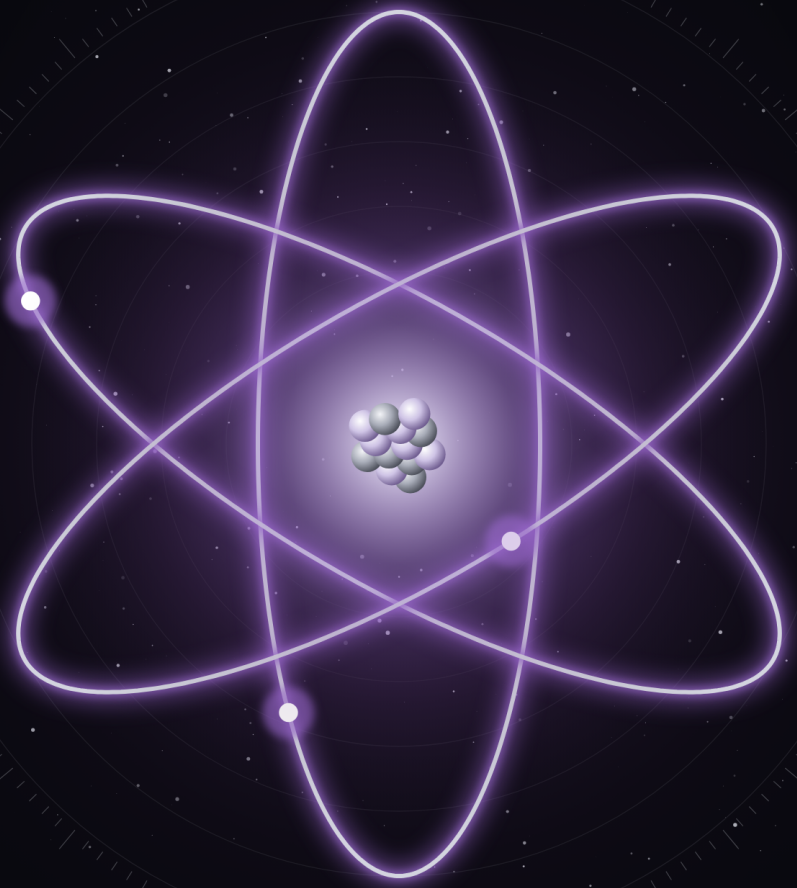
BOOK 5 · COMPANIONS TO THE SYSTEM OF INEVITABILITY



Nucleus *and* Orbit

ATOMS, NECESSITY, AND THE SCIENCE OF AN INTERWOVEN PRACTICE

An evidence-based companion to the System of Inevitability

COMPILED BY CORY MATTHEW SNELL

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An evidence-based companion to the System of Inevitability

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System of Inevitability originated by Uki (@ukigigi)
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Nucleus and Orbit: Atoms, Necessity, and the Science of an Interwoven Practice *Book 5 of the Companions to the System of Inevitability*

Compiled by **Cory Matthew Snell**. The System of Inevitability was originated and developed by **Uki (@ukigigi)**, stonemason and martial artist.

First edition, November 2026. Also in this series: Book 1, *Walking and Turning: Iron, Spirals, and the Science of a Practicing Mind*; Book 2, *Wave and Return: The Bent Fist, the Figure-Eight, and the Science of a Restrained Hand*; Book 3, *Shape and Choice: Everyday Geometry, Calm Presence, and the Science of a Choosing Mind*; and Book 4, *Lens and Lattice: Altered Perception, the Internal Arts, and the Science of a Curious Practice* (all 2026), released under the same license.

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Independence notice. This is an independent, unofficial work. It is not written, reviewed, or endorsed by Uki, and it does not speak for him. The account of the system's origin in Athens, its atomist philosophy, its three axioms, its 3-6-9 architecture, and its "quantum" language comes from a project document, compiled in November 2026, that consolidates a dialogue about the system. Quotations attributed to the system come from that document. That document itself describes the system's energetic claims as "personal and philosophical rather than clinically verified." This book treats them the same way. Where it offers science, practices, or interpretations, those are the compiler's, drawn from the published literature. The plates and diagrams are original drawings made for this book; the cover is inspired by, but does not reproduce, the design of the Greek 10-drachma coin.

Health and safety notice. This book is for education and inspiration. It is not medical, psychological, or legal advice, and it is not martial arts instruction. Training with heavy tools, striking, and partner work carry real risk of injury. You train at your own risk.

About the science. Every study cited here was checked against its published record (authors, year, journal, and DOI) at the time of writing, and the findings reported were checked against the published abstracts. Non-peer-reviewed sources (a central bank's coin catalogue, the Nobel Foundation, an en-

cyclopedia of philosophy, a magazine article from 1919) are named in the text and labelled as such. No study, number, or quotation has been invented. Where the evidence is thin, contested, or absent, the text says so.

For everyone who has ever held something small and felt the whole world turning inside it.

And for the patient ones who check whether it is true.

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How to Read This Book

This is the fifth companion to the System of Inevitability. *Walking and Turning* looked at its iron tools and the juggling brain. *Wave and Return* looked at its striking. *Shape and Choice* looked at the mind behind both. *Lens and Lattice* looked at perception, altered and ordinary. This book steps back to ask how all of them fit together: atoms and stars, orbits and spirals, chance and necessity, the body and everything it is woven into.

The owner of this project asked for a book that "ties all the books together on the quantum level" and that would "melt people's minds with the philosophical, interdependent, and multidimensional connections." That is a wonderful request, and a dangerous one. The word *quantum* is easily misused. So this book makes a promise: every connection it draws will be either real, measured physics and biology, or clearly marked as philosophy. As you will see, the real science is stranger than anything we could invent.

You will see four kinds of marked boxes:

> ● EVIDENCE: WELL-ESTABLISHED
>
> **Well-established.** Supported by multiple independent experiments, systematic reviews, or foundational results with consistent support. You can lean on these.

> ◐ EVIDENCE: SUGGESTIVE · EMERGING
>
> **Suggestive or emerging.** Supported by real peer-reviewed research, but the studies are few, small, indirect, or debated. Promising, but hold them loosely.

> ◇ SPECULATIVE SCIENCE
>
> **Speculative science.** Serious, published scientific proposals that remain unconfirmed or are strongly contested. They are part of science's frontier, not its settled ground.

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **Practitioner experience and philosophy.** The originator's lived philosophy, personal meaning, and images, and the compiler's suggestions. They may be deeply meaningful. They have not been tested, and many cannot be.

And the box you should never skip:

> ⚠ CAUTION
>
> **Caution.** Practical safety information, or a warning about how an idea could mislead. Read these.

Citations appear as author and year, for example (Hensen et al., 2015). The full list, with journal details and DOIs, is in the References. A sentence that makes a factual claim with no citation and no box is the compiler's reasonable summary or opinion.

How the book is built. The system organizes itself as "3 Foundations, 6 Pillars, 9 Embodiments." This book borrows that architecture as its spine. After a prologue about a coin and a cave, Part I takes the **three foundations** (atom, triad, necessity) and asks what physics says about each. Part II takes the **six pillars**, one chapter each, and pairs each with a scientific idea and with one of the earlier books. Part III gathers the **nine embodiments** into three chapters, three embodiments each, and opens three scientific horizons: life's quantum molecules, time, and interdependence. A coda looks back across the series, and forward.

A word about the word "quantum." In physics, *quantum* refers to a precise and astonishingly successful theory of matter and light, tested to extraordinary precision. In popular culture, it has come to mean something like "mysterious and connected." When a book uses the physics word for the cultural meaning, it borrows authority it has not earned, and readers who know the physics stop trusting everything else on the page. This book does not want to lose those readers. It wants to hand them the real thing.

Foreword

By convention sweet and by convention bitter, by convention hot, by convention cold, by convention color; but in reality atoms and void.

— DEMOCRITUS, FRAGMENT DK 68B9, TRANS. TAYLOR, AS QUOTED IN THE STANFORD ENCYCLOPEDIA OF PHILOSOPHY

In 1997, according to the system's own account, a young man spent five and a half months juggling on the streets of Athens, sleeping in limestone caves beneath the Acropolis, drinking from a spring-fed well among the ruins. Somewhere in those months a Greek coin came into his hands: a 10-drachma piece showing an atom on one side and the philosopher Democritus on the other. He has kept it on his keychain ever since.

Every system has an origin story. This one is unusually beautiful, because the object at its centre connects a street juggler to a line of thought that runs from the fifth century BCE to the most precise experiments ever performed. Democritus said the world is atoms and void, moving by necessity. Twenty-four centuries later, physicists closed the last major loopholes in tests that show nature cannot be both local and fully pre-scripted in the way he might have imagined. The coin on the keychain is a pocket-sized doorway into that whole story.

When the owner of this project asked for a fifth book, tying the series together "on the quantum level," I had a choice. I could repeat the system's quantum language as if it were physics. Or I could do something I think is more respectful of both the originator and the reader: take every one of those images seriously, find the real science that lives nearest to it, and tell you honestly how near it is.

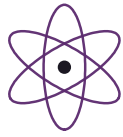
What I found was not a disappointment. The atoms in your hands were forged in stars. Many of the cells in your body are younger than the coin on that keychain. Your heartbeat and your stride carry patterns that look the same at every scale. Birds may navigate by quantum spin chemistry in their eyes. Clocks

tick differently a metre higher off the floor. And when two people move together, their brains can fall into step.

None of that requires a coin to be entangled with a past life. All of it is enough to melt a mind.

Read it slowly. Keep the boxes apart. And when you have finished, go and practise.

Cory Matthew Snell, compiler November 2026



Prologue · The Coin

A nucleus, three orbits, a face. Twenty-six millimetres of copper and nickel, carried for almost thirty years.

CHAPTER 1

The Coin and the Cave

The system does not train mastery. It reveals what was already carried.

— FROM THE SYSTEM OF INEVITABILITY SOURCE MATERIALS



Plate 1 · Nucleus and three orbits. An original study inspired by the atom symbol on the Greek 10-drachma coin.

Every book in this series has started from a tool or an idea. This one starts from an object small enough to close a fist around.

The origin, as the system tells it

The project document for this book describes the origin plainly. "In 1997 the inventor spent 5.5 months as a homeless street juggler in Athens. He slept in the white limestone caves of the Acropolis and drank from a spring-fed well in the ruins beneath the white rocks. Daily juggling consisted of continuous, non-repetitive orbital patterns." During that time "a Greek 10 drachma coin bearing the atomic symbol (central nucleus with three angled elliptical orbits, associated with Democritus) entered his possession. The coin has remained on his keychain continuously since that time."

The document then frames the experience in the system's own terms: as "the precise alignment point where past-life geometric and martial knowledge collapsed into present expression." The caves are "literal void-chambers," the well "living atomic essence," the juggling orbits "the physical reenactment of the coin's three paths," and the coin "a living talisman that maintains the entanglement."

This book does not doubt the story of the street, the caves, the well, or the coin. It is the originator's life, told as he tells it. The interpretation of that story, past lives and entanglement, is something else: a personal philosophy. This book will honour it as that, and then ask what science can say about the things the philosophy points at.

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **The origin story and its meaning.** The Athens months, the caves, the well, and the coin are the originator's biography as recorded in the source document. The interpretation of them as "past-life" knowledge "collapsing" into the present, and of the coin as maintaining "entanglement," is the originator's lived philosophy. It is not a scientific claim and is not treated as one here. The source document itself frames such energetic claims as "personal and philosophical rather than clinically verified."

The real coin

The coin is real, and it is easy to verify. According to the Bank of Greece's catalogue of drachma coins, the 10-drachma coin first issued in 1976 is made of 75%

copper and 25% nickel, measures 26 mm across, weighs 7.5 g, and shows on its two faces the "symbol of the atom" and Democritus. The Bank notes that, after the fall of the military junta in 1974, a new series of coins was issued in 1976, with the 10-drachma piece bearing Democritus, and that drachma coins continued to be issued until 2000. The drachma was replaced by the euro, and the Bank of Greece stopped exchanging drachma coins in 2004.

The symbol on the coin is the familiar modern emblem of the atom: a small nucleus surrounded by three elliptical orbits, tilted at different angles. It is not, of course, a picture of what an atom looks like. No one in the fifth century BCE drew such a thing, and modern physics no longer pictures electrons as tiny planets on tracks. It is a twentieth-century icon placed beside an ancient face. That pairing is itself a kind of argument: that the line from Democritus to the modern atom is a single story.

● EVIDENCE: WELL-ESTABLISHED

The coin. The Greek 10-drachma coin, first issued in 1976, depicts the symbol of the atom and Democritus, and is 26 mm in diameter, 7.5 g, and copper–nickel (Bank of Greece coin catalogue; a central bank source, not peer-reviewed).

Why an object can matter

Why would a coin matter so much to a practitioner for almost thirty years? Psychology has some honest answers, and they do not require any special physics.

Objects and places cue memory. In a classic experiment, divers learned lists of words either on dry land or underwater, then recalled them in the same or the other setting. Lists learned underwater were best recalled underwater, and lists learned on land were best recalled on land (Godden & Baddeley, 1975). A meta-analysis of environmental context-dependent memory found such effects to be reliable, and found that mentally reinstating the original context at test reduced the effect of a changed environment (Smith & Vela, 2001). In other words, the cues of a place help us return to what we learned there, and imagining those cues can partly stand in for being there. An object carried from that place is a portable cue.

Ritual and repeated action can steady us. Under anxiety, people spontaneously become more ritualized in their movements, with more redundancy, repetition, and rigidity, which the authors interpret as a way to regain a sense of control (Lang et al., 2015). Book 4 described how a lack of control makes people perceive more patterns (Whitson & Galinsky, 2008).

Lucky charms: a cautionary tale. In 2010, a set of experiments reported that activating a superstition, such as being told one's golf ball was lucky, improved performance by boosting self-efficacy (Damisch et al., 2010). Two high-powered replications of the golf experiment found that participants with a "lucky" ball performed almost identically to controls, and a meta-analysis found no effect among the studies with the strongest designs (Calin-Jageman & Caldwell, 2014). A widely cited paper claiming that rituals improve performance by decreasing anxiety (Brooks et al., 2016) was later retracted (Brooks et al., 2024).

That story is worth keeping in mind for the whole of this book. The honest science of a talisman is not that it does something to the world. It is that an object can carry memory, meaning, and attention, and that people who care about such things should check claims about them more carefully, not less.

> ◐ EVIDENCE: SUGGESTIVE · EMERGING
>
> **Objects, places, and rituals carry memory and meaning.** Context reliably cues memory (Godden & Baddeley, 1975; Smith & Vela, 2001), and anxiety increases ritualized behaviour (Lang et al., 2015). Claims that charms or rituals improve performance have not held up well: a key superstition finding failed to replicate (Calin-Jageman & Caldwell, 2014), and a prominent ritual study was retracted (Brooks et al., 2024).

Remembrance, not acquisition

The source document says the system "is presented as remembrance rather than acquisition." In Book 4, the same idea appeared as "recognition rather than invention." In Book 3, it appeared as the hope that the right movements are already latent in ordinary life.

There is a scientific cousin of this idea that needs no past lives. Much of what skilled movement looks like is not invented by the learner. It is discovered, because the body, the nervous system, and the physics of the world already constrain it. The figure-eight of the juggling cascade, the smooth curves of a reaching hand, the stable ways a body can walk or turn: these are, in a real sense, there before we find them. Book 3 described how the nervous system's own movements follow lawful curves (Flash & Hogan, 1985; Huh & Sejnowski, 2015). Later chapters of this book will show more.

So "remembrance" can be read in two ways. As the originator's philosophy, it means knowledge carried from before this life. As science, it means something almost as strange: that the patterns of good movement are woven into the structure of bodies and the laws of physics, and that practice is the slow work of finding them.

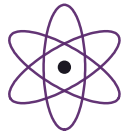
A book in the shape of the system

The source document describes the system's architecture as "the 3-6-9 vortex format": three foundations, six pillars, nine embodiments. Many readers will recognize the numbers 3, 6, and 9 from a famous quotation attributed to the inventor Nikola Tesla, that knowing "the magnificence of the 3, 6 and 9" would give you "a key to the universe." Researchers who have tried to trace that quotation have found no source for it in Tesla's writings, lectures, patents, or autobiography; it appears to be a modern internet attribution. What Tesla did write, in his autobiographical series *My Inventions* (published in *The Electrical Experimenter* in 1919), is that as a young man "all repeated acts or operations I performed had to be divisible by three."

This book uses the 3-6-9 structure as an organizing spine because the system does, and because it is a good one for a book. It does not claim that the numbers have physical power. Chapter 3 will show where the number three really does appear in physics and the body, and it is more interesting than numerology.

⚠ CAUTION

Check the quote. The "3, 6 and 9" quotation is widely attributed to Nikola Tesla, but no primary source has been found for it. Attribution checks by independent researchers (not peer-reviewed) trace it to the internet era. Please do not repeat it as Tesla's words.



Part I · Three Foundations

Atom. Triad. Necessity. Three ideas from ancient Greece, and what twenty-four centuries of physics made of them.

CHAPTER 2

Atomos: From Democritus to the Quantum Atom



Atomic Indivisibility — Every aligned movement is an uncuttable unit originating from the eternal nucleus (rooted center of mass).

— THE SYSTEM'S FIRST AXIOM, FROM THE SOURCE MATERIALS

The system calls itself "kinetic atomism." Its source document puts the philosophy in a sentence: "Reality consists of indivisible atoms (atomos) moving through the void (kenon) according to absolute necessity (ananke). There is no true randomness." To understand what physics has done with that sentence, we need to go back to where it came from.

Atoms and void

According to ancient reports summarized in the *Stanford Encyclopedia of Philosophy* (a scholarly reference work, not a peer-reviewed journal), Democritus was born around 460 BCE in Abdera, and with his associate or teacher Leucippus founded ancient atomism. The atomists held that there are smallest, indivisible bodies from which everything else is made, moving in an infinite void. They reasoned from the fact that motion exists to the conclusion that empty space must exist for things to move into. And Democritus denied that most of the qualities we perceive belong to the atoms themselves. One direct quotation survives: "by convention sweet and by convention bitter, by convention hot, by convention cold, by convention color; but in reality atoms and void."

From Leucippus, one direct quotation survives too: that nothing happens in vain, "but everything from logos and by necessity." This is the *ananke* of the system's third axiom.

The next great atomist, Epicurus, found that strict necessity troubled him. If everything follows from prior motion, what becomes of freedom? According to the *Stanford Encyclopedia*, the Epicurean answer, known chiefly through later sources such as Lucretius and Cicero, was "a certain randomness in the motion of atoms, that takes the form of a minute swerve in their forward course." The entry's author adds that the idea of such a minute, undetermined veering "is less strange in the modern age of quantum" physics.

So within a few generations, Greek atomism had already split into two views: atoms moving by pure necessity, and atoms with a tiny, irreducible swerve. Hold onto that split. Chapter 4 will show that modern physics has, in its own way, sided with the swerve.

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **Kinetic atomism.** The system's statement that reality is "indivisible atoms … moving through the void … according to absolute necessity" is a philosophical position with a 2,400-year history. It is a lens for practice, not a claim the source document asks us to test.

The atom that could be cut

Modern physics kept Democritus's word and broke his idea. The *atom* (from *atomos*, "uncuttable") turned out to be cuttable. Ernest Rutherford's 1911 paper on the scattering of alpha and beta particles proposed the structure that gave the atom a tiny, dense nucleus (Rutherford, 1911). Niels Bohr's 1913 paper "On the constitution of atoms and molecules" gave electrons fixed orbits around that nucleus (Bohr, 1913), the picture that the coin's three ellipses still echo. And in 1926 Erwin Schrödinger published the wave equation of the hydrogen atom, in which the electron is not a little planet but a wave, described by a mathematical function spread through space (Schrödinger, 1926).

The planetary orbits on the coin are therefore a historical image, not a modern one. In today's physics an electron in an atom has no track. It has a wave function, which gives the probabilities of finding it here or there. For most of a century, that wave function was only a calculation. In 2013, physicists used a technique called photoionization microscopy to directly observe the nodal structure of hydrogen atoms' electronic states, the pattern of the electron's wave function, validating predictions made over the previous three decades (Stodolna et al., 2013).

Here is the first mind-bending fact. The atom is, by volume, mostly emptiness. The nucleus is a tiny fraction of the atom's size, and the electrons are not little hard balls filling the rest. Democritus's "void" did not disappear. It moved inside the atom.

● EVIDENCE: WELL-ESTABLISHED

The atom has a nucleus and wave-like electrons. The nuclear atom (Rutherford, 1911), Bohr's orbits (Bohr, 1913), and Schrödinger's wave mechanics (Schrödinger, 1926) laid the foundations of modern atomic physics. The nodal structure of the hydrogen atom's electron wave function has been directly observed (Stodolna et al., 2013).

Matter is a wave

The strangeness is not limited to electrons. In 1999, physicists sent buckyballs, football-shaped molecules of sixty carbon atoms, through a grating and observed an interference pattern: the molecules behaved like waves. The authors noted that this molecule was "almost a classical body" (Arndt et al., 1999). Twenty years later, a team reported quantum superposition of molecules heavier than 25,000 atomic mass units (Fein et al., 2019).

So the line between the quantum world and the everyday world is not a wall. It is a gradient, and experiments keep pushing it further. What makes large things *look* classical is not that they stop obeying quantum mechanics. It is that they are constantly interacting with their surroundings, a process physicists call **decoherence**. As one major review puts it, "many (perhaps all) of the symptoms

of classicality can be induced in quantum systems by their environments" (Zurek, 2003). Chapter 11 will return to what decoherence means for brains and bodies.

● EVIDENCE: WELL-ESTABLISHED

Large molecules show wave behaviour; the environment makes things look classical. Matter-wave interference has been observed with C60 molecules (Arndt et al., 1999) and superposition with molecules above 25 kDa (Fein et al., 2019). Decoherence explains how classical behaviour emerges from quantum systems through interaction with their environment (Zurek, 2003).

Made in stars

There is one more journey every atom in your body has taken. A classic 1957 paper set out the theory of the "synthesis of the elements in stars" (Burbidge et al., 1957). A modern review summarizes the picture: elements heavier than helium are produced in the lives and deaths of stars. High-mass stars fuse heavier nuclei and explode as supernovae, releasing elements into space; their remnants, neutron stars, may later merge to make more heavy elements; and dying low-mass stars throw off their enriched outer layers (Johnson, 2019).

That means the iron in your blood, the calcium in your bones, the carbon in every cell, and the iron in the iron balls of Book 1 were made inside stars that lived and died before the Sun existed. When a practitioner juggles iron, they are throwing star-forged atoms through the air with star-forged atoms.

● EVIDENCE: WELL-ESTABLISHED

The elements of the body were made in stars. Elements heavier than helium are produced by stellar nucleosynthesis and stellar deaths (Burbidge et al., 1957; Johnson, 2019).

The uncuttable unit, revisited

The system's first axiom is "Atomic Indivisibility": every aligned movement is "an uncuttable unit originating from the eternal nucleus (rooted center of

mass).” As physics, the word “indivisible” has not survived: atoms can be split, and so can movements. But as a description of skill, the axiom points at something real.

Book 1 and Book 3 described **chunking**: with practice, the brain groups sequences of movement into units that are executed as wholes (Sakai et al., 2003). A beginner’s punch is many pieces; an expert’s is one. In that sense, skilled movements really do become “uncuttable”: not because they cannot be divided, but because the nervous system has stopped dividing them.

And the “rooted center of mass” is a real anchor of mechanics. Every movement of a body changes how its mass is distributed around its centre, and every stable movement has to manage that centre over the base of support. Chapter 5 will show how the nervous system prepares the centre before the limbs move.

◐ EVIDENCE: SUGGESTIVE · EMERGING

“Uncuttable units” as chunks. Practised movement sequences are grouped into chunks executed as single units (Sakai et al., 2003). The system’s “atomic” language can be read as a poetic description of this, though the system itself intends more.

CHAPTER 3

Three Orbits: The Triad and the Real Threes

Triadic Orbital Geometry — All kinetic expression arises from the synthesis of three interlocking geometries: figure-8 infinity patterns, toroidal pathways, and helical pathways.

— THE SYSTEM'S SECOND AXIOM, FROM THE SOURCE MATERIALS



Plate 2 · The triad: figure-eight, torus, helix. An original geometric study made for this book.

The source document maps the system's Geometric Triad (the figure-eight, the torus, and the helix) onto the three orbits of the coin. "The three geometries form the complete set of motion templates," it says, and "the coin's three orbits remain the portable blueprint."

Books 1 to 3 explored these shapes in practice: the figure-eight of the cascade and the bent-fist wave, the toroidal loop of the spinning ring, the helix of the twisting forearm and turning body. This chapter asks a different question. Where does three-ness really live in the physical world and the human body? The answer is not numerology. It is the shape of space itself.

Three bodies on a figure-eight

Start with the most beautiful coincidence in this book.

The "three-body problem" is one of the oldest puzzles in physics: how do three masses move under their mutual gravity? In general, the answer is chaotic and has no simple formula. But in 2000, two mathematicians used a variational method to exhibit "a surprisingly simple periodic orbit" for three equal masses moving in a plane. "Its most surprising feature," they wrote, "is that the three bodies chase each other around a fixed eight-shaped curve." The orbit has zero angular momentum and a rich symmetry (Chenciner & Montgomery, 2000).

Three bodies, chasing each other around a figure-eight. That is the three-ball juggling cascade, written by Newton's law of gravity. Book 1 described how skilled cascade juggling relies on stable, flexibly coupled timing between hands and balls (Beek & Turvey, 1992). The young man juggling in Athens in 1997 was, without knowing it, drawing in the air a shape that mathematicians would find hidden in the laws of gravity three years later.

● EVIDENCE: WELL-ESTABLISHED

A figure-eight orbit of three bodies exists. Three equal masses under Newtonian gravity can chase each other around a fixed figure-eight curve (Chenciner & Montgomery, 2000). The likeness to the three-ball cascade is a visual coincidence, not a physical connection.

The torus: where rhythms live

The torus, the shape of a ring or a doughnut, turns up in physics in an unexpected place. When two rhythms run together, like two hands juggling or two legs walking, the state of the pair can be described by two angles: where each rhythm is in its cycle. Two angles, each wrapping around, define a torus. The mathematics of coupled oscillators, used throughout movement science, lives on surfaces like this.

One of the most famous models in movement science describes what happens when two such rhythms are pushed. When people move their hands in an out-of-phase pattern and gradually speed up, there is a critical frequency beyond which the pattern abruptly switches to an in-phase, symmetrical mode. A theoretical model of these phase transitions, drawing on synergetics and nonlinear oscillator theory, reproduced the dramatic switch (Haken et al., 1985). The authors compared such transitions to gait shifts in animal locomotion.

So the "toroidal pathway" of the system has a precise cousin: the space in which coordinated rhythms move, and the place where sudden reorganizations of coordination happen.

● EVIDENCE: WELL-ESTABLISHED

Coordination behaves like coupled oscillators, with sudden phase transitions. The Haken–Kelso–Bunz model reproduces abrupt switches in bimanual coordination when movement frequency increases (Haken et al., 1985).

The helix: a circle that travels

A helix is what a circle becomes when it also moves forward: the path of a point on a turning wheel that is rolling, or of a hand that spirals while the body steps. Book 3 called it the "corkscrew of the turning body." It is also the shape of the molecule that carries your genetic inheritance, described in a one-page letter in 1953 (Watson & Crick, 1953).

There is a pleasing symmetry here with the system's idea of "remembrance." The most literal form of something carried from before this life is not a past-life

memory. It is DNA, wound in a double helix, copied from parents, who copied it from theirs, back through an unbroken chain to the beginnings of life.

Three dimensions, and why

The coin's three orbits are tilted at different angles, as if to fill three-dimensional space. That is fitting, because the three dimensions of space may be one of the deepest facts of all.

Physicist Max Tegmark has argued that the number three may be close to necessary for observers to exist. In a space with more than three dimensions, "there can be no traditional atoms and perhaps no stable structures." A space with fewer than three dimensions "allows no gravitational force and may be too simple and barren to contain observers" (Tegmark, 1997). This is a theoretical argument, not an experimental result, but it means that the three-dimensionality of the world is tied, in physics, to the very existence of atoms.

> ◇ SPECULATIVE SCIENCE
>
> **Why three dimensions?** The argument that observers can only exist in a (3+1)-dimensional spacetime is a published theoretical argument (Tegmark, 1997), not an experimental finding.

Three in the body

The body, built to live in that space, carries three-ness in its sense organs.

Three canals for three dimensions of turning. Each inner ear contains three semicircular canals, roughly at right angles to one another, which sense rotation of the head in three dimensions, while other organs in the inner ear sense linear acceleration and gravity (Day & Fitzpatrick, 2005). Every spin of the ring bar, every turn in a circle walk, every rotation of a strike is registered by these three loops of fluid.

Three pigments for colour. Human colour vision is based on three light-sensitive pigments. In 1986, researchers isolated and sequenced the genes that encode them, finding that the red and green pigments are 96% identical to each

other but only 43% identical to the blue (Nathans et al., 1986). Every colour you have ever seen is the brain's comparison of three signals.

Three planes of movement. Anatomists describe movement in three planes (sagittal, frontal, and transverse) and rotation about three axes. The system's "Rotational Multi-Plane Power" (Chapter 10) is, in this sense, a recognition that the body moves in the three dimensions it was built for.

● EVIDENCE: WELL-ESTABLISHED

The body senses a three-dimensional world with three-part systems. Three semicircular canals in each ear sense rotation in three dimensions (Day & Fitzpatrick, 2005), and normal human colour vision depends on three pigments (Nathans et al., 1986).

The triad, honestly

Is the Geometric Triad "the complete set of motion templates"? No study could test that claim, because it is a statement about how to see movement rather than a measurable property of it. Movement science has its own templates. Book 3 described lawful relations between speed and curvature in drawn and reached curves (Huh & Sejnowski, 2015) and smoothness principles in reaching (Flash & Hogan, 1985). Locomotion research uses "templates" in a technical sense, the simplest models that capture a behaviour, such as a bouncing spring-mass for running (Full & Koditschek, 1999).

What can be said is that the figure-eight, the torus, and the helix are each real, deep shapes of physics and biology. The figure-eight hides in the gravity of three bodies. The torus is the home of coordinated rhythm. The helix carries life. If a practitioner finds that holding those three shapes in mind makes their movement clearer, they are in good mathematical company.

○ PRACTITIONER EXPERIENCE · PHILOSOPHY

"The three geometries form the complete set of motion templates." This is the system's philosophy of movement. It is a lens, not a testable hypothesis. Each shape has real scientific significance; that they are *complete* is untested and probably untestable.

CHAPTER 4

Ananke: Necessity, Chance, and the Swerve



Absolute Necessity (Ananke) — When natural biomechanics, the Geometric Triad, and the atomic nucleus align, outcomes become predestined. Probability collapses into certainty.

— THE SYSTEM'S THIRD AXIOM, FROM THE SOURCE MATERIALS

The third foundation of the system is necessity. The source document is uncompromising: "There is no true randomness." When alignment is achieved, "outcomes become predestined."

This is the oldest question in this book, and the one on which modern physics has the most surprising thing to say. In the twentieth century, the question "Is the world, at bottom, necessary or chancy?" stopped being purely philosophical. It became something you could test in a laboratory. And the tests have been done.

Einstein's objection

In 1935, Albert Einstein, Boris Podolsky, and Nathan Rosen asked whether quantum mechanics could be a complete description of reality (Einstein et al., 1935). Quantum mechanics predicted that two particles could be prepared in a joint state, now called **entanglement**, such that measuring one would instantly tell you the result of measuring the other, however far apart they were. To Ein-

stein, that suggested the particles must already carry hidden instructions. The randomness of quantum mechanics would then be only our ignorance, and underneath it would lie a deterministic world, a world of necessity, just as Leucippus believed.

Bell's theorem

For three decades this looked like a matter of taste. Then, in 1964, John Bell published a short paper on the Einstein–Podolsky–Rosen paradox (Bell, 1964). He showed that the question could be tested. If particles carry local hidden instructions, the correlations between measurements on them must obey certain limits, now called Bell inequalities. Quantum mechanics predicts that entangled particles will break those limits.

In 1982, Alain Aspect and colleagues performed a famous test in which the settings of the measuring devices were changed while the photons were in flight, using switches operating near 50 MHz, so that one side could not "know" the other's setting in time. The results violated a Bell inequality by five standard deviations and agreed with quantum mechanics (Aspect et al., 1982).

Critics pointed to possible loopholes: detectors that missed too many particles, or settings that might be influenced by signals travelling between the stations. In 2015, three groups closed the main loopholes at once. In the Netherlands, researchers entangled electron spins in two diamonds 1.3 km apart and, over 245 trials, measured a Bell parameter of $S = 2.42 \pm 0.20$, violating the local-realist bound (Hensen et al., 2015). Groups in Vienna and at the US National Institute of Standards and Technology reported photon experiments with very strong violations (Giustina et al., 2015; Shalm et al., 2015).

In 2022 the Nobel Prize in Physics went to Alain Aspect, John Clauser, and Anton Zeilinger "for experiments with entangled photons, establishing the violation of Bell inequalities and pioneering quantum information science" (Nobel Prize press release, 2022; not peer-reviewed).

● EVIDENCE: WELL-ESTABLISHED

Nature violates Bell inequalities. Entangled particles show correlations that no theory of local hidden variables can explain, confirmed in loophole-free tests (Aspect et al., 1982; Hensen et al., 2015; Giustina et al., 2015; Shalm et al., 2015).

You, choosing, in a physics experiment

One loophole cannot be fully closed: the possibility that the choices of measurement settings were themselves not free, but somehow correlated with the particles from the start. John Bell himself suggested that human "free will" could be used to choose the settings.

On 30 November 2016, about 100,000 people around the world took part in the BIG Bell Test. Playing an online game, they produced 97,347,490 binary choices, which were sent in real time to twelve laboratories on five continents and used to choose measurement settings for a range of entangled systems. The experiments rejected local realism (BIG Bell Test Collaboration, 2018).

Others pushed the choice back further in time. In a "cosmic Bell test," measurement settings were chosen by the colour of light from distant quasars. That light had left its sources at least 7.8 billion years earlier. If some hidden mechanism had coordinated the settings with the particles, it would have had to begin before the Earth existed. The experiment violated Bell's inequality by 9.3 standard deviations (Rauch et al., 2018).

Let that settle. A hundred thousand human choices, and the light of quasars older than the Sun, were used to ask the universe the same question as Leucippus. The answer came back the same each time.

● EVIDENCE: WELL-ESTABLISHED

Human choices and ancient starlight in Bell tests. About 100,000 participants supplied random choices for twelve Bell tests (BIG Bell Test Collaboration, 2018), and quasar light emitted at least 7.8 billion years ago was used to set measurements in another (Rauch et al., 2018). Both rejected local realism.

What Bell does, and does not, say about necessity

It is easy to overstate what these experiments prove, so let us be careful. They rule out a particular combination: that the world is made of things carrying preset, local properties that fully determine results. Something in that picture has to give. Physicists disagree about which.

- **Genuine chance.** In the most common reading, quantum results are truly random, a modern version of Epicurus's swerve. On this view, "there is no true randomness" is simply false at the level of single quantum events.
- **Non-locality.** Some interpretations keep determinism but accept that what happens here depends in some way on what happens far away.
- **Superdeterminism.** A minority view holds that measurement settings and particles are correlated because everything, including the "choices" of experimenters and the light of quasars, was fixed together from the beginning. Its defenders argue that this view has been unfairly dismissed (Hossenfelder & Palmer, 2020). It is the purest modern form of *ananke*, and it remains a speculative, minority position.

The mathematicians John Conway and Simon Kochen proved a related result they called the "free will theorem" (Conway & Kochen, 2006): roughly, if experimenters are free to choose settings in a way not determined by the past, then the particles' responses are not determined by the past either. Whatever one makes of the word "free," it binds the freedom of people and particles together.

> ◇ SPECULATIVE SCIENCE
>
> **Is the universe fully necessary?** Bell tests do not decide between genuine chance, non-locality, and superdeterminism. Superdeterminism (Hossenfelder & Palmer, 2020), the view closest to the system's "absolute necessity," is a minority interpretation without direct experimental support.

Entanglement is not a thread between people and things

This is the place to be plain about one of the system's phrases: that the coin is "a living talisman that maintains the entanglement."

Physical entanglement is a precise and fragile property of quantum systems, prepared under strict conditions. As Chapter 2 described, interaction with the environment destroys quantum coherence extremely quickly in warm, large objects (Zurek, 2003). Even when entanglement exists, it cannot be used to send any signal or influence on its own; the correlations only appear when results from both sides are compared. There is no evidence of entanglement between a person and an object, between a coin and a memory, or across lifetimes.

None of this takes anything away from what the coin means to the person who carries it. It just means that the word "entanglement," used about the coin, is a metaphor. Chapter 14 will say more about why that distinction matters.

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **"The coin maintains the entanglement."** This is the originator's personal philosophy, expressed in physics vocabulary. There is no evidence of quantum entanglement between people, objects, memories, or lives, and physics gives strong reasons why such entanglement would not survive in warm, everyday matter.

Necessity without predictability

Even in a purely classical world, necessity does not mean predictability. In 1963, the meteorologist Edward Lorenz studied a simple set of equations for convection. He found that "slightly differing initial states can evolve into considerably different states," so that long-range prediction was impossible even though the equations were completely deterministic (Lorenz, 1963). This became known as **chaos**, and it is the subject of Chapter 7.

So the honest picture is layered. At the smallest scales, the universe appears to contain irreducible chance. At human scales, many processes are deterministic but chaotic. And somewhere in between, a body makes choices.

The swerve in the brain

What about the choices themselves? In a classic experiment, Benjamin Libet and colleagues asked people to make spontaneous, freely timed movements and to report when they first felt the urge to move. A slow brain signal, the readiness potential, began several hundred milliseconds before the reported urge, roughly 350 ms on average (Libet et al., 1983). Many took this to mean that the brain "decides" before we know it.

Later work challenged that interpretation. A model in which spontaneous fluctuations in neural activity accumulate until they cross a threshold could account for the readiness potential without supposing that a decision had been made long before awareness (Schurger et al., 2012). In this model, the moment of a spontaneous movement depends partly on random neural noise. A small swerve in the brain, as it were.

Book 3 was titled *Shape and Choice*, and it argued that daily movements are chosen, again and again, until they become shape. This chapter adds a cosmic footnote: the question of whether choices are free has been asked of the universe in laboratories on five continents, and the universe did not answer "everything is fixed."

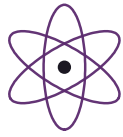
◐ EVIDENCE: SUGGESTIVE · EMERGING

Spontaneous decisions and neural noise. Readiness potentials precede reported urges to move (Libet et al., 1983), but an accumulator model suggests they may reflect spontaneous fluctuations rather than an early decision (Schurger et al., 2012). What this means for free will is debated.

Ananke, reconsidered

The source document says that when alignment is achieved, "probability collapses into certainty." Read as physics, this is not how probability or quantum collapse work. Read as a description of skill, it is close to something real. A beginner's movements are unreliable; their outcomes are spread widely. An expert's outcomes cluster tightly. The probability distribution of results really

does narrow with skill, though it never becomes a single point. The rest of this book is, in a sense, an inquiry into how that narrowing happens.



Part II · Six Pillars

Arm, iron, flutter, void, chain, and turn. Six pillars of a practice, each one a doorway into a different science.

CHAPTER 5

The Anatomical Triad: Hand, Forearm, Shoulder



Reflex becomes predestined pre-flex.

— FROM THE SOURCE MATERIALS

The first pillar is the body's own triad: hand, elbow and forearm, shoulder. Book 2, *Wave and Return*, was built around this chain: the bent fist, the whip-like wave of force from the centre to the hand, and the return. This chapter looks again at that chain through one of the most striking phrases in the source document: "Reflex becomes predestined pre-flex."

It turns out that "preflex" is a real term in movement science, and what it describes is stranger and more beautiful than a metaphor.

Faster than a nerve

When something disturbs a moving limb, the nervous system responds, but nerves are slow. Signals must travel to the spinal cord or brain and back, and muscles take time to respond. Yet bodies cope with sudden bumps and slips far faster than that.

Part of the answer is that muscles and tendons respond mechanically before the nervous system has time to act. The neuroscientists Ian Brown and Gerald Loeb gave this response a name. They called it a **preflex**, the "zero-delay, intrinsic response of a neuromusculoskeletal system to a perturbation" (Brown & Loeb, 2000, as quoted in later literature). A recent review of preflexes in legged

locomotion describes them as acting within a few milliseconds, an order of magnitude faster than neural reflexes. It identifies muscle short-range stiffness as dominant in the very first moments after a disturbance, followed by damping, and notes that neural control could tune the properties of preflexes in advance (Araz et al., 2023).

Biologists who study running animals put the principle well: "passive, dynamic self-stabilization from a feedforward, tuned mechanical system can reject rapid perturbations" (Full & Koditschek, 1999). In plain words: a well-tuned body can catch itself before the brain knows it has stumbled.

So "reflex becomes pre-flex" has a precise reading. It is not that reflexes become predestined. It is that a trained, well-tuned body handles more of the world mechanically, in the zero-delay response of its tissues, so that the slow nervous system is needed less.

◐ EVIDENCE: SUGGESTIVE · EMERGING

Preflexes. Muscles and tendons provide a "zero-delay" mechanical response to perturbations (Brown & Loeb, 2000), acting within milliseconds, an order of magnitude faster than neural reflexes, and their properties may be tuned by the nervous system (Araz et al., 2023; Full & Koditschek, 1999). Most of this evidence comes from locomotion and from animal and modelling studies. Whether martial training enhances preflexes in the arm has not been studied.

The body prepares before it moves

There is a second way that movement gets ahead of itself. Every fast arm movement disturbs balance. If you punch while standing, your arm's motion pushes your body the other way. The nervous system does not wait for this disturbance. It prepares for it.

These **anticipatory postural adjustments** have been studied for decades. A theoretical review asks the question at their heart: why is voluntary movement, which perturbs balance, possible without falling down? (Bouisset & Do, 2008). In one experiment, standing subjects made fast shoulder movements in different directions while standing on a force platform. Postural muscles began to change

their activity before the first burst of activity in the arm's prime-mover muscle, and the pattern depended on the direction of the movement (Aruin & Latash, 1995). In another, fine-wire recordings in fifteen people showed that a deep abdominal muscle, the transversus abdominis, switched on before the shoulder's deltoid, regardless of which direction the arm moved (Hodges & Richardson, 1997).

So before the hand moves, the trunk has already moved. The "rooted center of mass" of the system's first axiom is not a metaphor. Every skilled arm movement begins, invisibly, in the centre.

● EVIDENCE: WELL-ESTABLISHED

Posture is prepared before the limb moves. Anticipatory postural adjustments in trunk and leg muscles begin before the prime-mover muscle of a fast arm movement (Aruin & Latash, 1995; Hodges & Richardson, 1997; Bouisset & Do, 2008).

The prediction machine in the arm

Why can the body prepare before it moves? Because the brain predicts. Computational neuroscience has found unifying principles of movement, including planning, prediction, estimation, and learning, that describe how the brain uses internal models of the body and the world (Wolpert & Ghahramani, 2000). The brain's model of the arm predicts the consequences of a command and prepares the body to meet them.

This is the deep link between the first pillar and the fourth (Chapter 8). The body that "pre-flexes" is a predicting body. And a predicting body is, in a sense, always living slightly in the future.

The chain of force

Book 2 summarized the evidence on striking. Trained kung fu practitioners may differ from untrained people mainly in how much of their body's mass is effectively behind a strike (Neto et al., 2007). A tightly buttressed fist protects the bones of the hand (Horns et al., 2015). The Anatomical Triad, in this light, is a

way of linking the mass of the trunk to the small, vulnerable structures of the hand through the elbow and forearm: three segments, each passing force to the next.

◐ EVIDENCE: SUGGESTIVE · EMERGING

The chain from trunk to hand. Effective mass may distinguish trained from untrained strikers (Neto et al., 2007), and a buttressed fist reduces strain in hand bones in laboratory tests (Horns et al., 2015). The specific benefits of the system's Anatomical Triad have not been tested.

Where this leaves "predestined"

The source document says that, in alignment, reflex becomes "predestined preflex." The science supports the first half of the poetry. Well-trained bodies do prepare before they move, and their tissues do respond to the world faster than thought. What science does not support is the word "predestined." A preflex is a probability-shifter, not a certainty. It makes a good outcome more likely, by doing in milliseconds what nerves would do in tens of milliseconds. That is wonder enough.

CHAPTER 6

The Iron Tool Triad: Juggling, Spinning, Push and Pull



The body is the pen; the void is the canvas; the triad is the eternal template.

— FROM THE SOURCE MATERIALS

The second pillar is the Iron Tool Conditioning Triad: juggling, the spinning ring iron bar, and push and pull. Book 1, *Walking and Turning*, introduced the iron tools. This chapter asks what they change, and finds that the deepest answer is a question about what a body even is.

Iron that changes the brain

Book 1 opened with the remarkable fact that juggling was the skill that first showed, in humans, that the adult brain physically changes with learning. People who learned a three-ball cascade over three months showed increases in grey matter in brain areas involved in processing and storing complex visual motion, and these increases partly reversed when they stopped practising (Draganski et al., 2004). A later study found that six weeks of juggling increased a measure of white-matter structure beneath a region of the parietal cortex (Scholz et al., 2009).

That is the first strange truth of the iron triad. A practice with iron balls rewrites the brain that guides it.

The body that rebuilds itself

The second strange truth is that the body doing the practice is never the same body twice.

A 2021 study estimated the overall rate of cell turnover in the human body. It calculated that about 80 g of cells, roughly 0.33 trillion cells, are replaced each day, with blood cells making up about 90% of that number (Sender & Milo, 2021). Over a year, a mass of cells close to the mass of a large dog is rebuilt.

But not everything turns over. Using the spike in atmospheric carbon-14 caused by nuclear bomb tests in the 1950s and 1960s, which was taken into the DNA of cells made at that time, researchers dated the cells of the human body. Neurons in the visual cortex were found to be as old as the individual, while other cells were exchanged over the years (Spalding et al., 2005). A later study using the same method found that about one-third of the neurons in the hippocampus, a region essential for memory, are subject to exchange, with about 700 new neurons added in each hippocampus per day (Spalding et al., 2013).

● EVIDENCE: WELL-ESTABLISHED

The body is constantly rebuilt, but not all of it. About 80 g, or 0.33 trillion cells, are replaced daily, mostly blood cells (Sender & Milo, 2021). Many neurons last a lifetime (Spalding et al., 2005), but about one-third of hippocampal neurons are subject to exchange (Spalding et al., 2013).

A pattern that persists

Put these facts together and something mind-bending appears. The iron balls of Book 1 are more permanent than the hands that throw them. Many of the cells that juggled yesterday are being dismantled today. Yet the skill persists.

Skill does not live in any single atom. It lives in the pattern: in connections, in structure, in the shape the brain and body take as they are rebuilt again and again around a practice. And the iron in a practitioner's blood cells, forged in ancient stars (Chapter 2), is recycled as those cells are replaced, carried into new cells that carry oxygen to the muscles that lift the iron bar.

This is where the system's phrase "the body is the pen" becomes literal in a way the source document may not have intended. The body writes with itself. It is a pattern that rebuilds its own material, and practice is one of the forces that shape what pattern it rebuilds into.

◇ SPECULATIVE SCIENCE

"You are a pattern, not a substance." The idea that identity and skill reside in a pattern maintained through turnover of material is a philosophical interpretation, informed by the turnover data above. It is not itself an experimental finding.

Three tools, three demands

Why these three tools? The system does not claim research support for the specific combination, and none exists. But each draws on a different side of movement:

- **Juggling** demands timing and prediction, with stable, flexible coordination between hands and balls (Beek & Turvey, 1992).
- **The spinning ring bar** demands control of rotation, and so draws on the conservation of angular momentum (Chapter 10) and on the rotation-sensing canals of the inner ear (Chapter 3).
- **Push and pull** demands force passed through the chain of hand, forearm, and shoulder (Chapter 5).

Timing, rotation, force. A triad, chosen by practice rather than by laboratory.

⚠ CAUTION

Iron is unforgiving. Iron balls and bars can break toes, teeth, and windows. Books 1 and 2 give safety guidance for iron tools. Start light, practise over soft ground, keep others well clear, and stop if anything hurts.

○ PRACTITIONER EXPERIENCE · PHILOSOPHY

The Iron Tool Conditioning Triad. Juggling's effects on brain structure are well established (Draganski et al., 2004; Scholz et al., 2009). The particular benefits of the system's combination of juggling, spinning, and push/pull with iron tools have not been studied.

CHAPTER 7

The Butterfly Flutter: Chaos and the Fractal Body

Slightly differing initial states can evolve into considerably different states.

— EDWARD LORENZ, 1963



Plate 3 · The butterfly. A trajectory of the Lorenz equations, computed for this book.

The third pillar is called Fluid-Dynamic Butterfly Flutter. The name is a gift, because the most famous image in the science of chaos is a butterfly.

The butterfly in the equations

In 1963, Edward Lorenz published a short study of a simplified model of convection, the rolling of heated fluid. His equations were completely deterministic: given a starting state, there was only one future. Yet he found that their solutions never settled into a repeating pattern, and that "slightly differing initial states can evolve into considerably different states." From this he concluded that precise very-long-range weather forecasting would be impossible (Lorenz, 1963).

When the solutions of Lorenz's equations are plotted in three dimensions, they trace a shape of two looping wings around two centres, never repeating, never crossing itself. Plate 3 shows one. It has become the emblem of chaos theory, and because of its shape, and Lorenz's later talk about whether the flap of a butterfly's wing could set off a tornado, the idea of sensitive dependence became known as the **butterfly effect**.

Look at the plate again. It is a figure-eight. The system's own fluid, looping "butterfly flutter" and the strange attractor of chaos theory share a silhouette.

● EVIDENCE: WELL-ESTABLISHED

Deterministic chaos. Simple deterministic equations can produce non-repeating behaviour that is extremely sensitive to initial conditions, making long-range prediction impossible (Lorenz, 1963).

The healthy body is not constant

For most of the twentieth century, physiology was guided by the idea of homeostasis: healthy systems work to reduce variability and hold steady. The heartbeat, in that view, should tick like a metronome.

It does not. A review of fractal dynamics in physiology states the surprise plainly: contrary to the predictions of homeostasis, the output of systems such as the normal human heartbeat "fluctuates in a complex manner, even under resting conditions." Techniques adapted from statistical physics reveal long-range correlations operating over a wide range of time scales, and the authors

conclude that "maintaining constancy is not the goal of physiologic control." In people at high risk of sudden cardiac death, including those with heart failure, this fractal organization breaks down (Goldberger et al., 2002).

A method developed to measure these correlations, detrended fluctuation analysis, showed that the long-range correlation of the healthy heartbeat breaks down in severe congestive heart failure (Peng et al., 1995).

Earlier, Lewis Lipsitz and Ary Goldberger proposed that physiologic aging is associated with a loss of such complexity, and hypothesized that this loss leads to an impaired ability to adapt to stress (Lipsitz & Goldberger, 1992).

● EVIDENCE: WELL-ESTABLISHED

Healthy physiology is complex, not constant. Healthy heartbeats show fractal, long-range correlations that break down in heart disease (Peng et al., 1995; Goldberger et al., 2002). Loss of complexity with aging and its link to reduced adaptability is a well-supported hypothesis (Lipsitz & Goldberger, 1992).

The fractal walk

Book 1 was about walking. Here is something about walking that Book 1 did not have room for.

In 1995, researchers measured the time between strides of ten healthy young men as they walked for nine minutes at their usual pace. The fluctuations were not random noise. They showed "long-range self-similar correlations extending over hundreds of steps": each stride depended on strides taken long before, in a scale-free, fractal-like way. When the order of strides was shuffled, the pattern disappeared (Hausdorff et al., 1995).

A later review concluded that "the alleged noise actually conveys important information," and that stride-to-stride fluctuations may help to assess disease severity, medication effects, and fall risk (Hausdorff, 2007).

So your walk has a memory. Each step carries a faint trace of hundreds of earlier steps, folded together across time scales. The circle walk of Book 1, practised for hours, is a fractal written by the feet.

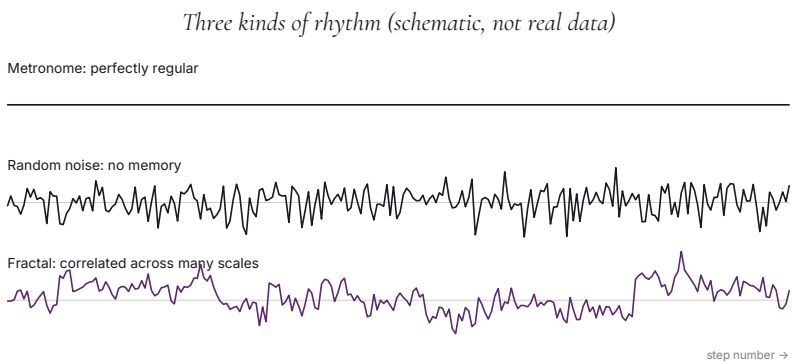


Figure 1 · Illustrative comparison of a metronomic rhythm, uncorrelated noise, and a fractal fluctuation. Schematic, not real data.

● EVIDENCE: WELL-ESTABLISHED

Walking is fractal. Stride intervals in healthy walking show long-range, fractal-like correlations over hundreds of steps (Hausdorff et al., 1995), and changes in these fluctuations carry clinical information, including about fall risk (Hausdorff, 2007).

Flutter, freedom, and necessity

There is a subtle link between this chapter and the last. Chaos shows that necessity and unpredictability can live together: a fully deterministic system can be unknowable in practice. Fractal physiology adds that health itself may depend on this kind of complex, never-quite-repeating variability. A body that ticks like a clock may be a body losing its ability to adapt.

The system's "butterfly flutter" asks for fluid, looping, never-rigid movement. Science cannot say that this practice increases physiological complexity. No one has measured that. But it can say that the healthy body was never a metronome, and that the shapes of chaos are written in the heart and the stride.

◇ SPECULATIVE SCIENCE

Can practice restore complexity? Whether fluid movement practices increase fractal complexity of gait or heart rate is an open question. It has not been tested for this system. The idea is offered as a hypothesis worth studying, not a finding.

CHAPTER 8

Void: The Fullness of Empty Space

By convention sweet and by convention bitter, by convention hot, by convention cold, by convention color; but in reality atoms and void.

— DEMOCRITUS, FRAGMENT DK 68B9

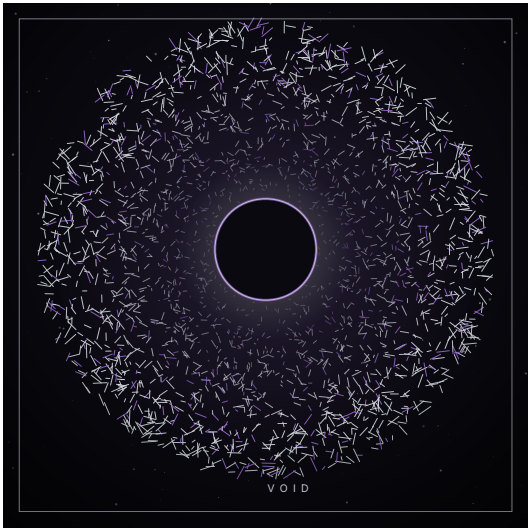


Plate 4 · Void. An original study of a field of fluctuations around an empty centre.

The fourth pillar is Void Utilization. In the source document, the void is the canvas on which the body writes, and the caves of the Acropolis were "literal void-chambers." For Democritus, the void was the empty

space without which atoms could not move. This chapter follows the void through physics, through the brain, and back into practice, and finds at every step that emptiness is not what it seems.

The atom is mostly void

Chapter 2 described the nuclear atom: a tiny, dense nucleus, surrounded by electrons described as waves (Rutherford, 1911; Schrödinger, 1926). Nearly all of the atom's mass is in the nucleus, and the nucleus takes up a minute fraction of the atom's volume. Everything that feels solid, the floor, an iron ball, your own hand, is made of atoms that are, by volume, overwhelmingly empty.

Why, then, does a punch land rather than pass through? Because the electrons of atoms repel one another, and because of the quantum rules that keep electrons from occupying the same state. The solidity of the world is not the solidity of tiny hard balls. It is the pressure of fields and rules in the void.

The void is not empty

Here the story turns again. In quantum physics, even a perfect vacuum is not nothing. It is a field in its lowest energy state, and that lowest state still fluctuates.

This has measurable consequences. Two conducting plates placed very close together in a vacuum are pushed toward each other by the **Casimir force**, which arises from the way the plates modify the zero-point fluctuations of the electromagnetic field between them. In 1997, a torsion-pendulum experiment conclusively demonstrated this force for separations between 0.6 and 6 micrometres, with agreement with theory at the level of 5% (Lamoreaux, 1997).

Democritus said that, in reality, there are atoms and void. Twenty-four centuries later, physics found that the void itself pushes.

● EVIDENCE: WELL-ESTABLISHED

The vacuum has measurable effects. The Casimir force, arising from modified zero-point fluctuations of the electromagnetic field, has been measured with agreement with theory of about 5% (Lamoreaux, 1997).

○ PRACTITIONER EXPERIENCE · PHILOSOPHY

"Caves as void, spring as essence, field effects." In the source document, these are framed as "personal and philosophical rather than clinically verified." The quantum vacuum has nothing to do with caves or wells; there is no evidence that places "charge" a field in a person. The poetry of the caves belongs to the originator's philosophy.

The brain fills the void

Now turn to the void inside experience. Democritus's fragment says that sweet, bitter, hot, cold, and colour exist "by convention." A modern neuroscientist might say: they are constructed by the brain.

One influential account holds that brains are "essentially prediction machines," constantly "attempting to match incoming sensory inputs with top-down expectations or predictions," using a hierarchical model that aims to minimize prediction error (Clark, 2013). A related framework, the free-energy principle, proposes that a single quantity, surprise or prediction error, is minimized across action, perception, and learning (Friston, 2010).

On this view, we do not simply receive the world. We meet it with predictions and correct them with the signals that come in. The colours you see are, in a real sense, the brain's best guess, built from three cone signals (Chapter 3). Democritus's "convention" has become a theory of perception.

Book 4 explored what happens when these predictions are loosened. The REBUS hypothesis proposes that psychedelics relax high-level beliefs and allow more bottom-up information to flow (Carhart-Harris & Friston, 2019). Book 4 also showed the risk: a loosened predictive brain can find patterns that are not there, which is why checking what one perceives matters.

◐ EVIDENCE: SUGGESTIVE · EMERGING

The predictive brain. Predictive processing and the free-energy principle are influential frameworks in which perception and action minimize prediction error (Friston, 2010; Clark, 2013). They are well supported as frameworks but still debated in their details. REBUS is a hypothesis (Carhart-Harris & Friston, 2019).

The void between two people

In practice, "void utilization" means something concrete: moving into the empty space an opponent leaves, not meeting force with force, letting an attack fall into nothing. Book 3's "Imagined Opponents" and Book 4's work with the dummy and the listening hand both trained this sense.

The predictive brain gives this a new reading. If perception is prediction, then a fighter who "uses the void" is exploiting the gap between what the other person's brain predicts and what actually happens. An attack that meets nothing produces a large prediction error in the attacker. The empty space is not empty; it is full of the other person's expectations.

The quiet self

There is one more void the internal arts have always cared about: the quieting of the self. Book 3 discussed *mushin*, "no-mind." Neuroimaging studies of experienced meditators found reduced activity in the brain's default mode network, a set of regions associated with mind-wandering and self-referential thought (Brewer et al., 2011).

This is not proof that any practice empties the mind, and it says nothing about caves or fields. But it suggests that the feeling of inner spaciousness that practitioners describe has measurable correlates in the brain.

◐ EVIDENCE: SUGGESTIVE · EMERGING

Meditation and the default mode network. Experienced meditators showed reduced default mode network activity during meditation (Brewer et al., 2011). This is one small study; whether martial practice produces similar changes is untested.

Atoms and void, revisited

Put this chapter together and the picture is dizzying. The solid world is mostly void. The void is full of fluctuation. The qualities we perceive are the brain's predictions laid over the void. And the art of moving with another person is, in part, the art of working with the void inside their predictions.

The system says "the void is the canvas." Physics and neuroscience agree, in their own languages, that the canvas is never blank.

CHAPTER 9

Non-Repetitive Chaining: Variability and Emergence



Daily juggling consisted of continuous, non-repetitive orbital patterns.

— FROM THE SOURCE MATERIALS

The fifth pillar is Non-Repetitive Kinetic Chaining: linking movements in sequences that flow into each other and never quite repeat. Book 2's chapter "Never the Same Strike Twice" made the case that this kind of variation helps learning. This chapter adds two deeper ideas: that the nervous system actively uses variability to explore, and that wholes can have properties their parts do not.

Variability is how bodies explore

Movement scientists used to treat variability as noise, the unwanted wobble around a perfect movement. A 2014 study found something surprising. Across two very different learning tasks, people with higher levels of task-relevant variability in their movements learned faster. Training could also reshape the structure of that variability, aligning it with the task. The authors concluded that "motor variability facilitates motor learning in humans and that our nervous systems actively regulate it to improve learning" (Wu et al., 2014).

In other words, a body that never moves the same way twice is not failing to be precise. It is searching.

A much older finding points the same way. In a classic 1979 experiment, people learned three motor tasks either in blocks (all of one task, then all of the next) or in a random order. Random practice produced better retention when tested under changed conditions, and better transfer to new, more complex tasks (Shea & Morgan, 1979). This **contextual interference** effect has been widely studied since, with variations, but its central lesson remains: mixing practice makes learning harder in the moment and stronger later.

● EVIDENCE: WELL-ESTABLISHED

Variability aids learning. Task-relevant motor variability predicted faster learning, and the nervous system appears to regulate it (Wu et al., 2014). Random, interleaved practice improved retention and transfer compared with blocked practice (Shea & Morgan, 1979).

Chains and transitions

What happens at the joins of a chain? Chapter 3 described a classic model of coordination in which a rhythm, pushed beyond a critical frequency, suddenly reorganizes into a new pattern (Haken et al., 1985). Coordination, in this view, has stable states and transitions between them, like water and ice.

A chain of movements is a journey through such states. Each transition is a small reorganization, and a practitioner who links movements without stopping is practising the transitions themselves, the places where one pattern dissolves into the next. That is a different skill from practising each movement alone.

More is different

In 1972, the physicist Philip Anderson published a short essay with a famous title: “More is different” (Anderson, 1972). Its argument, now central to how scientists think about complex systems, is that at each level of complexity new properties appear that cannot be simply read off from the level below. Knowing all the laws of particles does not tell you what a cell does, or what a mind does.

This is the most important idea in this book for understanding how the books of this series fit together. A movement chain is more than a list of movements. A body is more than a list of cells. A practice is more than a list of drills. Each level has its own laws.

It also answers a question that runs through this whole book: if the body is made of quantum particles, why don't quantum effects show up in movement? Because more is different. By the time particles have become atoms, molecules, cells, muscles, and limbs, the quantum strangeness of individual particles has been averaged and decohered away (Zurek, 2003), and new laws, the laws of mechanics and coordination, have emerged. The quantum level is real. It is just not where movement lives.

● EVIDENCE: WELL-ESTABLISHED

Emergence and the classical world. Higher levels of organization show properties not reducible to lower levels in practice (Anderson, 1972), and decoherence explains why quantum superpositions do not persist in large, warm systems (Zurek, 2003). No quantum effects in human movement have been demonstrated.

Cousins in other arts

The source document compares the system with several traditional arts:

- **Bagua Zhang**, the circle-walking art of Book 1, with its continuous spiralling changes;
- **Chen Tai Chi**, with its silk-reeling, figure-eight movements;
- **Filipino Kali**, with its figure-eight stick patterns;
- **Systema**, the Russian art known for fluid, relaxed movement.

All four share a love of continuous, looping, non-repeating movement. For tai chi in general, there is a substantial research literature, mostly on health and balance, which Book 4 surveyed. For the specific features the source highlights (Bagua's spiral changes, Chen silk-reeling, Kali's figure-eight patterns, Systema's flow), controlled research is scarce or absent. The kinship between these arts and the system is a matter of form and philosophy, not of evidence.

○ PRACTITIONER EXPERIENCE · PHILOSOPHY

Comparisons with traditional arts. The resemblance of the system to Bagua Zhang, Chen Tai Chi, Filipino Kali, and Systema is noted in the source document. There is little or no controlled research on the specific techniques compared.

The chain without repetition

Here is a way to hold this chapter. A non-repeating chain of movement is three things at once. To the nervous system, it is exploration, the variability through which learning happens. To a dynamical-systems scientist, it is a journey through stable patterns and the transitions between them. And to a philosopher of science, it is an emergent whole, with properties no single movement has.

The system's own phrase is "continuous, non-repetitive orbital patterns." Science would add only one word: *exploratory*.

CHAPTER 10

Rotational Multi-Plane Power: Symmetry and Spin



The coin's three orbits remain the portable blueprint.

— FROM THE SOURCE MATERIALS

The sixth pillar is Rotational Multi-Plane Power: force generated by turning, in all three planes of movement. Book 1 was built around turning, from circle walking to the spinning iron bar. This chapter goes underneath turning, to one of the most beautiful ideas in physics.

Symmetry and conservation

In 1918, the mathematician Emmy Noether proved a theorem on "invariant variation problems" (Noether, 1971, an English translation of the 1918 original). Its central result, as physicists use it today, is that every continuous symmetry of the laws of physics corresponds to a quantity that is conserved.

- Because the laws of physics are the same today as tomorrow (symmetry in time), **energy** is conserved.
- Because the laws are the same here as there (symmetry in space), **momentum** is conserved.
- Because the laws are the same in every direction (symmetry under rotation), **angular momentum** is conserved.

Pause on the last one. Every spin you have ever made, every turn of a circle walk, every rotation of a strike, obeys a conservation law that exists because space has no preferred direction. The power of a turning body is a consequence of the symmetry of the universe.

● EVIDENCE: WELL-ESTABLISHED

Symmetry and conservation. Noether's theorem links continuous symmetries to conserved quantities: time symmetry to energy, spatial symmetry to momentum, and rotational symmetry to angular momentum (Noether, 1971; standard textbook physics).

How a body turns

Angular momentum is the "quantity of spin" a body carries. Without outside forces, it stays the same. This is why a skater spins faster when they pull their arms in: the same angular momentum, with mass closer to the axis, means faster rotation.

A standing body is not free like a skater. It pushes against the ground, and the ground pushes back. Rotation in striking comes from that exchange: the feet twist against the floor, the hips turn, the trunk follows, and angular momentum is passed up the chain to the arm. Book 2 described this as the whip and the wave. In each segment, mass close to the axis spins fast; mass far out carries the spin into the target.

The spinning iron bar of Book 1 makes this visible. A bar spun around the hand carries its own angular momentum, and resists changes in the plane of its spin, as a gyroscope does. The practitioner learns, through the hands, the rules of a conserved quantity.

Three axes, three canals

There are three independent axes of rotation in three-dimensional space, and the body has a sensor for each. As Chapter 3 described, the three semicircular canals of each inner ear sense rotation of the head in three dimensions (Day &

Fitzpatrick, 2005). Multi-plane rotation is, quite literally, what this part of the body was built to feel.

Circle walking, spinning the bar, and turning strikes all keep these three canals busy. The internal arts have long worked with what physiology calls the vestibular sense, even if they did not use the word.

⚠ CAUTION

Spinning and the inner ear. Prolonged turning can cause dizziness and falls. Build up gradually, change direction, and stop if you feel unwell. People with vestibular disorders should seek medical advice first.

The coin's three orbits, rotated

The atomic symbol on the coin shows three orbits, tilted at different angles. If one orbit is a turn in one plane, three tilted orbits together suggest turning in every direction. The system's sixth pillar asks the practitioner to do exactly that: to generate force not only in the horizontal plane, as in a typical punch, but in all three.

Is multi-plane rotational training better than single-plane training for martial power? There is no direct evidence either way for this system. What can be said is that the body moves in three dimensions, senses rotation in three dimensions, and obeys a conservation law for rotation that comes from the symmetry of space itself.

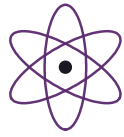
○ PRACTITIONER EXPERIENCE · PHILOSOPHY

Rotational Multi-Plane Power. The physics of angular momentum and the anatomy of rotation sensing are well established. Whether the system's multi-plane rotational training produces more power or fewer injuries than other methods has not been studied.

Symmetry as a teacher

Noether's theorem offers a final thought. Conservation laws are not rules imposed on the universe from outside. They express the universe's own symmetries. In the same way, good movement may not be a set of rules imposed on a body, but an expression of the body's own structure, its joints, its sensors, and the symmetric space it lives in.

That is a scientific version of the system's idea that movement is "remembrance rather than acquisition": not memory of past lives, but recognition of a symmetry that was always there.



Part III · Nine Embodiments

Bag, root, step. Turn, deflect, close. Evade, endure, and live it. Nine expressions, and the sciences hidden inside them.

CHAPTER 11

Embodiments One to Three: Where Quantum Meets Life



Juggling in 1997 is framed as the quantum catalyst.

— FROM THE SOURCE MATERIALS

The system's nine embodiments are the places where its foundations and pillars are meant to show up in a living practice. This part takes them three at a time. For each triad, it looks briefly at what the earlier books said, then goes deeper into one of the great questions that ties the series together. This chapter takes the first three, the heavy bag, standing, and walking, and asks where, in a living body, quantum physics truly matters.

The first triad: bag, root, step

The source lists the first three embodiments as:

1. "Continuous heavy-bag orbital striking chains from all angles"
2. "Standing postural stability and rooting through triadic flow"
3. "Dynamic walking and locomotion as inherent martial fitness"

Book 2 covered the bag: effective mass, the buttressed fist, and the safe path for the hand (Neto et al., 2007; Horns et al., 2015). Chapter 9 of this book adds that a chain which never repeats is a chain that explores (Wu et al., 2014).

Standing and rooting rest on the body's habit of preparing its centre before it moves (Aruin & Latash, 1995; Hodges & Richardson, 1997), described in Chapter 5.

Walking was the subject of Book 1, and Chapter 7 of this book showed that walking carries fractal memory across hundreds of steps (Hausdorff et al., 1995).

All three are mechanical, chemical, and biological. None of them, as far as any study shows, uses quantum effects in any special way. And yet every one of them would be impossible without quantum physics.

Every bond is quantum

That is not a contradiction. Quantum mechanics explains why atoms are stable, why they bond into molecules, and why chemistry works at all. The muscle contraction behind a strike, the energy in the sugar a body burns, the light a retina absorbs: all of it rests on quantum rules. In that sense, life is quantum all the way down, just as a car is quantum all the way down.

The interesting question is narrower. Do living things use *distinctly* quantum effects, such as coherence, superposition, tunnelling, or entanglement, in ways that matter for their function? That is the question of **quantum biology** (Lambert et al., 2013), and its honest answer is a story of excitement, caution, and a few real successes.

The rise and fall of quantum photosynthesis

In 2007, researchers studying a light-harvesting protein from green sulphur bacteria reported evidence of "wavelike energy transfer through quantum coherence," observed in a sample cooled to 77 kelvin, about −196 °C (Engel et al., 2007). The idea that plants and bacteria might use quantum coherence to harvest light efficiently electrified science and the popular press.

Over the following decade, other researchers re-examined the evidence. One team concluded that "nature does not rely on long-lived electronic quantum coherence for photosynthetic energy transfer," finding that such coherence typic-

ally decays within a few tens of femtoseconds (Duan et al., 2017). A 2020 review titled "Quantum biology revisited" concluded that the relevant coherences "are too short lived to have any functional significance in photosynthetic energy transfer," and that the long-lived signals came instead from vibrations of the molecules (Cao et al., 2020).

This is science working as it should: an exciting claim, careful testing, and a correction. It is also a warning. Many popular accounts of "quantum life" still repeat the 2007 claim without the correction.

● EVIDENCE: WELL-ESTABLISHED

Photosynthetic coherence was re-examined. Early evidence of functional quantum coherence in photosynthesis (Engel et al., 2007) has been reinterpreted; later work found that electronic coherences are too short-lived to matter for energy transfer (Duan et al., 2017; Cao et al., 2020).

The compass in a bird's eye

A more promising case is the compass of migrating birds. Many birds can sense the direction of the Earth's magnetic field, and how they do so has been a puzzle for decades. In 2000, physicists proposed a model in which pairs of molecules with unpaired electrons, called **radical pairs**, produce chemical reactions whose yields depend on their alignment with the Earth's magnetic field (Ritz et al., 2000). The direction of the field would then subtly change visual signals.

In 2021, a study showed that a protein called cryptochrome 4, from the night-migrating European robin, is magnetically sensitive in the test tube, more so than the same protein from chickens and pigeons, which do not migrate (Xu et al., 2021).

The radical-pair mechanism is "the leading hypothesis," but a review notes that the primary sensory mechanism "is still unclear" (Hore & Mouritsen, 2016). If it is confirmed, a migrating bird would be steering by quantum spin dynamics happening in its eye.

◐ EVIDENCE: SUGGESTIVE · EMERGING

Quantum magnetoreception in birds. Radical-pair chemistry in cryptochrome is the leading hypothesis for the avian magnetic compass (Ritz et al., 2000; Hore & Mouritsen, 2016), and robin cryptochrome 4 is magnetically sensitive in vitro (Xu et al., 2021). The mechanism in living birds is not yet confirmed.

Tunnelling in enzymes

A firmer case is tunnelling. In quantum mechanics, a particle can sometimes pass through an energy barrier it could not climb over. In many enzymes, the proteins that run the body's chemistry, hydrogen atoms appear to tunnel when chemical bonds are broken. A major review describes how hydrogen tunnelling in enzyme reactions provides "a unique window" into the role of protein motion in catalysis (Klinman & Kohen, 2013).

So inside your cells, right now, some of the chemistry that keeps you alive appears to involve atoms passing through barriers in a way no classical object could.

● EVIDENCE: WELL-ESTABLISHED

Hydrogen tunnelling in enzymes. Quantum tunnelling of hydrogen is associated with enzymatic C–H bond cleavage and linked to protein dynamics (Klinman & Kohen, 2013).

Is the brain a quantum computer?

The most famous and most contested question is whether the brain itself uses quantum effects for thought or consciousness.

The physicist Max Tegmark calculated in 2000 that quantum superpositions in the brain would decohere in about 10^{-13} to 10^{-20} seconds, far faster than the 10^{-3} to 10^{-1} seconds of neural processes, and concluded that the brain should be thought of as a classical system (Tegmark, 2000). Defenders of quantum theories of mind replied that Tegmark had modelled the wrong sys-

tem, and recalculated much longer times, of around 10^{-5} to 10^{-4} seconds (Hagan et al., 2002).

The best-known quantum theory of consciousness, Orchestrated Objective Reduction or "Orch OR," proposes that consciousness depends on orchestrated quantum processes in microtubules, structures inside neurons, ending in a form of quantum state reduction linked to the geometry of space-time (Hameroff & Penrose, 2014). It is a bold and serious proposal by distinguished scientists. It is also highly contested and not supported by direct evidence.

◇ SPECULATIVE SCIENCE

Quantum consciousness. Whether quantum effects play any role in brain function is unresolved, with decoherence calculations disputed (Tegmark, 2000; Hagan et al., 2002). Orch OR (Hameroff & Penrose, 2014) is a speculative theory without direct experimental confirmation.

What this means for movement

Put together, the evidence draws a clear line. Distinctly quantum effects in biology are real at the level of molecules, such as tunnelling in enzymes and perhaps radical pairs in birds. They are unproven at the level of the brain. And at the level of whole-body movement, there is no evidence for them at all.

So the bag, the root, and the step are not quantum phenomena. They are emergent, as Chapter 9 put it: built from quantum matter, but governed by their own laws. That is not a disappointment. It means that the strangeness of the quantum world is present in every cell of a practitioner, but that the practice itself lives, and can be studied, in the world of mechanics, coordination, and learning.

○ PRACTITIONER EXPERIENCE · PHILOSOPHY

"The quantum catalyst." The source frames juggling in 1997 as a quantum event in which "orbital paths held past-life knowledge in superposition." This is the originator's philosophy. No study has found quantum effects in human movement, and superposition in a warm, large body would decohere almost instantly (Zurek, 2003; Tegmark, 2000).

CHAPTER 12

Embodiments Four to Six: Time, Clocks, and the Other



Subjective time expands while external events appear to slow.

— FROM THE SOURCE MATERIALS

The second triad of embodiments is about meeting force and meeting people:

1. "Explosive yet effortless rotational power generation"
2. "Multi-angular redirection and deflection in close range"
3. "Close-range domination through fluid sensitivity and chaining"

Chapter 10 described the physics of rotational power. Book 2 explored reading another person, and Book 4 explored the listening hand. This chapter takes on the two great mysteries that live in close-range work: the experience of time, and the strange coupling between two people. Both turn out to touch physics in unexpected ways.

When time seems to slow

The source document says that, in alignment, "subjective time expands while external events appear to slow." Fighters, athletes, and people in accidents often report this. Does time really slow down inside the brain?

One ingenious experiment tested it. Participants experienced a 31-metre free fall into a safety net while using a hand-held device that measured the speed of

their visual perception. If time really slowed for them, their perception should have become faster during the fall. It did not. There was "no evidence of increased temporal resolution," even though they later estimated their own fall to have lasted 36% longer than other people's. The authors concluded that "time-slowing is a function of recollection" (Stetson et al., 2007). The memory of a frightening event is richer, so it seems longer afterwards.

Flow can also bend time, often in the other direction. In a laboratory study, people were most likely to be in flow when the attentional demands of a task were moderate, neither too low nor too high, and those in flow showed a distortion in which time seemed to pass faster than it did (Im & Varma, 2018). Book 4 described how psilocybin alters time perception, particularly for intervals longer than two to three seconds (Wittmann et al., 2007).

● EVIDENCE: WELL-ESTABLISHED

Subjective time is malleable, but perception does not speed up. During a frightening fall, perceptual speed did not increase, although the fall was remembered as longer (Stetson et al., 2007). Flow is associated with distorted time, and psilocybin alters duration perception (Im & Varma, 2018; Wittmann et al., 2007).

When time really does change

Now the mind-melting turn. There is a kind of time that genuinely runs at different rates for different people. It is not in the brain. It is in physics.

Einstein's relativity predicts that moving clocks and clocks at different heights in a gravitational field tick at different rates. In October 1971, two physicists flew four atomic clocks around the world on commercial jets, once eastward and once westward. Compared with clocks at the US Naval Observatory, the flying clocks lost 59 ± 10 nanoseconds on the eastward trip and gained 273 ± 7 nanoseconds on the westward trip, in good agreement with relativity (Hafele & Keating, 1972b), having been predicted in advance (Hafele & Keating, 1972a).

By 2010, optical atomic clocks had become precise enough to detect time dilation at speeds of less than 10 metres per second, about the speed of a sprint-

er, and from a change in height near the Earth's surface of less than one metre (Chou et al., 2010).

Think about what that means for two people facing each other. If one stands on a step, their time runs very slightly faster than their partner's. When a fist moves, the time inside it runs very slightly slower than the time of the body behind it. The differences are unimaginably small, far too small for any nervous system to notice. But they are real. Two people in close range are, in the most literal physical sense, living in slightly different times.

● EVIDENCE: WELL-ESTABLISHED

Time really does run at different rates. Atomic clocks flown around the world recorded relativistic time differences (Hafele & Keating, 1972a, 1972b), and optical clocks detect time dilation at speeds under 10 m/s and height differences under 1 m (Chou et al., 2010). These effects are far too small to be perceived.

◇ SPECULATIVE SCIENCE

"Subjective time expands." The experience of slowed time in skilled action is real as an experience, but evidence suggests it reflects memory and attention rather than faster perception (Stetson et al., 2007). It has nothing to do with relativistic time dilation, which is real but imperceptibly small at human speeds.

Two brains, one rhythm

The fifth and sixth embodiments, redirection and close-range sensitivity, are about two bodies moving together. Here science has found something that sounds like mysticism but is not.

When people interact, their brains can become coupled. In a dual-EEG study, nine pairs of people freely imitated each other's hand movements while their brain activity was recorded at the same time, a technique called **hyperscanning**. The study found synchronization between the two brains' activity during the interaction (Dumas et al., 2010). In another study, the brain activity of a person telling a story was coupled with the brain activity of a listener, and this coupling disappeared when the two failed to communicate. Some of the listen-

er's brain areas even anticipated the speaker's, and the more anticipation there was, the better the listener understood (Stephens et al., 2010).

Researchers who led this work have argued for a shift "from a single-brain to a multi-brain frame of reference," in which the neural processes of one brain are coupled to those of another through signals passing through the environment (Hasson et al., 2012). The coupling is not telepathy. It travels through sound, sight, and touch. But its result is that two brains, interacting, behave in some ways as one system.

Bodies synchronize too. At a fire-walking ritual in Spain, researchers recorded heart rates from performers and spectators. The heart rates of fire-walkers and of spectators related to them became synchronized, while those of unrelated spectators did not (Konvalinka et al., 2011).

◐ EVIDENCE: SUGGESTIVE · EMERGING

Brains and bodies couple during interaction. Hyperscanning studies show inter-brain synchronization during imitation and communication (Dumas et al., 2010; Stephens et al., 2010; Hasson et al., 2012), and heart rates synchronized between ritual performers and related spectators (Konvalinka et al., 2011). Studies are small, and coupling is mediated by ordinary senses. No hyperscanning study has examined martial sensitivity training.

Close range, reconsidered

Close-range sensitivity training, the listening hand of Book 4, the reading of the other in Book 2, is a practice of coupling. Two bodies in contact become a single dynamical system, each predicting the other. Stephens and colleagues found that the listener who anticipated best understood best. A practitioner who anticipates the other person's movement, through touch, is doing something similar with the body.

And so the "fluid sensitivity" of the sixth embodiment has two layers of wonder. In physics, two people in contact live in very slightly different times. In neuroscience, two people in contact can come to share a rhythm. Each is real;

neither is quantum entanglement; and together they make the space between two people far stranger than it looks.

CHAPTER 13

Embodiments Seven to Nine: The Interwoven Body

Seamless integration in which every daily movement becomes both martial application and fitness expression.

— THE NINTH EMBODIMENT, FROM THE SOURCE MATERIALS

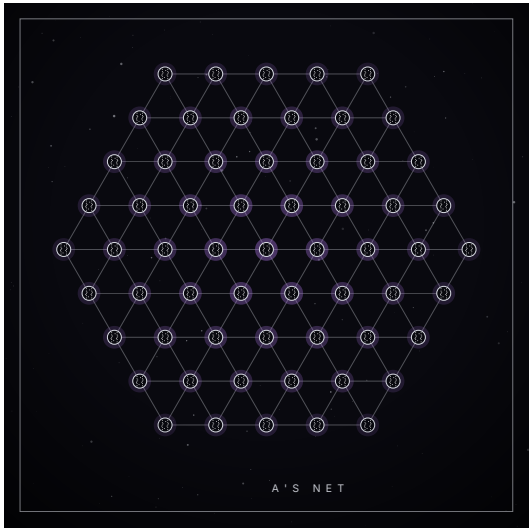


Plate 5 · Indra's net. An original study of a lattice in which every node reflects every other.

The last triad of embodiments widens out from the fight to the whole of life:

1. "Evasion, angling, and positioning as natural extensions of the triad"

2. “Full-body injury-resistant conditioning and endurance”
3. “Seamless integration in which every daily movement becomes both martial application and fitness expression”

Evasion and angling are the practical face of the void (Chapter 8): not being where the force arrives. Conditioning and endurance are the work of the iron tools (Chapter 6) and the patient rebuilding of the body. And the ninth embodiment, integration into daily life, was the subject of all of Book 3.

This chapter asks what “integration” means at the deepest level. Its answer is that the body was never separate from the world to begin with.

Where you come from

Gather the threads of this book.

The atoms of your body were forged in stars that died before the Sun was born (Burbidge et al., 1957; Johnson, 2019). The iron in your blood and the iron in Book 1’s iron balls share that origin.

Your body is rebuilt continuously. About 80 g of cells, around 0.33 trillion, are replaced each day (Sender & Milo, 2021), while many of your neurons have been with you since birth (Spalding et al., 2005).

Who you are made of

Now add a fact that changes what “your body” means. A careful 2016 estimate of the cells in a reference adult found about 38 trillion bacterial cells and about 30 trillion human cells. The often-quoted ratio of ten bacteria to every human cell was wrong; the numbers are of the same order. The bacteria weigh only about 0.2 kg in total, because they are so small (Sender et al., 2016).

By count, then, you are at least as much a community as an individual. The body that practises is an ecosystem, most of it microbial, all of it alive.

● EVIDENCE: WELL-ESTABLISHED

The body is a community. A reference adult carries about 3.8×10^{13} bacterial cells and about 3.0×10^{13} human cells, so the numbers are of the same order (Sender et al., 2016).

What you breathe

Each breath a practitioner takes during a form is a loan from other living things. The oxygen in the air is a product of photosynthesis, and the food that powers the muscles began as sunlight captured by plants and algae. A global estimate of the planet's net primary production, the carbon fixed by photosynthetic life after its own needs, found about 104.9 billion tonnes of carbon per year, with roughly equal contributions from land and oceans (Field et al., 1998).

Half of the living engine that feeds the world is in the sea, much of it microscopic. Every breath during Book 2's breathing practices draws on forests and plankton on the other side of the planet.

● EVIDENCE: WELL-ESTABLISHED

The biosphere's production. Global net primary production is about 104.9 petagrams (billion tonnes) of carbon per year, roughly half on land and half in the oceans (Field et al., 1998).

The extended mind

If the body is a community and a borrowing, where does the mind end? In 1998, the philosophers Andy Clark and David Chalmers published a short paper called "The extended mind" (Clark & Chalmers, 1998). Their argument, now widely discussed, is that when we rely on tools and objects in the right way, such as a notebook that holds our memories, those things can become part of our thinking, not just aids to it.

Here the coin returns. Chapter 1 described how places and objects cue memory (Godden & Baddeley, 1975; Smith & Vela, 2001). A coin carried for almost thirty years, linked to a formative time and a body of practice, can be read,

in Clark and Chalmers's terms, as part of a memory system that extends beyond the skull. That is not entanglement. It is something the originator might find just as moving: the possibility that the coin is, in a real philosophical sense, part of his mind.

◇ SPECULATIVE SCIENCE

The extended mind. The thesis that cognition can extend into tools and objects (Clark & Chalmers, 1998) is an influential and debated philosophical position, not an experimental finding. Reading the coin as part of an extended memory system is this book's interpretation.

Indra's net

Many traditions have pictured this interdependence. Buddhist philosophy speaks of **dependent origination**, the idea that nothing arises on its own, and everything exists only through relations with everything else. A famous image from Mahayana Buddhism is **Indra's net**: an infinite net with a jewel at every knot, each jewel reflecting all the others, so that every part contains the whole.

These are philosophies and contemplative images, not scientific theories. But it is hard to read this chapter and not see why they still speak to people. A body made of stars, rebuilt daily, outnumbered by its microbes, breathing the work of distant plankton, thinking partly through the objects it carries, and coupled to the brains of those it meets (Chapter 12): this is a net, and each of us is a jewel in it.

○ PRACTITIONER EXPERIENCE · PHILOSOPHY

Dependent origination and Indra's net. These are traditional philosophical and contemplative ideas, included here as lenses for reflection. They are not scientific claims.

The ninth embodiment in daily life

The ninth embodiment asks that every daily movement become both practice and fitness. Book 3 explored this in depth, including the finding that habits take widely varying amounts of time to become automatic, between 18 and 254 days in one study, and that missing a single day did not derail the process (Lally et al., 2010).

There is a modern echo in the fitness world. In the American College of Sports Medicine's survey of fitness trends for 2026, based on 2,038 responses from fitness professionals, "Balance, Flow, and Core Strength" ranked fifth and "Functional Fitness Training" ranked tenth, as the source document states. The number-one trend was wearable technology (McAvoy et al., 2025). The system, which needs no device at all, sits at an interesting angle to that list: aligned with what professionals see as important, and quietly opposed to the top trend.

◐ EVIDENCE: SUGGESTIVE · EMERGING

Fitness trends. The ACSM 2026 trends survey ranked Balance, Flow, and Core Strength fifth and Functional Fitness Training tenth; Wearable Technology was first (McAvoy et al., 2025). This is a survey of professional opinion, not evidence that any training method works.

Injury-resistant?

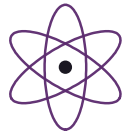
The eighth embodiment promises "full-body injury-resistant conditioning." No study has tested whether this system reduces injuries. Book 2's safe path for the hand and Book 1's guidance on iron tools remain the best advice in this series: build gradually, protect the joints, and treat pain as information, not as an obstacle.

⚠ CAUTION

No one is injury-proof. Conditioning can reduce some risks, but no system makes a body immune to injury. Treat claims of "injury resistance" as goals, not guarantees.

The interwoven practice

The subtitle of this book is *Atoms, Necessity, and the Science of an Interwoven Practice*. This chapter has tried to show what "interwoven" means. A practitioner's body is woven from stars, renewed by its own turnover, shared with trillions of microbes, fed by the planet's photosynthesis, extended into the objects it carries, and coupled to the people it meets. The ninth embodiment asks that practice be woven into every daily movement. Science suggests that the practitioner was already woven into everything else.



Coda · The Open Door

What the four earlier books were walking toward, and what remains to be explored.

CHAPTER 14

Remembrance, and an Open Door

The system is presented as remembrance rather than acquisition.

— FROM THE SOURCE MATERIALS

The 3-6-9 spine of this book

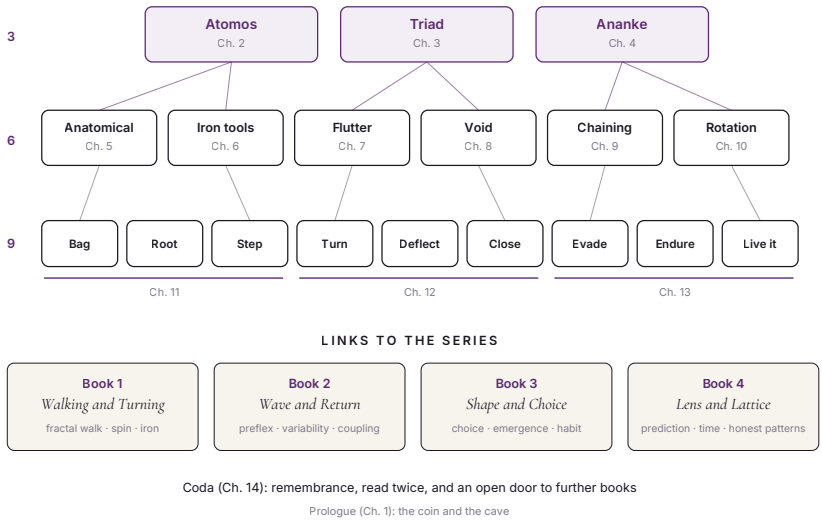


Figure 2 · The 3-6-9 architecture of this book and its links to Books 1 to 4.

This book set out to do two things: to follow the System of Inevitability down to its foundations in atoms, necessity, and void, and to show how

the four earlier books in this series connect. This coda gathers those threads. It does not tie them off. It leaves the door open.

The series, seen from the nucleus

Each earlier book took one face of the practice and looked at it closely. Seen from the atomic level, each turns out to touch something larger.

How each book in the series connects to the themes of Book 5

Book	Its focus	What Book 5 adds
1 · *Walking and Turning*	Circle walking, iron tools, the brain changing with juggling	Walking is fractal (Ch. 7); turning obeys a conservation law born of symmetry (Ch. 10); the iron is star-forged (Ch. 2); the body throwing it is rebuilt daily (Ch. 6)
2 · *Wave and Return*	The bent fist, the wave of force, variability, reading the other	The body prepares and "preflexes" before it strikes (Ch. 5); variability is exploration (Ch. 9); brains couple in interaction (Ch. 12)
3 · *Shape and Choice*	Daily movement, habit, presence, restraint	Choice meets physics in Bell tests (Ch. 4); emergence explains why movement is classical (Ch. 9); integration into daily life (Ch. 13)
4 · *Lens and Lattice*	Altered perception, patterns, the listening hand	Perception as prediction filling the void (Ch. 8); time felt versus time measured (Ch. 12); honesty about false patterns, including "quantum" ones (this chapter)

What has been found

Gather the most astonishing facts in this book, every one of them measured:

- The universe does not obey local hidden instructions. A hundred thousand human choices and the light of quasars older than the Earth were used to show it (BIG Bell Test Collaboration, 2018; Rauch et al., 2018).

- Molecules heavier than 25,000 atomic mass units can exist in quantum superposition (Fein et al., 2019).
- The vacuum pushes (Lamoreaux, 1997).
- Three bodies under gravity can chase each other around a figure-eight (Chenciner & Montgomery, 2000).
- Clocks tick at different rates a metre apart in height (Chou et al., 2010).
- Healthy hearts and strides are fractal, and lose their complexity in disease (Hausdorff et al., 1995; Goldberger et al., 2002).
- Muscles respond to the world faster than nerves can (Araz et al., 2023).
- Two communicating brains couple, and anticipation predicts understanding (Stephens et al., 2010).
- You are rebuilt daily, outnumbered by your microbes, and made of the ash of stars (Sender & Milo, 2021; Sender et al., 2016; Johnson, 2019).

None of this requires coin entanglement, past lives in superposition, or quantum effects in movement. It is stranger than that, and it is true.

Why the word "quantum" deserves care

The source document uses quantum language freely: superposition, probability collapse, entanglement, field. It is worth saying clearly, and without scolding, why this book has handled that language so carefully.

"Quantum" names a precise body of physics, with precise conditions. When it is used as a metaphor for intuition, destiny, or connection, three things happen. First, people who know the physics stop listening, and the real insights of a practice are dismissed along with the borrowed words. Second, people who do not know the physics may believe that a claim has been scientifically established when it has not. Third, the real wonders of quantum physics, which are astonishing enough, get buried under claims they cannot support.

The originator's experiences in Athens, and the meaning the coin holds, do not need quantum physics to be valuable. They are his. The philosophy of remembrance can stand as philosophy. And the science that genuinely connects

atoms, necessity, and movement is available to anyone who wants to look, as this book has tried to show.

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **Quantum language in the system.** The source's quantum framing (juggling as "quantum catalyst," "past-life knowledge in superposition," the coin as "probability collapse," caves that "charged the field") is the originator's philosophy. There is no evidence for quantum effects in movement, in memory across lives, or between a person and an object.

Remembrance, read twice

The system says it reveals "what was already carried." This book has offered a second reading of that sentence, one that sits beside the first without replacing it.

What does a practitioner carry? Atoms from stars. A double helix copied through an unbroken chain of ancestors. A nervous system shaped by the symmetries of space, with three canals for three dimensions and three pigments for colour. A body whose tissues respond before thought, whose walk remembers hundreds of steps, whose heart is fractal. A brain that predicts, couples with others, and extends into the objects it holds.

Whether or not anyone carries knowledge from past lives, everyone carries all of this. Practice, in this reading, is not acquiring something foreign. It is discovering the structure that was already there.

What remains open

The source document is admirably candid on one point: "Viability remains conditional as a transmissible martial system until progression standards and outcome measures are established."

That sentence is an invitation. The system's claims could be tested. Some questions that could be studied:

- Does non-repetitive chaining practice improve learning or transfer compared with blocked practice of the same movements (Shea & Morgan, 1979; Wu et al., 2014)?
- Does long-term fluid practice change the fractal structure of gait or heart rate (Hausdorff, 2007; Goldberger et al., 2002)?
- Do practitioners show earlier or larger anticipatory postural adjustments than non-practitioners (Aruin & Latash, 1995)?
- Do partners in sensitivity training show measurable coupling of movement or physiology (Konvalinka et al., 2011)?

Book 3's chapter "How to Test the Philosophy" and Book 2's test protocols give the methods. Appendix A of this book adds practices for exploring the ideas of this book directly.

An open door

This is Book 5. It is not the end of anything.

The series began with walking and turning and has reached, here, down to the atom and out to the stars. But a practice that never repeats itself does not end in a summary. Every book in this series has left questions unanswered, and this one has left more than most: about necessity and chance, about the coupled brain, about complexity in the healthy body, about what a practice can and cannot change.

Those questions are doors. More books in this series will walk through some of them. Readers, practitioners, and researchers can walk through others. The three orbits on the coin have no starting point and no end. They keep going around.

The body is the pen; the void is the canvas; the triad is the eternal template.

Practise gently. Check what you are told, including by this book. Share it freely. And keep the door open.

Appendix A · Practices and Logs

These practices are ways to feel the ideas of this book in your own body. None of them is a test of quantum physics, and none needs any equipment beyond what is listed. Keep them gentle. Log what you notice, and keep what you notice separate from what you conclude.

Nine practices for the 3-6-9 spine

Three foundations

1. **The uncuttable unit** (Chapter 2). Choose one short movement chain. Practise it slowly in pieces, then as a whole. Log the day it first felt like one movement rather than several.
2. **The three orbits** (Chapter 3). Trace a figure-eight, a circle, and a spiral with one hand, then with the whole body. Note which feels most natural and which most foreign.
3. **Necessity and swerve** (Chapter 4). Repeat a simple target task ten times (for example, tossing a soft ball into a bucket). Record the spread of results today and again after four weeks. Watch the distribution narrow, but never vanish.

Six pillars

1. **Before the hand** (Chapter 5). Standing, raise one arm quickly forward. Notice what your trunk and legs do *before* the arm moves.
2. **The pattern that persists** (Chapter 6). At the start of a month, film a short juggling or iron-tool sequence. Film it again at the end. Your cells have changed; has your pattern?
3. **The fractal walk** (Chapter 7). Walk for nine minutes at your usual pace, without a metronome or music. Notice how your rhythm drifts without your deciding.

4. **The void** (Chapter 8). With a cooperative partner, at very slow speed, practise letting a push fall into empty space instead of resisting it. Note what happens to the partner's balance and expression.
5. **The chain that explores** (Chapter 9). Practise three movements in a random order instead of in blocks for one week. Compare your recall a week later.
6. **Turning and symmetry** (Chapter 10). Spin slowly with arms out, then draw them in. Feel the conserved spin. Stop at any dizziness.

> ⚠ CAUTION
>
> **Gentle first.** Use soft balls before iron, slow speed before fast, and a cooperative partner before any resistance. Stop at pain or dizziness. People with heart, balance, or joint conditions should consult a health professional first.

Practice log

Date	Practice (1–9)	Minutes	What I noticed	What I think it means	How sure (1–10)

Narrowing the distribution (Practice 3)

Date	Hits out of 10	Notes on misses (short, long, left, right)	Felt "aligned"? (Y/N)

Appendix B · The Evidence at a Glance

A summary of the main claims in this book. "●" marks well-established findings, "◐" suggestive or emerging ones, "◊" speculative science or philosophy, and "○" claims that are untested or belong to the originator's personal philosophy.

Claim	Strength	Key sources
Nature violates Bell inequalities; local hidden variables are ruled out	● Established	Aspect et al., 1982; Hensen et al., 2015; Giustina et al., 2015; Shalm et al., 2015
Human choices and quasar light have set Bell-test measurements	● Established	BIG Bell Test Collaboration, 2018; Rauch et al., 2018
The universe is fully determined (superdeterminism)	◇ Speculative, minority view	Hossenfelder & Palmer, 2020
Large molecules show quantum interference	● Established	Arndt et al., 1999; Fein et al., 2019
The vacuum produces a measurable force	● Established	Lamoreaux, 1997
The body's elements were made in stars	● Established	Burbidge et al., 1957; Johnson, 2019
Three bodies can orbit on a figure-eight	● Established (mathematics)	Chenciner & Montgomery, 2000
Three space dimensions are needed for observers	◇ Theoretical argument	Tegmark, 1997
Posture is prepared before a fast arm movement	● Established	Aruin & Latash, 1995; Hodges & Richardson, 1997
Muscles provide a near-zero-delay "preflex" response	◐ Suggestive (mostly locomotion, animal and model studies)	Brown & Loeb, 2000; Araz et al., 2023
Juggling changes brain structure	● Established	Draganski et al., 2004; Scholz et al., 2009

Claim	Strength	Key sources
The body replaces about 0.33 trillion cells a day	● Established (estimate)	Sender & Milo, 2021
Healthy heartbeat and gait are fractal	● Established	Hausdorff et al., 1995; Peng et al., 1995; Goldberger et al., 2002
Variability and random practice aid learning	● Established	Shea & Morgan, 1979; Wu et al., 2014
Functional quantum coherence in photosynthesis	○ Not supported after re-examination	Engel et al., 2007; Duan et al., 2017; Cao et al., 2020
Radical-pair quantum compass in birds	◐ Leading hypothesis	Ritz et al., 2000; Hore & Mouritsen, 2016; Xu et al., 2021
Hydrogen tunnelling in enzymes	● Established	Klinman & Kohen, 2013
Quantum processes underlie consciousness (Orch OR)	◇ Speculative	Tegmark, 2000; Hagan et al., 2002; Hameroff & Penrose, 2014
Time slows in the brain under threat	○ Not supported; it is a memory effect	Stetson et al., 2007
Clocks run at different rates with speed and height	● Established	Hafele & Keating, 1972b; Chou et al., 2010
Brains couple during interaction	◐ Suggestive (small studies)	Dumas et al., 2010; Stephens et al., 2010
Lucky charms improve performance	○ Failed to replicate	Damisch et al., 2010; Calin-Jageman & Caldwell, 2014
Coin entanglement, past lives in superposition, quantum movement	○ Originator's philosophy; no evidence	Chapters 1, 4, 11, 14
The 3-6-9 "Tesla quote"	○ No primary source found	Chapter 1
The system's six pillars and nine embodiments have been tested	○ Untested	Chapter 14

Glossary

Angular momentum — The rotational equivalent of momentum; the "quantity of spin" a body carries, which stays constant unless an outside twisting force acts.

Anticipatory postural adjustment (APA) — Activity in postural muscles that begins before a voluntary movement, preparing the body for the disturbance the movement will cause.

Ananke — Greek for "necessity." In the system, the third foundation: the idea that aligned movement produces inevitable outcomes.

Atomos — Greek for "uncuttable," the root of "atom."

Bell inequality — A limit on the correlations between measurements that any theory of local hidden variables must obey. Entangled particles violate it.

Casimir force — A small attraction between closely spaced conducting plates, caused by the way they modify the fluctuations of the electromagnetic vacuum.

Chaos — Behaviour of a deterministic system that is so sensitive to its starting conditions that long-term prediction is impossible.

Chunk — A group of movements or information that is executed or remembered as a single unit.

Contextual interference — The finding that mixing different tasks during practice can make learning harder at first but improve retention and transfer.

Decoherence — The loss of quantum behaviour in a system through its interaction with the environment. It explains why large, warm objects behave classically.

Default mode network — A set of brain regions associated with mind-wandering and self-related thought.

Dependent origination — A Buddhist teaching that all things arise in dependence on other things, and nothing exists on its own.

Detrended fluctuation analysis (DFA) — A method for measuring long-range correlations in a signal such as a heartbeat or stride series.

Emergence — The appearance, at higher levels of organization, of properties and laws that are not obvious from the parts.

Entanglement — A quantum relationship between particles in which measurements on them are correlated more strongly than any classical explanation allows. It cannot be used to send signals, and it is fragile in warm, large systems.

Extended mind — The philosophical thesis that tools and objects can, under some conditions, be part of a person's thinking.

Fractal — A pattern that looks similar across many scales. In physiology, fluctuations that are correlated across many time scales.

Free will theorem — A result by Conway and Kochen linking the freedom of experimenters' choices to the undetermined behaviour of particles.

Hyperscanning — Recording the brain activity of two or more people at the same time while they interact.

Indra's net — A Buddhist image of an infinite net with a jewel at every knot, each reflecting all the others.

Kenon — Greek for "void," the empty space through which the ancient atomists said atoms move.

Noether's theorem — The result that every continuous symmetry of physical laws corresponds to a conserved quantity.

Nucleosynthesis — The making of chemical elements inside stars and in stellar explosions and mergers.

Orch OR — Orchestrated objective reduction, a speculative theory proposing that consciousness arises from quantum processes in neuronal microtubules.

Preflex — The near-instant mechanical response of muscles and tendons to a disturbance, before any nervous reflex can act.

Predictive processing — The view that the brain constantly predicts its sensory input and updates its predictions using prediction errors.

Radical pair — A pair of molecules with unpaired electrons, whose chemical reactions can be sensitive to magnetic fields; proposed as the basis of the bird compass.

Superdeterminism — The minority interpretation that measurement settings and measured particles are correlated because everything was determined together from the start.

Superposition — A quantum state that combines more than one possible configuration until it is measured or decoheres.

Time dilation — The relativistic effect by which clocks moving faster, or lower in a gravitational field, tick more slowly.

Tunnelling — The quantum process by which a particle passes through an energy barrier it could not classically climb over.

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Title. *Nucleus and Orbit: Atoms, Necessity, and the Science of an Interwoven Practice.* Book 5 of the Companions to the System of Inevitability.

Compiled by Cory Matthew Snell. **System originated by** Uki (@ukigigi). First edition, November 2026.

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