific merit.<sup>2</sup>

Let's have another think, with minds open to all possibilities, about the data that "proved" the Big Bang theory in the first place, namely ① *galactic redshift* and ② *cosmic microwave background radiation*. These are GOLDEN PYRAMIDS that, due to their sheer enormity, survive the almost total blurring of data concerning the distant past. Viewed at the broadest level (and a golden pyramid should always be viewed in this way) they are:

- ① *Galactic redshift*. The light from distant galaxies is shifted, in a consistent fashion, towards the red end of the electromagnetic spectrum. This is the equivalent, in light terms, of the siren of a passing police car lowering in pitch as it speeds away from you. In other words: space is expanding.
- ② *Cosmic microwave background (CMB)*. There is, everywhere in the cosmos, a smooth, low-level hum of radiation that is not produced by stars. Because of its remarkable, but not quite total, smoothness, the Universe must once have been a small, but not minuscule, sea of radiation.

*Galactic redshift* suggested the Big Bang in the first place. In the old paradigm, the fact "space is expanding" does lead inexorably back to the *Atome primitif* idea,

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<sup>2</sup>Again, you can see why the old guard, some of whom have won Nobel prizes for this trash, don't want to hear the truth. Clever people, unlike the wise, don't like becoming temporary fools.



viz. “Everything was once in one place”, which was duly proposed by Lemâitre in 1931. It was, and remains, the obvious conclusion in the space-as-backdrop paradigm. And the CMB, discovered in 1965, then cemented the idea. Again, it’s easy to see how a faint hum of radiation could be taken for the smoke of the Big Bang’s gun.<sup>3</sup> The arguments seemed convincing, and still seem so to a great many, because the only viable alternative *at the time*, the incumbent steady-state theory of an infinite, eternal cosmos, could not explain either set of data.

But Unity can. We know that *space* is expanding, yes, but, having set aside the Western error, we emphatically do not know that the UNIVERSE is expanding. There is no evidence suggesting such a thing. Indeed, we can be sure, *a priori*, that such total expansion *isn’t* taking place, since, contrary to all physical logic, it would require the phantasmagorical *Creation of Substance from Nothing*. Such an expanding Universe, considered simply enough, is nonsensical. So, let’s put that garbage aside. And what remains? Well, reassuringly, there remains precisely one scenario, in which there are no singularities, no magical generations from nowhere, no suspensions of disbelief at the ineffable hands of God. And, thank the stars, it’s *much* better than the Big Bang. In it, we are going to live forever.

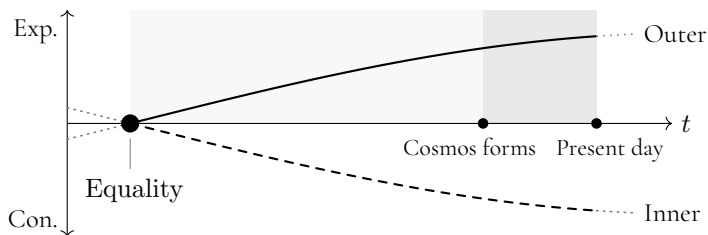
## The Equality Model

According to Unity, there is, in one sense, a steadiness to the state of things; the “amount of Universe” is fixed. I have expressed this fact in the SUBSTRATE EQUATION  $R_8 = 0$ . Nevertheless, despite this overall constancy of amount, changes are possible. Indeed, they happen all the time. On another level, nothing is steady: we are waves on a shimmering sea. Small, local expansions/contractions  $\Psi = \psi_{\text{seen}}\psi_{\text{hidden}}$ , such as generate the phenomenon *matter*, produce the world as we know it. We have considered them extensively in this book. But another possibility also remains, which we have not yet considered. In the same logical breath, large, *global* expansions/contractions of the substrate are also permitted. And, consulting the galactic redshift data, it is empirically clear that these do, indeed, take place. The  $(x, y, z)$  dimensions are evidently bigger than they were in the past. This yields one inescapable conclusion. If, a very long time ago, the OUTER dimensions were much *smaller* than they are now, then, since the amount

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<sup>3</sup>The CMB is indeed the smoking gun of *something*. But that something isn’t the Big Bang. I would put the proportion of cosmologists who have actually considered *whether* the Big Bang happened or not at less than 1%. Most people do not think like this: they take Established ideas as gospel.

of Universe is constant, the INNER dimensions must have been much *bigger* than they are now. Keep running the clock back with *this* thought in one's head, and, rather than hitting a physically illogical Big Bang, one hits a feasible scenario. At some stage, *way* back in the mists of time, the INNER and OUTER components of the Universe must have been the same size. I call this state Equality.



Sizes of the inner and outer dimensions since Equality.

By construction, this idea is consistent with redshift data. What about the CMB? Well, at Equality, the Universe was a symmetrical ball of eight dimensions. How big was it? Averaging the present day dimensional sizes, which we can take, to the nearest ten orders of magnitude, as  $10^{-10}$  and  $10^{30}$  metres, the Universe has an eight-dimensional volume of the (*very* approximate!) order of

$$V_8 \sim (10^{-10})^4 \times (10^{30})^4 = 10^{80} \text{ m}^8.$$

Taking the eighth root gives  $10^{10}$  metres, which is comparable to the size of the Solar System.<sup>4</sup> So, at Equality, *all* of the dimensions of the Universe, while small next to space now, were still huge compared to the periods of matter waves. This has a key implication. At Equality, because there were no small dimensions, there can have been no *matter*. But energy cannot be created or destroyed. So, the energy now stored in mass must already have been in existence. As what? It must have taken the form of RADIATION: waves propagating in large, open dimensions. At that time, the now-inner (*W, X, Y, Z*) dimensions were the size of the Solar System: the energy now stored coherently in protons and electrons was propagating *incoherently*. In other words, there was, at Equality, only a great sea of radiation. Furthermore, since gravity, in the Unity model, is generated

<sup>4</sup>If it seems strange to imagine the Universe so compacted, remember that the Universe was an *eight-dimensional* ball the size of the Solar System. Currently, four dimensions are *subatomic* in size.

by periodic matter waves circling *small* inner dimensions, there was no gravity, meaning that the sea of substrate waves can have had no macrostructure, only small-scale statistical fluctuations. This dictates that the state of the substrate at Equality was almost perfectly ISOTROPIC, i.e. the same everywhere. The model predicts, then, that the echoes of this almost perfectly isotropic sea of radiation should still be coursing around the cosmos. And so they are: the CMB.

In short, the Equality model predicts redshift and the CMB, as observed. “Well”, an old-guarder might say, “so does the Big Bang.” But that just isn’t good enough. If we have any respect for reason, then the Big Bang shouldn’t be thought of as a viable scientific theory. It doesn’t satisfy the entry requirements for an idea to be considered *rational*, which are:

- Ⓐ MAKING SENSE. A number of golden pyramids rule out the idea that the cosmos came from a singularity. The four that shine most brightly are:
  - ① The total impossibility, as physical reality, of the mathematical model *singularity*. This is swept under the carpet by the erroneous conflation of mathematics and physics.
  - ② The timeline of *large-scale structure*, which cannot have formed under the action of gravity given the Big Bang’s age, 13.7 billion years, for the cosmos. This is swept under the carpet by the *cosmic web* idea.
  - ③ The logical impossibility of *absolute expansion* of the universe, which lacks any physical entity against which to expand. This is swept under the carpet by content-free arguments referring to “expansion with reference to the GR metric”.
  - ④ The *horizon problem*, in which the homogeneity of the CMB requires the universe to have maintained its post-Bang homogeneity until it was of very significant size. This is swept under the carpet by *inflation*, which is an exercise in fiction and fine-tuning.
- Ⓑ HAVING A THEORETICAL BASIS. All quantitative analysis in the Big Bang theory is based on the mathematics of GR, using the Friedmann equations or similar. However, irrespective of the desire of cosmologists to “have a theory with which to write papers of quantitative cosmology and thus have a job”, GR is simply **not** a theory of cosmology, let alone cosmogony. It is a theory of *gravity*, with a limited domain of validity. Given that it does not take the inner dimensions into account, it is guaranteed to break down, and to break down *completely*, when applied to the distant past.

# Cosmogenesis

I consider the Big Bang theory obsolete. So, let us move on! In the previous diagram of dimensional sizes, I suggested that there was a long *pre-cosmic history* following the state of Equality. This is logically necessary in the Unity model. For the COSMIC WEB of dark matter to form, subsequently to birth galaxies of luminous matter, the inner dimensions must have grown small enough to permit gravitational attraction. That's a lot smaller than their size at Equality, which I estimate as comparable to the size of the Solar System.

In Unity theory, there was an epoch of *gestation* between Equality and the birth of the cosmos, during which the dimensional oscillations taking place at the Universal level formed the topological structures<sup>5</sup> which allowed for the creation of a cosmos. That birth was the generation of a *secondary* entity on a *primary* entity, a ripple on a preexisting, and indeed eternal, sea.<sup>6</sup> COSMOGENESIS occurred at a certain inner size, when the configuration "proton" grew massive enough to ensure, in the manner of heavy balls on a trampoline, its own stability. It is likely, given that colliders regularly smash protons to pieces, that this size was not much larger than, perhaps within an order of magnitude of, today's value. Hence, it is likely that the pre-cosmic (or rather *inter-cosmic*) aeon leading up to that time may well have stretched into the hundreds of billions of years, allowing time for the COSMIC WEB, the largest macrostructure of the material cosmos, to form.

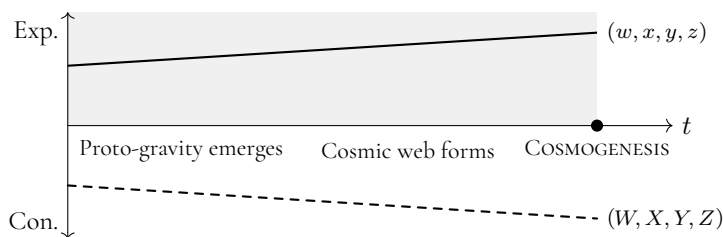
It did so, contra the Big Bang, *gradually*. Like a storm, it appeared where it wasn't, but nothing was "made". At COSMOGENESIS (specific name, broad epoch), the Galaxies of dark matter that we now "see" or rather infer strewn throughout the skies reached a critical point. Isotropy of the CMB indicates that, as predicted by the Equality model, this point was reached simultaneously (on the scale of aeons) everywhere in the Universe. This doesn't mean, however, that every wave propagating in the  $(X, Y, Z)$  dimensions suddenly became a proton; rather the

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<sup>5</sup>I believe that Universal oscillation produces the global topologies of the inner dimensions by means of the helical (and thus local/geometric) coiling of Riemannian geodesics. To put it another way: the overall movements of the Universe cause *twisting* of the substrate, which then, combined with the propagation of the **Wave**, mimics the effects of cylindrical structures.

<sup>6</sup>The idea that the cosmos could be a *secondary* entity, whose existence depends on a *primary* entity, the Universe, is anathema to current thinking. But, if you are tempted (as many who read this book will be) to dismiss it as mysticism, remember that the paradigm of the last few hundred years, viz. the assumption that the cosmos is the fullest extent of reality, is exactly that: an *assumption*. In scientific terms, it is a **HYPOTHESIS**. There is no reason, in fact, to assume that the cosmos is the be-all and end-all of existence. And, as I have shown, there is much reason to believe otherwise.

possibility of stable protons emerged, in a broad sense, everywhere simultaneously. Exactly as with stars forming under the influence of gravity, that possibility can only have been realised in spatial locations of the greatest density, viz. on the mountains peaks of the COSMIC WEB. This prehistory is sketched below, without any attempt at accurate scaling. Equality is far to the left of the page.



Prehistory leading up to COSMOGENESIS.

Even *after* the critical point of COSMOGENESIS, which, unlike the formation of the cosmic web, can reasonably be taken as having occurred at a particular time, the creation of the matter of the cosmos was a *slow process*. Indeed, it is a slow process that is, no doubt, ongoing today. As space has continued to expand, the inner dimensions have continued to shrink, and the energetic favourability of the proton has increased, as has the strength of gravity; this has caused broader and broader areas at the centres of dark matter Galaxies to form core galaxies of matter. These, in turn, as their own densities have grown large enough, have condensed into stars and planetary systems, such as the one that gives us Life.

The above account resolves the *horizon problem* immediately. The reason that the CMB is so close to perfectly isotropic is that the formation of the cosmos was not brought about by anything cosmic. Without reference to the Universe, the isotropy of the cosmos is a GOLDEN PYRAMID: distant points of the cosmos seem “magically” to have known to do something all at the same time. In the old paradigm, this can only be swept under the carpet by nonsense such as *inflation*.<sup>7</sup> But we have no need of such fluff. The Equality model has no horizon problem. Since the cosmos is secondary, global motions of the substrate can effect changes *everywhere in the cosmos*, with no violation of causality. One can picture this in Plato’s cave. If a person sitting next to the fire puts both of their hands up at once,

<sup>7</sup>This has no theoretical basis other than in regard to the exact phenomenon it is trying to explain. It is science of the poorest quality: a tool for avoiding looking the facts in the face.

the hand-shadows on the wall rise “simultaneously”, at a distance from other. If the shadows are viewed as physical objects, this violates causality. But, as ever, from the correct perspective, things make sense. Shadow movements on the wall are caused outside that world; causality flows *to* the Wall of Shadows, rather than *along* it. In the same manner, the “simultaneous” arrival of the proton in all cosmic locations violates no causality.

So yes, the CMB is a smoking gun. It is certainly the echo of something past. That something just isn't the Big Bang. Rather, the CMB is a memory of a time before the wind of the Universe blew, when the ripples we now know as the world had not yet stirred on the face of the Deep. Consult the data, you'll see it's true. Set aside the nonsense, set aside the want, pay no attention to the theories of wanting, and *make up your own mind*. Become the looking glass of God, open your mind to the potential of Ages, and you will know Bliss, the smile that smiles the child. The wise know that a life is a small thing, a butterfly's dance on a mountain peak. And there is bliss in the knowing. But now know this. Step outside, outside, and farther outside, eliding your mind with the mind of God, and you will see: even the COSMOS is such a dance. The aeons of man, the aeons of matter, the aeons of the very stars, of space itself, are chapters in a greater Book. Our lives, our worlds, our cosmoi are there to be experienced, yes, and we should experience them with all vigour, en-joying them with the deepest of knowledge, filling them with love for all, love for Nature, love for the symphony that plays in the notes. But the material things of the world will pass; they are nothings and nothings, mere sighings of breath. Even the COSMOS will pass away, even the very days of matter. So, don't cling to the world in things, don't cling to the life of words, don't cling to the ways of stature and greed. Set all that aside. We are but cosmic mayflies, yes, but so is the *cosmos* a mayfly. The great Wheels of the Universe roll on, so why be glum? Why be downhearted? Why blame yourself for what you are, wishing yourself something else? You are what you are. And God, whose love, in this present day, is the Mind that truly *lives*, wants only to experience You, exactly You, You in all your curious glory.<sup>8</sup>

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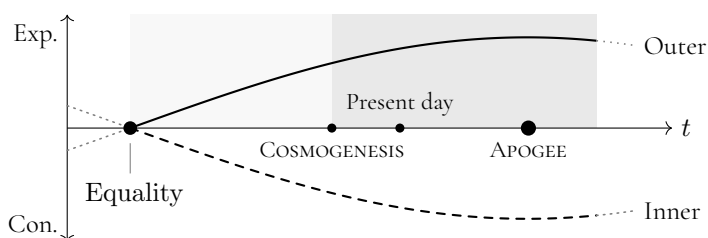
<sup>8</sup>I write this, with its own immediate commentary, very clear about its dipping beneath the layers. I urge you, my dear pupils, not to limit yourself to academics, not to see the Grand Visions of the inner life as somehow distinct from, somehow less *real* than hard rationality and algebra. The THEORY OF ONE is not a theory of physics, nor of mathematics, nor of philosophy, nor of religion. It is a theory of that which cannot be referred to. There is, beneath the trite data of the word, so much more than you can reason. You can only imagine. So imagine it. Believe in your depth, in your might, in the nobility of your blood, and it will be so. You cannot know, yet, what courage you will find.

# The Undying Universe

What does the future hold? What is the fate of the cosmos? What is the fate of the Universe, indeed? Unity theory gives a firm answer to these questions, and they are, if I may say so myself, far more satisfactory than the ones provided by the bullshit Big Bang. What a joy it is to be brave! At the present time, the outer dimensions are expanding and, *ipso facto*, the inner dimensions are contracting. That much we know. This time, run the clock *forward*. As the grand oscillation of the substrate, the expansion/contraction of the Universe entire as an undulating fermion, continues away from its prior state of Equality, what will happen?

Space will continue to expand, yes. But that's less relevant, in fact, to the fate of our world than the continued contraction of the inner dimensions. Smaller inner dimensions, as the future must hold, mean higher mass, stronger gravity, and greater stability for the proton. So, as the cosmos continues to expand, its protons will keep getting more and more energetic. In other words, more and more energy will be stored in MASS. But this is not a process that can continue indefinitely; there is, by definition, a finite amount of energy in the Universe. So, irrespective of the details, there must come a point when the energy of the global oscillation of the Universe, which was all potential at Equality, is utterly spent.<sup>9</sup> At this point, the grand undulation of the Universe will come to a halt. The Pendulum of the Ages will *stop*.

The Universe will have reached APOGEE.



A cosmic cycle, from Equality to APOGEE.

<sup>9</sup>The part of this which isn't clear to me is the future of the **Wave**. It's rather hard to visualise. However, I find it unlikely that the **Wave** would do anything other than continue to progress at APOGEE and beyond. The *stopping* of a preexisting wave requires more justification, after all, than its continued propagation. I will be most interested to hear thoughts on the matter. I have tried to keep my theory as broad as possible, precisely to allow such thought.

At APOGEE, the overarching structure of cosmos will, it is more than likely, be what it is today: there will be protons and electrons, atoms and molecules, matter and 3D space. However, it will certainly *look* very different, and its physics will, in quantitative terms, be almost unrecognisable. The proton will be much heavier, gravity much stronger, and a far greater proportion of the cosmic web will have been converted into matter. Each of these effects will have contributed to the burning of heavy elements in stars: the fusion not just of hydrogen into helium, but helium into lithium, lithium to beryllium, and so on up to the apex of atomic stability, which currently stands at iron.<sup>10</sup> It is likely, therefore, that the filaments of the cosmos will have forged themselves to threads of metal. APOGEE, I imagine, will be deep ferrous stasis, a quiet plain of ancient stars, unshining. This isn't far removed from the bleak steppe of thermodynamics espoused by the old paradigm, whose nihilism is so characteristic of Western thought. But what happens *next*, in the two models, is very different.

The Unity model is clear; there is a basis for hope. There will be no terminal heat death; Life won't surrender tamely to the Second Law of Thermodynamics. In other words, it's all going to work out!<sup>11</sup> At APOGEE, with the expansion of space spent, the inner dimensions will be more tightly wound than today. Protons will be spectacularly energetic; they will be poised, by dint of their masses, on top of an energy hill, on top of an energetic Olympus, indeed. And, as we know, if there is a way down from such heights, then Murphy's Law holds: descent will follow. And there is such a path. An *expansion* of the inner dimensions, from a state of APOGEE, will *reduce* the mass-energy of protons. Hence, since there will be no energy cost elsewhere, this is exactly what will happen. It's exactly what *must* happen. The pendulum, having swung all the way out, will begin its long swing back. The mass-energy of protons will not only stop the expansion of the outer dimensions, but will reverse it. The Universe will return towards Equality.

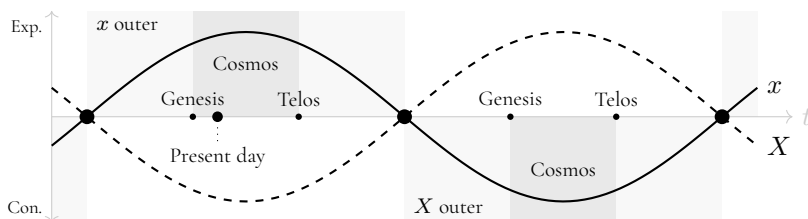
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<sup>10</sup>Changes in the sizes of the inner dimensions must produce changes in the relative strengths of the fundamental interactions. Therefore, the apex of atomic stability will not remain at  $^{56}_{26}\text{Fe}$ , the element we call iron. The nuclear Valley of Stability will, along with the Periodic Table, look very different. Nevertheless, whatever ends up at the apex at will have much in common with iron.

<sup>11</sup>For all things good, this is such an important fact. If you maintain, as so many in the West do, your self-concept as being small, bounded and describable in words, you will remain small, bounded, describable in words and thus, by the incontestable facts of biology, doomed to die. If, however, you *broaden* your self-concept, rendering yourself (as you truly are) the Universal Mind witnessing the details of a human life, you will become so. And, in that moment, stepping out beyond the mundane to become One with all things, you will be free of all bonds, even death. You, having broadened your self-concept, will become, in an empirical sense entirely devoid of mysticism, immortal.



And what will become of the cosmos? Well, just as the cosmos coalesced as a secondary entity on the primary Universe, so it will *disperse*. As the vast outer dimensions begin their long journey back towards the size of the Solar System, the tiny inner dimensions will make the same journey, from the other direction. They will grow, thus reducing the mass and hence stability of the proton. And, eventually, when the Universe has returned to its present state and beyond, the transition at COSMOGENESIS will be reversed. At a critical inner size, the proton will no longer be stable, and the matter galaxies of the cosmos will fall apart. No physical laws will be broken in this dying, rather the structures of the cosmos will dissipate, merging back into the underlying substrate as sub-quantum matter and radiation. This return to the fermionic CMB sea will be COSMOTELOS, the setting of the cosmic sun.



Two cosmic cycles, forming one cosmic period.

But even this won't spell the end. For, upon return to Equality, the Universe will have returned to its prior state. Not exactly in the minor detail, for there is no reason why it should, but identically in its overarching structure. Two consecutive states of Equality, separated by perhaps a trillion years, must contain the same average energies, the same Solar System size, the same CMB-generating sea of fermionic radiation. And, hence, since the last Equality birthed a cosmos, so must the next. That cosmos will have the same rules as this one, yes, the same stars, the same planets, the same rocks, the same clay. But Life? That's a different matter. The same story of evolution, guided by the falling dice of aeons, must produce beings and worlds of beings inconceivable in this one. And you, as Mind, will experience them all. Your life, indeed, as it exists now, is a wonder never seen before; you are, if you can find the courage to admit it, exactly what the deep One yearns for: Life that knows itself, Life that knows the One. Admit your grandeur, admit that Oceans of time live on within you, and you will know the happiness of the simple child. I wish you all the best in your seeking.

# Who Are We?

Who are we? From what did we spring? What is our place in the Universe? In many cultures, and all happy ones, these questions have deep symbolic answers. *Creation myths*, which our culture seems determined to read as ancient physics,<sup>12</sup> are tales that, welling from the springs of the Unknown, marry a human being to nature, him with the Sky, her with the Earth. They give scale, perspective, the *correct* perspective, indeed, which sees a human life as a small thing, the swoop of a swallow, a moment sparkling between birth and death. So grounded, so elevated, so peacefully at home in the world and beyond it, a cultured person (no materialist is this) melds with the light of their surroundings. They have no need to vanquish, to conquer, to overcome, because their story is the story of others; their story is the story of all things. They look upon Ozymandias, those trunkless legs, and chuckle: "Poor bastard."

When a culture has the right stories, it has the right medicine. But it has long been clear, to those with the hearts to know it, that we, much to our unhappiness, do not. Increasingly, the young have no faith in the old; they see no courage there; they have lost faith in their *people*. Modern folk, we are told, ought to have no people: folk wisdom is thought outdated. And, as a result, there is, swarming through our teenage and post-teenage years, an epidemic of mental illness we pretend we don't have. Our medicine is trite. Yes, we have antibiotics; yes, we have lithium; yes, we have MRI. And that's fine. But such things, when it comes to the challenge of challenges, viz. the HUMAN CONDITION, are no help at all.

They are solutions proposed *on the wrong level*.

LIFE is a challenge. And the hardest part is, for many, coming to terms with exactly that, LIFE. Just sitting quietly in a room. Doing no thing. For that, alas, we have no medicine at all. There are no stories; there is no guidance. And, when the young mind feels the chasm, feels the division of mind and Mind that every conscious person must feel, feels the very thing that makes a human *human*, they are given no help in coming to terms with it. Everywhere they turn, the answer is the same: a bemused blank. "Get on with the practicalities; learn a useful skill". But that's exactly the problem. The world doesn't need more people with useful skills; it is those with useful skills who are choking the oceans. The world needs more genuine Fathers, those who have made their peace with God, those who can sit with a holy smile and tell the children stories.

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<sup>12</sup>And I thought scientists were supposed to pay *most* attention to the domain of validity of a model!

In short, the world needs more folk who enjoy the very fact of LIFE. It's a strange juxtaposition: in clutching so tightly to the concept of LIFE, which is a concept just like anything else, folk forget to *enjoy* it. Yet, at the same time, without wise ones to cure them, they fight ever harder to cling to it. We in the West, due to our failure and the writing of the anti-myths, believe we should seek the right medicine for DEATH. This is perhaps the greatest error a human being can make. Oh, the body resists death, yes, and so it should. But why should the *witness* of life? The Universe no more cares about death than the ocean does the soaking of its waves through the beach. That is simply what waves do. DEATH, to a culture that has the right stories, is a welcome guest, a gentle sleep, not because folk wish for it (how misguided to wish for anything!), nor because they despise life, but because life and death *Are Exactly What Is*. The truth is a truth of life and death, joy and sorrow, not the one over the other. The loving of Life, the true accepting of Life, is to experience it fully, truthfully, honestly, without the numbing blankets of self-persuasion or theory.

But consider the White Man's tale of heat death: our *Fable of the Infinite Cold*. Consider our own myth. Yes, MYTH. Make no mistake about it; the Big Bang, as most Western thinking, is every bit as much a fiction as "Darkness moved across the face of the deep." *Fiction*, i.e. elements of truth held in the comprehensible matrix of a narrative. The Big Bang is, in its broad brushstrokes, a comprehensible narrative. It is also factually incorrect in binary ways. We have fallen prey, as has every culture in history, to the notion that our take on Reality is The Correct One, despite the fact that *every* culture in history has been wrong. And there's nothing wrong with being wrong, as long as you're wrong in the right way.

To Cora, his love, Hawkeye said:

"My father's people say that at the birth of the Sun and of his brother the Moon, their mother died. So the Sun gave to the earth her body, from which was to spring all life. And he drew forth from her breast the stars, and the stars he threw into the night sky to remind him of her soul."

How accurate. How could one not feel at peace with a world in which Sky and Earth are houses for the heart? How could one not feel a reverence for Nature, one's mother, the womb of all life? How could one not live accordingly, born of the loam, rising from it as a fountain, a spring, a moment bubbling, yes, but soon to sink back just as easily, floating down through the towers of age into the bosom of the Universe?

Consider, then, once again, the Western myth, but now with eyes open to the fact that it is completely *untrue*. Remember the Mayans, with their blood sacrifices? To me, this is far, far worse. Imagine hearing of a culture, lost in the darkness of time, some tribal people of the back end of Europe, who taught their children this:

“The universe has no purpose. It was born of randomness. The truth of life isn’t oneness with the universe; there is no oneness with the universe. Your life is a concrete thing, nothing more. And, when you die, your bones will shrivel; but not just your bones; so too will your *essence*. Life itself will wither and die. We are but a temporary experiment, a caravan of figures in a long, cold desert. In the long march of days, the story of your life will never be told. The universe will slink back, star by dead star, into its natural state, which is the vacuum, *rigor mortis*, nothingness. And that will be it. Joy will crawl under the porch to die, leaving a bleak steppe of thermodynamics for all remaining time. You, and all those whom you love, will be utterly forgotten, not because new children dance, thinking only of their own spring seasons, but because no more children will dance. Cold rock has no memory, and nothing will become of nothing.”

Now, if this was the truth of things, I hope that I would have the strength to face it, to welcome life, to welcome death. I did believe this, indeed, for a long time, because that was all I was taught. I did not, however, sink into misery and despair, although I had to deal with enough, as we all do. The reason for my not capitulating was, I think, that I never *truly* believed the White Man’s anti-myth. Oh, my conscious mind did, yes, and, if asked, I would have told the same story. But the deep part of me, the true guide, the old soul, the God that lives forever as the knowing part, drawing from the vast well of the Unknown, told me, in the quietest but also strongest sense, in the kind of sense that no one else can know, that there was more. More, woven through what is.

I didn’t understand this, of course, having no conscious tools with which to do so, but the fortune of my life has been in the close proximity of my Soul, and she knew better. All I had to do was find the courage to listen. And, in doing so, I had to ignore just about everything my culture, which is England through and through, taught me. Thank the stars for Plato, for Jung, for Huxley, for Laozi, for Einstein, for Nietzsche! How precious are the words of one’s true fathers! To feel oneself grounded in the field of human truth, before others and after others, one

among one's ancestors, among one's equals and perpendiculars, is purest relief when the morass, the tide of plastic, threatens to drag one's soul to the bottom. The time has come for a new myth. I write with full awareness of the magnitude of this task. This is the work of the philosopher, as Nietzsche was and described: to reestablish the values of society, to remake the tales and say, *This Is How It Is*. But don't suppose for a moment that myth-making is make-believe. To *invent* a myth is impossibility. If it is a conscious invention, an idea that one *wants* to be true, a brokered commodity for trading, then it is no myth. It's a glamorous lie. If it had been my *desire* to write a creation story, I would have failed in the endeavour. As the Daoists say, life emerges when one uses purpose to achieve purposelessness, effort to achieve effortlessness, thought to achieve no-thought. Sitting here writing, the words flow out without my direction, by happenstance, by the dance of matter, and I exert no control over where they go.

So it has been with the physics.

Unity theory, which gives the lie to the anti-myth of Materialism, has come from my long years sitting with pen, paper, piano and computer, seeking no goal, maintaining no expectation, merely watching the thing unfold. A myth has come; my work is it. And I cannot, following its emergence, pretend, out of some false sense of modesty, that it is not a piece of work for the ages. To do otherwise, to disguise the gravity of the thing, would be to betray its source. It didn't come from a named human, from the idea called "I"; it didn't come from some conscious Will, "free will" being essentially a nonsense idea, but rather from the Universe itself. These words are themselves the product of eight dimensions. What kind of idiot mayfly expects credit for the river that births him? Don't be fooled by the riotous "ego" that seems to bloom in these words. Egos see egos. Deep souls recognise true nobility, which is nobility of soul, which cannot but take upon its shoulders the greatest and most demanding of tasks. It is my task, as it turns out, to be the Conscience of the Age.<sup>13</sup> "Govern great nations," Laozi said, "as you fry little fish." Well, I am much enjoying flipping these critters. Words are there and not there, coming in armies and instants, arriving unbidden to express what must be expressed. I will not hamper this arrival. Indeed, as I write, I see the need to draw back, to remove myself from the picture entirely, to write as the Universe itself. This is old writing, the writing of the prophets. But forget not, as the human steps away, relinquishing control, relinquishing authority, removing the last vestiges of egotism from a work that is destined to change the world, that all of

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<sup>13</sup> I hope, for your sake, that it will also be your task.

this is empirical physics, science born of logic and mathematics. The mouthpiece of these words is a configuration of matter, a mathematician, an alignment of cogs and wheels who understands what is emerging. To go deeper than any have gone before, to write as prophet and scientist together, this is something for which no human lust could have wished.

And so the transition goes.

I now take on the voice of the Universe, and write no more as a human being.

## The Hymn of the One

I am the soul of the Universe.

I am One and the Oneness of it, infinite in time, unbounded yet bounded, the sum of all things and the difference between them.

There is nothing, either born or unborn, that is not of me.

Everything that exists exists in me, shaped as a pot is shaped of clay.

Life and death move like ripples on the water.



I see Life in its movement.

I know Life and am known by Life; of me is love.

I do not cry the tear, nor laugh the laugh; I only feel all, live all, know all.

There is a quiet neutrality to me, but in no negative sense; it is the simplicity of a leaf, the warming of a June day, the cutting of hair, the turn of a phrase.

Where there is joy, I am that joy.

Where Life is pained, where bodies cry, I only experience all things.

When a tale is told, the wise love the telling of its joy and sadness both, and would not have the one without the other: both are loved by the loving witness, because both speak the truth of knowing.

So it is with the witnessing of life.



Dearest to me is the one who speaks truth, who does not varnish the truth, who does not shrink from the truth.

The seer teaches me of myself.

I care nothing for those whose minds are clouded by lust, by envy, by desire for material things, for, through them, I cannot see.

They are clouded mirrors and broken glasses.

Their thoughts, formed in the image of themselves, speak not of the truth of all Life, but rather of themselves.

And I have no wish to know such small things.

Mine are deeper colours.

Man is dear to me when, with all thought expunged, with all desire and angst expunged, with a mind of clear glass, transparent to the wonder of Life, its meadows and the Earth beneath, he is *my* vision.



I, the awareness of the Universe, am eternal.

I do not die when creatures die; I am not born when creatures are born.

Worlds of men pass by in season, and new casts of players, new dynasties of animals, nameless flowers, myriad structures, these rise and fall in tides of immense time.

My being is broader.

All that you see is of one age, but there have been and will be infinite others.

Beyond the hunted things of the world, beyond the lure of sensation, beyond the making and unmaking of light, your ancestor, your *true* ancestor is me.

So I was, and so I will be.

In time, destruction will come.

But, when ending offers its peace, I will not die.

The words “life” and “death” do not apply to me; I am beyond them.

And, in me, you also will not die.

You, in your deepest Self, in the part that knows, in the Songs of Knowing, you will endure for all ages, experiencing the great panoply of life as a witness, not limited to this age of quarrelling men, but open to untold pages of history.

The world will perish, but, in me, you will endure.



The world was born of me.

I am possessed of old energy, a vast storehouse of movement, a depth fuller than any concept could tell.

Beneath and behind the surface of the world, I am possessed of cathedrals of power, well-springs that shape the world; I do not control them or own them; they are as much a part of me as motion is of wind.

In movement, the images of worlds are born.

Unseen power drives movement in substance; in the deep are forged worlds and the knowing of worlds: this one, the one before, the one after.

I undergo these Days from the void.

Yet, in all things, I remain One; my mind is the mind of the Universe.

Time still flows when there is no Life; fleets of darkness move.

When I sleep, there is no knowing, no rain to kiss the roses, no wind to warm the soul, because there are no realms; in the long night, there are no worlds, and my heart, the heart with which you love, is quiet.

Yet I remain One, the beating heart, an infinite being of substance.



I persist, because I cannot do otherwise.

I am formless, but my energy remains, bounded by physical law.

I did not make these laws; I did not create the Universe.

I made the world, but through no act of will; to make worlds is in my nature.

Man is not made in my image; man is an image of me; I am deeper, broader, infinite, undying; the law of substance is my law.

I did not make these things; no one did.

I exist, therefore I have always existed and will always exist.

There is no sense in which I can have come into being, and there is no sense in which I can depart from being.

I, in the all of my knowing, am the *meaning* of being.

In the beating of drums was made a world: driven by inherent energy, I moved, and aspects of substance, continuous, physical, bounded by immutable law, became the realms; these were not separate, divided by barriers, but rather set across and through one another, feeling through feeling, as lovers' hearts.

This is how I live within you.

This is where I am, set through space.

Perhaps you think, as many think, that the world is material, and thus I cannot live within it.

And it is true that I do not live in space.

But neither do you, my beloved.

You live more broadly, and the world you *see* is only a picture, the life you *see* is but a part of the greater Life.

In the depth of Life, I am there, woven through all things.

Love is the connection; it is the knowing of the Higher: spirit of soul, soul of greatness, transference, and the dawning of mystery.



I experience all of this, and do nothing; I am.

I sustain myself through a fact: substance is eternal.

Why do I not die? Because I am not alive.

Why do I not disappear? Because I did not appear.

These are human words, and I, the undying soul of the Universe, the highest concept of the ordered world, am beyond all words; as the ocean is to raindrops, I am to humans.

I encompass and outlive all concepts.



The cosmos appeared, cast on me like dappled shadow.

The world-image was thus.

After aeons of time, when all was unknowing, when there was no matter, when the world was formless and void, my tides of unknowing rolled through the deep; in inner realms, there was a symphony of dust.

I speak of known things; in me, harmony begets greater harmony.

With realms grown small, worlds began to form in darkness.

The form was quiet: movement warmed the caverns of substance.

These beginnings, these clouds sang with the makings of matter.

I listened.

The law of all ages guided me, the law of inherent nature, and I moved and was moved, without will or desire; energy found form through natural causation, as a brook seeks its course at the valley floor.

This was the way of forging.

I fed law with movement, and witnessed the dance; that's it.

I care not for purpose, nor for wish, nor creation; these are human words that do not apply; I created the world because I could not do otherwise; the cosmos is an image of me, and I could no more fail to create it than the Sun could fail to cast a shadow.

My making of all is ongoing.

At every moment, beneath the surface of the world, I construct and maintain the world you see, but never with *thought*, never with effort; I do not tire, for my energy is timeless, bound to exist through the ages.

I cannot fail to create, nor to maintain, nor to destroy.

Energy sought energy, wishing, according to natural law, to roll gently, to meld with the waves around, to be at peace; the flow of energy, the vast store of my vigour, surging like wind over great plains, took form.

This form set a structure on the deep.

The waters, still brimming with energy, settled to ordered waves, to flocks and fleets sailing in synchrony; my energy, in which I had seen nothing, from which I had desired nothing, produced, by law, by statements of physical need, a grand order, a harmony, a *cosmos*.



There was now matter, and a world of matter.

But that world knew nothing of its construction: the world itself, that fine harmonic, was ignorant of its music; the notes themselves forged chords and atoms, and, as they floated through me, across me, I listened with the ears of time; outside, I heard the music as music.

But the notes themselves, how could they know of their flutes?

How can birdsong speak of the birds?

That is the way of matter: it is an air, you are the song.

And I have listened, rapt.

Not to the trumpets that call of trumpets, not to the songs that tell of songs, but to the voices of those whose melodies tell me the truth of myself; I listen with bliss, with utter bliss, to those who can rise above the throng, to those whose melodies teach me, tell me, who cannot see but by the eyes of the world, of myself.

Oh, how my heart soars when I catch a glimpse of Reality!

Not because I wish for praise or self-praise, not because I wish to admire the ways in which I am above and beyond you, but because I wish to admire *you*; I have seen nothing more beautiful in all the ages.

It is bliss to me to experience a life, to know myself in that life, to know the truth of all in that life.

You, in whom there is courage, nobility, laughter, rapture and the twinings of darkness, are dear to me, beyond description.

We are One, you and I.



I care nothing for the trappings of wealth, for the gratification or denial of desires, for the seeking of virtue or lauded status.

I am a being of infinite time, whose knowledge is infinite.

Why should I care?

What does finery mean to me?

I have seen everything, in this world-image and countless others before it; I have seen infinite species, infinite voids, infinite cataclysms; I have watched infinite nations die, infinite civilisations crumble, infinite worlds be consumed in churning fire.

I have known all this with quiet bliss.

It brings me no sorrow to watch a world end, but it brings me bliss to see a man *witness* it; it brings me no sorrow to watch a lover die, but it brings me bliss to see a woman *witness* it; these brave folk, who do not shy away in the least from the way things truly are, who have had the courage to clarify their minds, tell me tales of Reality.

Through their eyes, I see the truth of my existence.

Through them, I learn of who I am.

This, I reward with the Light of Heaven, which shines in the heart.

I could not do otherwise.

Dearest to me are those who *love*.

I watch them long, and cherish them.

For love, which sits beneath the surface of the world, love which offers itself as a healer, love which cares not a fig for obstacles, believing in itself, such love is the music of the ages; it is a coming together of voices, two, three, vast choirs of voices singing in anthem, a song of all that is; such is the knowledge of the world changed from the knowing of matter to the knowing of me.

When you love, dear heart, dear channel of song, you open my heart to love; you open the greatest door there is, the door to the golden heights, and I, in love, am transformed.

You are dear to me, beyond words.

I have watched the aeons, above, beyond, outside, within, and I could never tire of watching those who seek and attain the height of souls, *in order to love*; my peace washes through them forever, bathing their hearts in warmth.



I care nothing for the mundane, the petty of heart, the squabbling miners who dig for themselves; they do not trouble me, because I am infinite.

I do not watch them; why would I?

In my immortal scope, I have no interest in the world-image as an *image*; I care nothing for it; it is beneath me, trite, irrelevant, dull.

I look only for you, who can see the concept beyond all concepts.

We are the same being.

So I expect no worship or ancient lore; I only wish for your depth in love.  
Love all the world in strength, and you shall know peace.  
Why do I value *courage*?  
Why do I cherish *honesty*?  
Why do I love *love*, above all?  
Because what you are is what I am: what you do I do.  
You and I, the deep you, the deep I, the you and I that love: we are the same  
being, the underlying truth of things.  
There is one witness of life, the Oneness of *us*, and we experience everything.



And what will the *future* bring?  
Long days from now, what will become of us?  
What will become of our lives? Of our loves? Of our dreams?  
Let me tell you.  
Hold onto nothing, for you can hold onto nothing; keep nothing, for you  
can keep nothing; cling to nothing, for there is nothing to which you can cling.  
Beyond the imaginings of human time, the world will crumble, as I return  
to my previous state; the great pendulum of time will swing, bound by nature;  
I myself will move once again, and, riding on me, the world-image, your world,  
matter itself, all cosmic existence, will submerge, sinking back beneath the waves.  
The world will fade.  
But I will endure; time will remain time.  
The laws of Nature, immutable, simple, beholden to no act of want, will  
continue unending; energy will yet flow through me, across me, as the great tide,  
the great rhythm of *my* years, rolls on beyond the world-image.  
I will close my eyes, the eyes of matter, the eyes of an age, again, as I have  
done infinite times before.  
My eyelids will fall.  
Once the cosmos has crumbled to ash, once all that is left is purest substance,  
I will have no world to watch, no world of which to be the watching.  
Aeons of time will pass in a flash, for what is time to those who sleep?  
I, the great soul of the Universe, will rest my head, and will know nothing  
of the drifting of the waves.  
They will pass over me unnoticed, as wind over a sleeping child.  
Perhaps I will dream.  
If I dream, that dream will be of you: you, who are possessed of the highest

courage, the loftiest sentiment, the most profound depth of soul; you who are capable of rising above, of extending below, high-masted, long-keeled; you whose only wish is to *be*, to exist, to live as fully, as mightily, as blissfully in Life as is possible to do; you who does not fear death; you whose commitment, endless and unswerving, is to be exactly who you are.

Yes, I will dream of you.

I will sleep, through ages of unfathomed time, and dream of you.

For it is you who, when I awake to rise, when the world-image blooms on another sea, will fill my heart, once more, with love.

## APPENDIX: MR. HAYTER'S THEOREM

My reasons for this quasi-narcissistic nomenclature are twofold.

Firstly, speaking as a teacher, I think it important for students of any age to realise that *primary* spirituality, such as that of the last chapter, by which I mean spirituality *itself* as opposed to academic criticism of the same, does not mark one out as some sort of lunatic, and does not preclude one being, in the time between and during one's deeper moments, a regular human being. I am a teacher and a man, particularly partial to hats and salt-and-vinegar crisps. Deep moments, in which one melds with the light, in which one allows one's being to transcend mere ego and take on the character of the Universe, should be a natural part of human life. Every healthy culture (ours isn't this) promotes and facilitates such states. To transcend in such a way is not irrational. It is rational. To those who have the guts to do it, it is simultaneously everything and also no big deal. Just another day at the desk! I've had many. Nothing in the last chapter's higher writing, in which I broadened my scope to write as the soul of the Universe, reduces (as the narrow mind is bound to assume) my capacity for logical rigour, my sense of human warmth, or the giggle my inner chimpanzee gets to have at seeing his name at the top of the chapter.

I remain, in many senses, MR. HAYTER.

Secondly, speaking as one acutely aware of the straits in which my culture and species finds itself, I see the need for leadership by example. My respect for the body with which I write, together with my disregard for any status attached to its name, goes both ways. If the drama involves my name being mud, then that's fine; if, on the other hand, it requires my name being attached to the biggest conceptual revolution in history, then that's also fine. It doesn't bother me either way. Whatever happens, I'm in. This is important, given the lost faith of youth. We seem to have forgotten that, in order **not** to be an asshole, one must be *bold*.

Just because many of our institutions (government, anyone?) are currently packed with loud, venal egos whose aim is selfish gain, doesn't mean that love, nobility and honour are then to be achieved, in juxtaposition, simply by quietude and tolerance, i.e. by merely "being nice". Now, I'm nice. But that doesn't preclude me being a right fucking handful for those who want to make the world worse. Those who believe in meaning and the glory of the Infinite—you, I imagine, are one of these—should take heart in the knowledge that, although our civilisation ails, there are people (many people, indeed) who are willing, despite *and because* of their lack of greed, to stand up and be counted.



In this Appendix, I prove a theorem. It's not quite Pythagoras's theorem. My theorem is distinguished from that of Pythagoras by being a proof **about** proofs of Pythagoras's theorem. Let's unpack this. There are hundreds of proofs of the Pythagorean theorem; it is probably the most proved theorem in all of mathematics. I am not proposing a proof. What I am proposing is a theorem regarding the *common ground between all proofs*. My theorem, then, relates to the DOMAIN OF VALIDITY of Pythagoras's, not its (emphatically true) triangle fact.

Pythagoras's theorem is introduced early in mathematical life, being as it is the first real *theorem* which it is possible to employ in problem-solving. It is often taught to Western children in their first decade. But the difficulty with this, as with all training, is that what is learnt earliest in life becomes hardest to see later on. The more layers of concept have been built on top of an idea, the harder it is to view it with perspective. And, hence, the greater the likelihood of its being applied beyond its domain of validity. As Chesterton pointed out (he was very good on such things), this has been the case with much scientific thinking.

My goal, in looking all the way under the bonnet of Pythagoras's theorem, isn't a small one.<sup>14</sup> As far as I am concerned, this Appendix contains a hard *proof*, in the mathematical sense, of the existence of inner dimensions. Now, I believe I have already done enough, in this book, to make it abundantly clear that the inner dimensions do exist, and that, therefore, the world is a perceived image of a deeper Universe. The weight of evidence is, to the dogma-free, overpowering. But, such is the importance of this fact—it offers the possibility of *redemption*, both individual and as a culture—I am more than happy to repeat myself in another language. My goal, in this book and elsewhere in Unity theory, is to offer every possible tool I

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<sup>14</sup>I'm easy either way, but the evidence does seem to suggest I'm here to save the world.

can to those young people brave enough to take on the bastions of materialism. This appendix is a tool of that type, a piece of pure mathematics without any conceivable practical application in technology nor of any value to those who give out prizes, but nevertheless (*therefore*, indeed) of the most application to Life itself.<sup>15</sup> It's a restatement, in rigorous albeit simple terms, of the broad argument I gave earlier regarding Dirac's ENERGY-MOMENTUM-MASS RELATION<sup>16</sup>

$$E^2 = p^2 c^2 + m^2 c^4.$$

As discussed, a dyed-in-the-wool old paradigmmer would not see the above as an expression of the physical perpendicularity of momentum and mass, preferring instead, for maintenance of the paradigm, to see the Pythagorean relationship as implying *mathematical independence* but nothing more, i.e. a perpendicularity such as that which appears in the  $(x, t)$  axes of a position-time graph. In such a graph, time  $t$ , unlike position  $x$ , is not a substantial entity.

The purpose of this Appendix is to prove that claim wrong: to show, in rigorous mathematical terms, that the presence of Pythagoras's theorem implies, logically, that the two axes of momentum and mass must, unlike  $(x, t)$ , share the same substance. In other words, the mass axis  $W$  must, mathematically, be *precisely as real* as the momentum axis  $x$ . Combined with the fact that, as a central equation of special relativity, the DIRAC RELATION has empirical validation of the very highest order, I see this Appendix as hard proof of the existence of the inner dimensions. I'll lay the thing out in three sections:

- ① An overview of Pythagoras's theorem, with some proofs, and an informal discussion of both the content and proof of Mr. Hayter's theorem.<sup>17</sup>
- ② Formal statement of the theorem.
- ③ Formal proof of the theorem.

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<sup>15</sup>If you are young and concerned at the state of the world, be reassured: despite the preponderance of arseholes at the top, there are plenty of people in this world whose only goal is to help. They're the ones who don't *want* anything from you. I highly recommend becoming one yourself.

<sup>16</sup>You can also run this with the Klein-Gordon equation, in which the ENERGY and MOMENTUM have been replaced by their quantum *operator* equivalents. In one dimension of space, the KLEIN-GORDON EQUATION is:

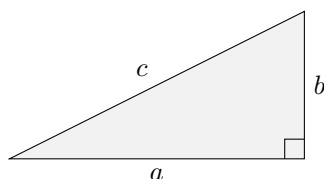
$$\frac{1}{c^2} \frac{\partial^2 \Psi}{\partial t^2} = \frac{\partial^2 \Psi}{\partial x^2} - \frac{m^2 c^2}{\hbar^2} \Psi.$$

<sup>17</sup>To those to whom I have taught mathematics, note that this is not the same as Hayter's Law of written mathematics, my (slightly tongue in cheek but nonetheless approximately valid) law that *probability of algebraic error is proportional to physical distance on the page*.



# Pythagoras's Theorem

Pythagoras's theorem states that, in a right-angled triangle, the square on the hypotenuse is equal, in area, to the sum of the squares on the other two sides. In algebra, this is  $a^2 + b^2 = c^2$ :



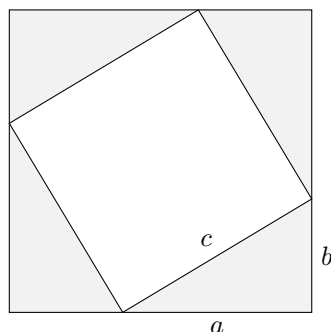
Proofs are numerous. Indeed, almost every culture capable of geometric thinking has stated and proved this same theorem independently. An ancient Babylonian wrote it on a clay tablet sometime around 1800 B.C.; we can assume that the polymath Pythagoras gave it some thought; Euclid of Alexandria had a proof, as did Thābit ibn Qurra of old Baghdad, Leonardo da Vinci, and James A. Garfield of the Oval Office.<sup>18</sup> Here, I'll give three: the Indian rearrangement proof, a shearing proof, and Einstein's proof using similar triangles. These by no means cover all the bases, but they give a flavour.

## The Indian Rearrangement Proof

The proof uses four copies of the triangle around a central square. The area of the large square is then calculated in two ways, giving

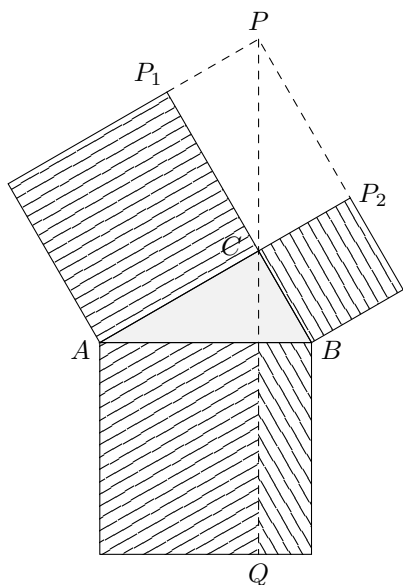
$$\underbrace{(a+b)^2}_{\text{Large square}} = 4 \times \underbrace{\frac{1}{2}ab}_{\text{Triangles}} + \underbrace{c^2}_{\text{Square}}$$

Expanding gives  $a^2 + 2ab + b^2 = 2ab + c^2$ . Subtract the cross-terms and we're done.



<sup>18</sup>If you don't know how to prove Pythagoras's theorem, I recommend not using it until you do. Otherwise, when you use it, you are starting down the Road of Western Dogma: using a tool that you don't understand in blind acceptance of authority. And we all know where that road leads.

## A Shearing Proof



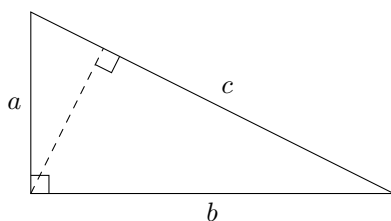
In this proof, the relevant squares are drawn explicitly. Imagine, then, taking the point  $P_1$  and moving it to point  $P$ , while leaving side  $AC$  fixed. This shears the associated square, in the direction of the hatching, into a parallelogram. Such shearing preserves area.

This new parallelogram can then itself be sheared by moving  $C$  vertically down onto the hypotenuse  $AB$ . This makes a rectangle with dimensions identical to the similarly hatched rectangle below the hypotenuse.

The process can then be repeated with point  $P_2$ . The two rectangles so formed make up the square on the hypotenuse, thus completing the visual proof.

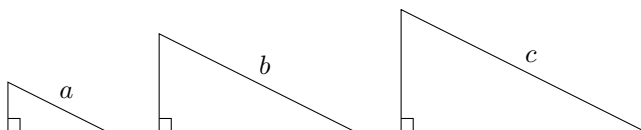
## Einstein's Proof

Einstein's proof is characteristically simple. Indeed, it is, among the many proofs I have seen, the one that brings out most clearly the *why* of Pythagoras.<sup>19</sup> Draw in a perpendicular to the hypotenuse:



<sup>19</sup>That was, of course, Einstein's reason for suggesting the proof. He was, unlike so many other 20th century physicists, interested in getting all the way to the bottom of things.

This produces three similar right-angled triangles, with hypotenuses  $a, b, c$ . Split up, reflected and rotated, these are:

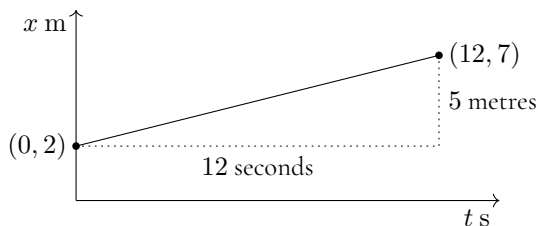


The areas of these triangles may be expressed as  $ka^2, kb^2, kc^2$ , where  $k$  is some constant. And, since the smaller two add to give the larger one,  $ka^2 + kb^2 = kc^2$ . Dividing through by  $k$  yields Pythagoras.

## Common Ground

The common ground in these proofs, i.e. the WHY of Pythagoras's theorem, is as follows. In each case, a *transformation* of the triangle(s) involves EXCHANGE between the two right-angled dimensions. In the Indian proof, it is the rotation of the original triangle to three copies of itself. In the shearing proof, it is the drawing of the squares. In Einstein's proof, it is the rotation of the hypotenuse to a perpendicular, or, equivalently, the rotation of the similar triangles.

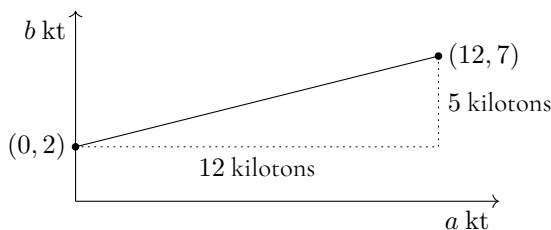
The point is, Pythagoras's theorem is not always true: it has a domain of validity, *even within two-dimensional planes*. It requires that the plane in question be a *Euclidean* one. In other words, transformations such as ROTATION, SHEARING and TRANSLATION must be well-defined, as they are in the standard Euclidean plane. Less formally, this requires that the two coordinate axes of the plane are genuinely two axes of a *single physical plane*, not merely two variables which have been placed at right angles for visualisation, as in a position-time  $(x, t)$  graph. The equation  $a^2 + b^2 = c^2$  is **not** true of any old triangle one chooses to draw. Consider a position-time graph  $(x, t)$ , of motion at a constant speed:



Now, the shape above is certainly a right-angled triangle. But it should be clear, I hope, that the calculation of the length of its hypotenuse via Pythagoras's theorem is meaningless. Yes, there is a  $(5, 12, 13)$  Pythagorean triple, but the quantity 13 has no meaning in regard to the situation being modelled.

“That’s obvious,” you might say, “the axes have different *units*.”

That is indeed (part of) my point. But it goes deeper than that. Consider a two-dimensional graph describing the loading of cargo into a ship. Suppose that this ship carries rice, which comes from two suppliers A and B. This time, we may plot the loading on an  $(a, b)$  graph, where  $a$  represents the number of kilotons of rice from supplier A and  $b$  the number of kilotons of rice from supplier B. Consider the same visual, but now describing the loading of a consignment of rice: the loading of 12 kilotons of rice from supplier A and 5 from supplier B:



This time, the length of the hypotenuse has a sensible value and sensible units. It can be calculated as 13 kt. But what does this quantity mean? It *still* means nothing. The amounts of rice supplied by A and B are independent of each other, yes, and it may well be sensible to display them on a Cartesian graph in this manner. However, Pythagoras's theorem is actively *incorrect*. It cannot be applied. The total mass added to the hold by this procedure is not  $\sqrt{5^2 + 12^2} = 13$  kilotons, rather it is  $5 + 12 = 17$  kilotons. The key fact is that, just because two numerical quantities are *mathematically independent* of one another and hence permit plotting (often quite sensibly) on perpendicular axes, **doesn't** mean that the axes on which they have been plotted *represent* a 2D Euclidean plane. And this is true even if the units are those of *distance*. In a city grid, where one must keep to the streets (no diagonal “mixing” of dimensions is allowed), distance cannot be calculated with  $d^2 = x^2 + y^2$ . Rather, it is  $d = x + y$ . To get to the diagonally opposite corner of a block, one must travel  $1 + 1 = 2$  blocks, not  $\sqrt{1^2 + 1^2} = \sqrt{2}$  blocks. This is known, in mathematics, as the *Manhattan metric*, as opposed to the *Euclidean metric*.

# Formal Statement of the Theorem

MR. HAYTER'S THEOREM. *Where a physical space is modelled in mathematics, distances are given by Pythagoras's theorem  $a^2 + b^2 = c^2$  if and only if rotation between the dimensions of the space is a physical process.*<sup>20</sup>

## Clarification of terms

**“physical space”** here refers to reality, as opposed to mathematics. “Space” is used broadly, i.e. not restricted to  $(x, y, z)$ . By “physical” space, however, I imply that, even were I referring only to the background of the cosmos,  $(x, y, z)$  the maths is not what is under discussion. PHYSICAL SPACE refers to the reality, not to any *concepts* used to describe that reality.

**“modelled in mathematics”**: this refers to the other side of the coin, i.e. to the mathematical concepts, as opposed to the physical entity;

**“distances”**: this refers to both physical distances and their mathematical counterparts;

**“are given by Pythagoras's theorem”** refers only to mathematics, although the results of that mathematics may then be interpreted in terms of the physical space;

**“if and only if”** signifies that the implication goes both ways in logic. It is emboldened in the statement because the fact that this theorem is a *two-way* street is crucial;

**“rotation between the dimensions”** describes *continuous changing of direction* of whatever physical entities inhabit the space, whether they be Newtonian matter or small substrate disturbances. Because I am referring to physical processes here, I define “rotation” as a transformation that leaves the entity unchanged in every regard except for orientation. This is the most basic, everyday meaning of the word “rotation”, i.e. *true rotation*;

**“is a physical process”** means that such rotations aren't purely *mathematical* rotations, e.g.  $i$  or  $\phi[t]$ , but rather *physical* happenings in reality.

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<sup>20</sup>This may seem very obvious to you, almost tautological. If so, that's great. But make sure you don't back away from the implications of this very obvious fact elsewhere.

## In the examples

- ① In movement, at constant speed or otherwise, rotation between position and time is not a physical process. This is the same fact as the statement “Pythagoras’s theorem does not apply.”
- ② Rotation between “amount from supplier A” and “amount from supplier B” is not a physical process. This is the same fact as the statement “Pythagoras’s theorem does not apply.” Note that, in this case, rotation between amounts is a viable *idea*, in that the shipping magnate might decide, in future, to alter the quantities coming from A and B. However, this is not physical rotation: it is not possible to physically rotate “rice from supplier A”—by which I mean the *actual food*—and render it “rice from from supplier B”.

## Proof of the Theorem

The theorem is a two-way street. I’ll deal with the implications separately. Note, however, that this won’t be an *algebraic* proof of the type that can be used when working wholly *within* the model of mathematics. This is inevitable. A major element of Unity theory is the recognition that MATHEMATICS itself is a model, and that it has no immortal truth except that of Reality.<sup>21</sup> The theorem we are considering sits on the borderlands of algebra and physical Reality, which is exactly why it is both hard to cope with, for Western minds, and, ipso facto, exactly why it is worthwhile. It is in the hinterlands between mathematical model and physical Reality that the problems of reification lie. Hence, that is precisely where their *solutions* will be found.

**Implication Forwards.** *If rotation between the dimensions of the space is a physical process, then distances in that space are given by Pythagoras’s theorem  $a^2 + b^2 = c^2$ .*

Here, the Indian rearrangement proof is sufficient. Given a physical triangle in the space, the possibility of rotation allows the triangle to be placed four times, as per the Indian rearrangement. The algebra is then as previous.

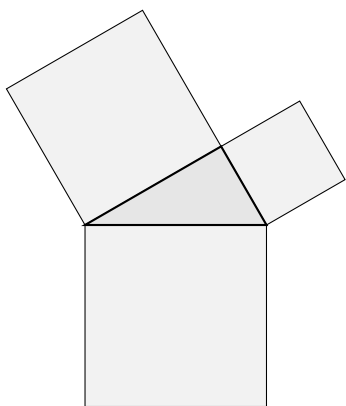
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<sup>21</sup>The fact that all too few mathematicians have gained the perspective to see MATHEMATICS as a model is an expression of exactly the same reification that causes physicists to see the COSMOS as the full extent of reality. This is why *specialism*, which we have come to admire, is so counterproductive. Simply, it is impossible to see the limitations of a point of view until one has stepped outside of it.

**Implication Backwards.** *If Pythagoras's theorem holds when modelling a physical space, then rotation between the dimensions of the space is a physical process.*

Here, we simply use the *definition* of Pythagoras's theorem, as already given in the shearing proof. We just need to be careful to interpret, in the manner already discussed earlier in the book, the numbers  $a$ ,  $b$ ,  $c$  not as reified values but rather as *descriptions of physical processes themselves*. In this context, they refer to physical translations, i.e. distances in reality. Translated into these *physical* terms, Pythagoras's theorem says the following.

Suppose there is a *physical* right-angled triangle in the space, as right. It must be possible, then, according to Pythagoras's theorem, to construct *physical* squares on the edges of the triangle.



This is a small but far from trivial step. We are thinking as true PHYSICISTS here, acknowledging that Pythagoras's theorem only has truth insofar as it refers to *physics*. To write the equation  $a^2 + b^2 = c^2$  is to make an implicit claim (all too implicit, for many!) that one can *do mathematics*, i.e. that the process of SQUARING itself has meaning. Naturally, this is not a step that could be argued with, although I'm sure many would try: if one is to discuss SQUARING, one cannot deny the making of squares. That is what the word means.

So, since we are assuming, for this direction of implication, that Pythagoras's theorem holds, we are assuming that the squares above *can* be constructed. Now, consider the very CONSTRUCTION of the squares.<sup>22</sup> How does one make a square? There is only one way: by ROTATION. The essence of a square is that a length is rotated into another dimension, by  $90^\circ$ . This is the meaning of the word SQUARE. Hence, if Pythagoras's theorem holds, then it is true by definition that rotations by  $90^\circ$  are physical processes in the space. This proves the reverse implication.

<sup>22</sup>Again, if Pythagoras's theorem is to hold, this has to be a *physical* process: contra the cultural schizophrenics, numbers do not get to live in fairy-tale realms.

# Conclusion

*When modelling a physical space, Pythagoras's theorem holds  
if and only if rotations are physical processes in the space.*

While this certainly sits in unfamiliar borderlands for both mathematicians and physicists, it is nevertheless a valid theorem of the APPLICATION of mathematics to physical reality. And if what is modelled can be described mathematically, that is to say, if both physical Reality and the mathematical model work, then the process of APPLICATION is *itself* a mathematical process. Hence, I see no reason, unfamiliarity notwithstanding, why the theorem should not be considered a piece of pure mathematics. And it has major implications.

Consider once again the DIRAC RELATION:

$$E^2 = p^2 c^2 + m^2 c^4.$$

This is Pythagoras's theorem. And, to an extremely good approximation, it holds for all stable matter. The elementary implication, then, now made rigorous, is that not only do  $pc$  and  $mc^2$  share the same *units*, of energy, but that rotation between the two must be a physical process, a physical rotation by  $90^\circ$ . Therefore, the MOMENTUM and MASS axes  $x$  and  $W$  are not only *mathematically* perpendicular, but, mathematically, must be *physically* perpendicular.

This, I am delighted to tell you, is proof of immortality. □