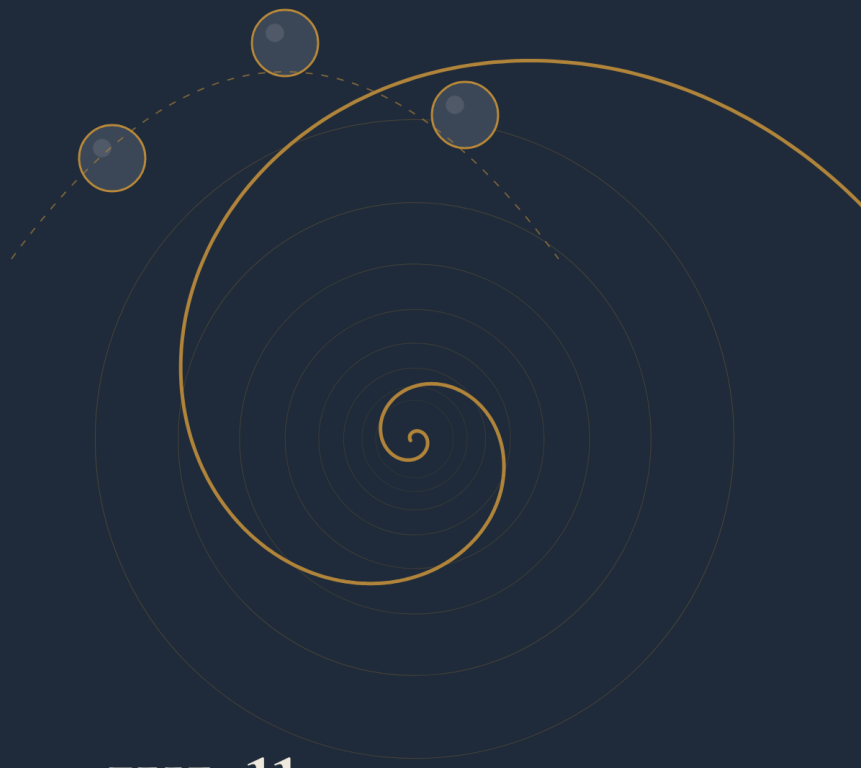

Walking *and* Turning

IRON, SPIRALS, AND THE SCIENCE OF A PRACTICING MIND

An evidence-based companion to the System of Inevitability

COMPILED BY CORY MATTHEW SNELL

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System of Inevitability originated by Uki (@ukigigi)
An independent, unofficial work

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Walking and Turning: Iron, Spirals, and the Science of a Practicing Mind *An independent, evidence-based companion 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.

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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. Descriptions of the System of Inevitability are drawn from his public statements and from a project brief that summarizes them. Where this book suggests progressions, tests, or safety rules, those are the compiler's suggestions based on the general scientific literature, not Uki's teaching.

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About the science. Every study cited here was checked against its published record (authors, year, journal, and DOI) at the time of writing. No study, number, or quotation has been invented. Where the evidence is thin, the text says so.

For everyone who has ever dropped the ball and bent down to pick it up again.

And for the stonemasons, the street jugglers, and the quiet practitioners in garages and backyards who keep the old conversation between body and world alive.

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How to Read This Book

This book makes a promise to you: it will tell you, at every important turn, *how sure we are*.

Science is not a pile of facts. It is a set of claims held with different degrees of confidence. Some findings have been replicated across thousands of people on several continents. Some rest on a single small, clever experiment. Some are honest hypotheses still waiting for their test. And some things in this book are not science at all. They are the lived experience and philosophy of a practitioner, which has its own kind of value and should be honored as that, not dressed up as a laboratory result.

So you will see three kinds of marked boxes:

> ● EVIDENCE: WELL-ESTABLISHED
>
> **Well-established.** Supported by multiple independent studies, systematic reviews, or meta-analyses with reasonably consistent results. You can lean on these.

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

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **Practitioner experience and philosophy.** Ideas, claims, or experiences from the System of Inevitability or from contemplative and martial traditions that have not been directly measured. They may be true and useful. They have not been tested.

There is a fourth kind of box, which you should never skip:

> ⚠ CAUTION
>
> **Caution.** Practical safety information. Heavy objects are honest teachers, and they do not negotiate.

Citations appear in the text as author and year, for example (Draganski et al., 2004). The full list, with journal details and DOIs, is in the References at the back. If a sentence makes a factual claim about the world and has no citation and no box, treat it as the compiler's reasonable summary or opinion.

One more thing. The phrase *upgrade in human consciousness* appears in this book because it names a real hope: that ordinary people, through patient practice, can become more awake, more present, more skillful, and kinder to one another. This book treats that hope as an *inspirational theme* rooted in what is actually known about attention, learning, the plastic brain, and flow. It does not claim that juggling iron balls or spinning a ring on a bar has been shown to alter consciousness in any metaphysical sense. That is not a lesser claim. It is an honest one, and honesty is the ground everything else in this book stands on.

Foreword

"Training method is just walking and turning."

— FROM THE SYSTEM OF INEVITABILITY PROJECT MATERIALS

I came to this material sideways, the way most of us come to the things that end up mattering.

There was a set of public posts by a stonemason and martial artist who goes by Uki. They described three iron balls, each weighing six pounds, kept in the air in the oldest patterns in juggling. They described a five-foot stainless-steel bar weighing twenty-five pounds, held palms-down, with a small iron ring spinning around it, kept centered and spinning in both directions while the body walked and turned. There was a heavy bag and a wooden-dummy-style training post with metal arms. There was a philosophy that fit in a sentence: *training method is just walking and turning.* And there was a refusal of the usual scaffolding: *no instructors, no belts.*

What struck me was not the spectacle, though it is a spectacle. It was the idea underneath it. Here was someone who had spent twenty-five years building a practice out of the most basic human movements, walking, turning, catching, releasing, and had made those movements so demanding that they required total attention. It looked like strength training. It also looked like meditation. It looked like a body thinking.

I wanted to know what science could honestly say about that. Not to debunk it and not to sell it, but to *understand* it. What happens in a brain that learns to juggle? What happens in a tendon that is loaded for decades? Why does grip strength predict how long people live? What is flow, and is it real? Can attention be trained, and does it change who we are? And what happens when one person's private practice is given away freely to anyone who wants it?

This book is my attempt to answer those questions as carefully as I can, and then to hand the answers to you for free.

You will find inspiration here, because the science of human learning is genuinely inspiring. The adult brain changes measurably when it learns something new. Older adults learn new motor skills. Strength protects us. Attention can be cultivated, and a wandering mind tends to be an unhappy one. These are not slogans. They are findings.

You will also find restraint, because inspiration that outruns the evidence eventually betrays the people it inspires. Some of the claims made for heavy juggling and spinning bars have not been tested. Some of the loads involved are genuinely dangerous for beginners. I have tried to mark every one of those places clearly, and to offer a gentler, safer road in.

If this book does its job, you will finish it wanting to *practice*: to pick up three soft balls, or a broomstick, or simply to walk and turn with more attention than you did yesterday. And then, I hope, you will give it to someone else.

— Cory Matthew Snell



Part I · The Way

Walking. Turning. Catching what falls and sending it back up. The oldest movements, made new by attention.

CHAPTER 1

An Invitation to Practice



"No instructors required. No belts. Just the tools, the physics, and the will to train."

— SYSTEM OF INEVITABILITY, PUBLIC STATEMENT

Pick up a ball and toss it from one hand to the other.

That is all. Nothing remarkable happened. And yet, in the half-second the ball was in the air, an astonishing amount of work took place. Your eyes caught the ball as it left your fingers and estimated its arc. Your brain predicted where it would come down, long before it arrived, and moved your other hand to meet it. Muscles in your forearm, shoulder, and trunk adjusted for its weight. Sensors in your skin, joints, and muscles reported the catch, and your nervous system compared what happened with what it expected. If the toss went slightly wrong, you corrected without thinking. If it went badly wrong, you laughed, or swore, and tried again.

Now imagine three balls instead of one, so that one is always in the air. Now imagine those balls are made of iron and weigh six pounds each. Now imagine doing it for twenty-five years.

This book is about a practice built on that idea, and about the science of what happens to a human being who commits to it. Not just to the muscles, though they matter, but to the brain that learns, the tendons that adapt, the attention that narrows and deepens, and the inner life that changes when a person spends hours each week doing something difficult, rhythmic, and wholly absorbing.

A practice, not a product

The **System of Inevitability** is a solitary training method developed over more than twenty-five years by Uki (@ukigigi), a stonemason and martial artist. By his own public description, it has no ranks, no instructors, and no formal syllabus. Its tools are few and heavy: three iron balls juggled in classic patterns, a long steel bar with a spinning iron ring, a heavy bag, and a metal-armed training dummy in the Wing Chun tradition. Its philosophy is spare: natural body movements, geometric pathways, continuous motion, spirals felt in the body. *Training method is just walking and turning.*

You do not need to adopt this system to benefit from this book. You may never lift a six-pound iron ball, and if you are new to training you probably should not for a long time. But the *principles* underneath the System of Inevitability touch some of the most robust and hopeful findings in modern science:

- The adult human brain physically changes when it learns a new skill, and juggling is the very skill that first showed this in humans (Draganski et al., 2004).
- That capacity does not vanish with age. Older adults learn new motor skills, and their brains change too (Boyke et al., 2008; Voelcker-Rehage & Willimczik, 2006).
- Muscular strength, and grip strength in particular, is one of the most consistent predictors of long-term health and survival ever measured (Leong et al., 2015; Celis-Morales et al., 2018).
- Tendons adapt to load, slowly, when load is applied intelligently (Bohm et al., 2015).
- Physical activity reliably improves mood and reduces symptoms of depression and anxiety (Singh et al., 2023; Noetel et al., 2024).
- A mind absorbed in what it is doing tends to be happier than a mind wandering elsewhere (Killingsworth & Gilbert, 2010).

None of those findings is about iron balls. All of them are about the kind of human being that a patient, attentive, physically demanding practice might help you become.

The adult brain is not a finished building. It is a workshop that stays open.

What this book is, and what it is not

This book is three things at once.

It is a **portrait** of a practice: what the System of Inevitability is, as far as its originator has described it in public, and what ideas animate it.

It is a **review of the science** that bears on that practice, written for curious non-specialists. That science is real, peer-reviewed, and checked. It is also, in places, incomplete, and you will be told where.

And it is an **invitation**: a suggested, safe path that lets almost anyone begin a version of this practice with light tools, simple tests, and clear rules for when to stop.

It is *not* an official manual. Uki has not written or endorsed this book. The progressions in Chapter 12 are suggestions drawn from general exercise science, not his syllabus, because, as far as the public record shows, no written syllabus exists yet.

It is also not a claim that this practice will make you a better fighter, a more enlightened person, or a different species. Some of the strongest claims made for heavy juggling and rotational bar work, especially that they transfer automatically to fighting skill, have never been measured. This book will tell you where those claims stand: asserted, plausible in part, untested.

Why "consciousness"?

The person who asked for this book wanted it to help "facilitate an upgrade in human consciousness." That is a large phrase, and it deserves a careful answer.

Science does not have a settled theory of consciousness, and nothing in this book proves that any practice changes consciousness in a deep metaphysical

sense. But science does have a great deal to say about things that are very close to what most people mean by the phrase:

- **Attention**: what we notice, how long we can hold it, and how it can be trained.
- **Awareness of the body**: proprioception (the sense of where your body is) and interoception (the sense of what is happening inside it).
- **Plasticity**: the brain's capacity to rewire itself through experience.
- **Flow**: the state of total absorption in a challenging activity, where self-consciousness fades and action seems to happen by itself.
- **Wellbeing**: mood, anxiety, resilience, and the sense that life is meaningful.
- **Connection**: how shared practice and moving together affect how we feel about one another.

If an "upgrade in consciousness" means becoming more attentive, more present in the body, more capable of learning, more often absorbed and less often anxious, and more connected to others, then there is real evidence that *practice* can move us in that direction. That is the sense in which this book uses the phrase. It is an inspiration grounded in evidence, not a promise beyond it.

How the book is organized

Part I, The Way, introduces the System of Inevitability and its philosophy.

Part II, The Tools, takes each implement in turn, the iron balls, the spinning ring bar, and the contact tools of bag and dummy, and asks what the science says about each.

Part III, The Science, steps back to the big themes: the brain that learns, how skill is built, the body that adapts, attention and flow, and movement and mood.

Part IV, The Spiral Outward, asks what happens when a solitary practice is shared: community without hierarchy, a safe path for beginners, and a closing invitation.

At the back you will find practice logs you can copy, a glossary, and a complete list of references.

Start wherever you like. But if you intend to *train*, please read Chapter 12 before you pick up anything heavy.

CHAPTER 2

The Stonemason's Method



Continuous motion is geometry, not style.

— PARAPHRASING A THEME OF THE SYSTEM OF INEVITABILITY PROJECT VISUALS

Every practice carries the fingerprints of the life that made it. To understand the System of Inevitability, it helps to begin not with the iron balls but with the stone.

Hands that learned from stone

By his own public account, Uki has spent more than twenty-five years as a stonemason and martial artist. He juggled on the street in the 1990s. Over the decades he refined a method of training largely alone, and he describes every part of his life as interdependent with it: the work, the training, the tools.

Consider for a moment what stonemasonry asks of a body. Stone is heavy, irregular, and unforgiving. It must be lifted, turned, set, and adjusted, day after day, often with the hands in awkward positions. A mason's grip is not the grip of a gym, where bars are knurled and loads are symmetrical. It is the grip of a person holding an object that wants to slip, roll, and fall. It is endurance strength more than peak strength: hours of holding, carrying, rotating, and placing.

The System of Inevitability's materials occasionally point to this occupational loading as the *base* on which the training tools sit. That is an important and honest detail. The iron balls and the twenty-five-pound bar were not

dropped onto an untrained body. They were added, over years, to a body already adapted by decades of manual work. As we will see in Chapter 8, tendons and connective tissues adapt slowly, and the loads that are safe for a long-adapted body can be dangerous for an untrained one.

○ PRACTITIONER EXPERIENCE · PHILOSOPHY

Practitioner experience. The idea that stonemasonry provided a foundation of grip and tendon tolerance is the practitioner's own account of his history. It is entirely plausible given what is known about tissue adaptation to long-term loading (see Chapter 8), but it has not been measured in his case.

The tools, as publicly described

On 30 July 2026, Uki publicly described the core tools of the system. They are summarized here as he presented them. The claimed benefits are his, and are listed as claims.

1. IRON BALL JUGGLING

Three metal balls of 6 lb (about 2.7 kg) each, worked in three classic juggling patterns:

- **The Cascade**, the basic three-ball pattern, in which each ball is thrown from one hand in an arc to the other, tracing a figure-eight in the air.
- **Mills Mess**, a pattern in which the arms continuously cross and uncross, so that balls are thrown and caught in a weaving, spiraling motion.
- **The Box**, a pattern in which two balls rise and fall vertically on either side while a third is passed horizontally between the hands, so that the pattern traces a rectangle.

Claimed benefits, as stated: continuous regenerative power (absorbing force on the catch and reversing it into the next throw), multi-plane torque, predictive tracking of multiple objects, grip endurance, core linking, and structural integrity under dynamic load. In a follow-up post on 31 July 2026, these benefits were asserted to transfer to striking ("chamber-to-impact without energy leak-

age"), blocking ("receive and redirect force"), clinch, trapping, and awareness of multiple threats.

2. THE SPINNING RING IRON BAR

A five-foot, 25 lb stainless-steel bar held palms-down. Around it, a 6-inch, 2 lb iron ring is kept continuously spinning and centered, in both directions. The bar is worked overhead, at roughly 45 degrees with a back-bend, or projected from the chest, either standing still or moving.

Claimed benefits, as stated: grip, forearm, and wrist resilience; rotator cuff and scapular stability; rotational core power; proprioceptive acuity; and tendon durability under persistent multi-planar instability.

3. OVERLAY TOOLS

A heavy bag and a custom metal-armed training dummy (built from schedule-40 pipe) in the Wing Chun tradition. These are used for contact skill and structure: the part of training in which force actually meets resistance.

The philosophy: walking and turning

What unites these tools is not their weight but a way of seeing movement. The system's public materials express it in a few phrases:

- **"Training method is just walking and turning."**
- Natural body movements, geometric pathways, and heavy iron conditioning tools.
- Continuous motion and geometry *felt in the body*: spirals, regenerative torque, kinetic chaining.
- Low-impact, high-control, and scalable for serious practitioners of any age; no hierarchy or competition required.
- **"No instructors required. No belts. Just the tools, the physics, and the will to train."**

There is something quietly radical in "walking and turning." It locates the source of skill not in secret techniques but in the two most universal human

movements. Every person who can walk has a gait cycle, a rhythm of loading and unloading, falling and catching. Every person who can turn has a spiral available in the hips, spine, and shoulders. The system's claim, as a philosophy, is that these ordinary movements, refined under load and attention, contain everything needed.

Some of the system's visuals also show spirals as something *revealed in practice*, and occasionally use natural, flowing, even psychedelic imagery. These images express how the practice *feels* from the inside: continuous, geometric, alive.

The claim is not that the body needs secret techniques. It is that ordinary movements, refined under load and attention, contain everything.

Reading the philosophy carefully

It would be easy to read this philosophy either too literally or too cynically. Neither helps.

Read *too literally*, "any age" and "low-impact" could suggest that a beginner of seventy can pick up three six-pound iron balls tomorrow. That would be dangerous. A dropped six-pound ball is not low-impact for a foot, a wrist, or a face. A 25 lb bar held at 45 degrees in a back-bend places real demands on the lower back and shoulders. These loads are scalable only *if* there is a scale: a progression that begins far lighter. The system's public materials do not yet include that progression. Chapter 12 offers one, clearly labeled as a suggestion.

Read *too cynically*, the philosophy could be dismissed as poetry. That would miss something real. As we will see, there is genuine science behind the idea that continuous, absorbing, whole-body skill practice changes the brain, strengthens the body, and steadies the mind. The philosophy points at real phenomena even where its specific claims run ahead of the measurements.

The most respectful reading is a *precise* one: honor the practice, take its experience seriously, and test its claims.

An honest assessment

In October 2026, a viability assessment was filed on the system as part of the project that led to this book. Its conclusions are worth stating plainly, because they shape everything that follows.

What holds. Ordinary juggling produces measurable, if temporary, changes in brain regions that process visual motion (Draganski et al., 2004). Rotational implements in the mace and club family have, in at least one recent randomized trial, improved grip strength, shoulder flexibility, and closed-chain upper-body stability (Akaras et al., 2026). Decades of stonemasonry and contact work provide a credible base for grip, tendon tolerance, and contact skill.

What does not hold, yet. The juggling brain studies used ordinary, light balls and a cascade of about a minute. Six-pound iron balls, roughly twenty times the weight of a typical juggling ball, are a different stimulus that has never been studied. Mace and club trials are not direct evidence for a spinning ring on a bar. "Low-impact" and "any age" are in tension with the actual loads. And the transfer of these skills to clinch, striking, and multi-threat awareness is *asserted, not measured*: there are no recorded bouts, force measurements, or independent practitioners on record.

What would make it viable as a system that other people could learn safely: a written progression from light tools to heavy ones, with clear stop rules; a few simple, repeatable tests; filmed standards and an injury log; and a clean separation between training-method claims and unproven martial or metaphysical ones.

The assessment's verdict was this: *conditionally viable as a personal conditioning practice for an already-adapted practitioner; not yet viable as a transmissible martial system.*

This book takes that verdict not as a dismissal but as a map. Everything it lists as missing, a progression, tests, logs, and a separation of claims, this book tries to supply in draft form, so that anyone who is inspired can begin safely, and so that the practice can grow into something others can test, share, and improve.

Inevitability

A last word about the name. "Inevitable" can sound like a boast. In the context of training, it has a gentler and more interesting meaning.

When you juggle well, the next throw *is* inevitable. It is already contained in the catch. The ball arrives; the hand gives with it, absorbing its momentum; and that same yielding motion becomes the beginning of the next throw. Nothing is forced. Each action follows from the one before it, the way each step of walking follows from the fall of the one before.

That is what *continuous regenerative power* means as a felt experience: not a bigger force, but a movement with no wasted beginnings. The catch becomes the throw. The turn becomes the walk. The end of one thing is the start of the next.

Whether or not that experience transfers to fighting, it is a beautiful thing to feel. And as we will see, the conditions that produce it, challenge matched to skill, total attention, immediate feedback, are exactly the conditions that psychologists associate with flow.

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **A note on other uses of "inevitable."** Some of the originator's public posts use the word "inevitable" for political or metaphysical forecasts. Those posts are separate from the training method, and nothing in them is evidence for or against it. This book concerns itself only with the practice.



Part II · The Tools

Iron, steel, leather, and pipe. Each tool is a question the body must answer.

CHAPTER 3

Iron Balls: The Art of the Cascade

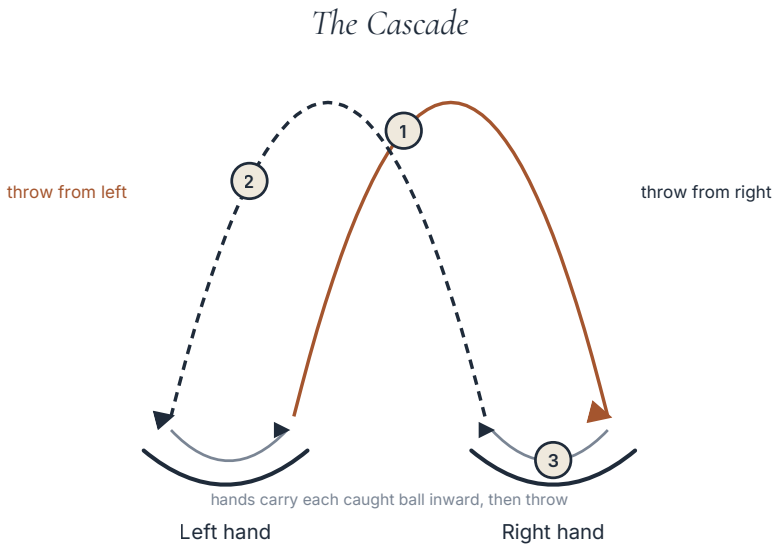


The catch becomes the throw.

Juggling is one of the oldest recorded human skills. It is also, by a happy accident of history, the skill that opened a new chapter in neuroscience. Before we come to the iron, we should understand the pattern.

Anatomy of a cascade

In the three-ball cascade, each hand throws a ball in an arc to the opposite hand, and the throws alternate: right, left, right, left. Because there are three balls and only two hands, one ball is always in the air. Each ball travels an arc that crosses the midline, and over time the three paths together trace a sideways figure-eight, a lemniscate, in the air in front of the juggler.



The three-ball cascade. Each ball crosses from one hand to the other; throws alternate, and the combined paths trace a figure-eight. Throws leave from the inside of each hand and are caught toward the outside.

Juggling has been studied as a model of rhythmic coordination for decades. In a classic analysis, Beek and Turvey (1992) examined the *temporal patterning* of cascade juggling: how the time a ball spends in the hand relates to the time it spends in flight, and how jugglers keep these intervals stable while still adapting them. Their work showed that a skilled cascade is not a rigid clock but a flexibly coupled rhythm, in which hands and balls settle into stable timing relationships while retaining room to adjust.

Where do jugglers look? Huys and Beek (2002) recorded the gaze of intermediate and expert jugglers. Experts made *smaller* eye movements than intermediates, relative to the size of the pattern. They tracked each ball less, and seemed to rely more on glimpses of the balls near the tops of their arcs, letting the rest of the pattern be handled by prediction and by feel. In their words, expertise was "reflected by an overall reduction in the extent to which the balls are visually tracked."

● EVIDENCE: WELL-ESTABLISHED

Well-established (for ordinary juggling). Skilled juggling relies on stable, flexibly coupled timing between hands and balls (Beek & Turvey, 1992), and expertise is associated with *less* visual tracking of each ball, not more (Huys & Beek, 2002). Skill shifts work from the eyes to prediction.

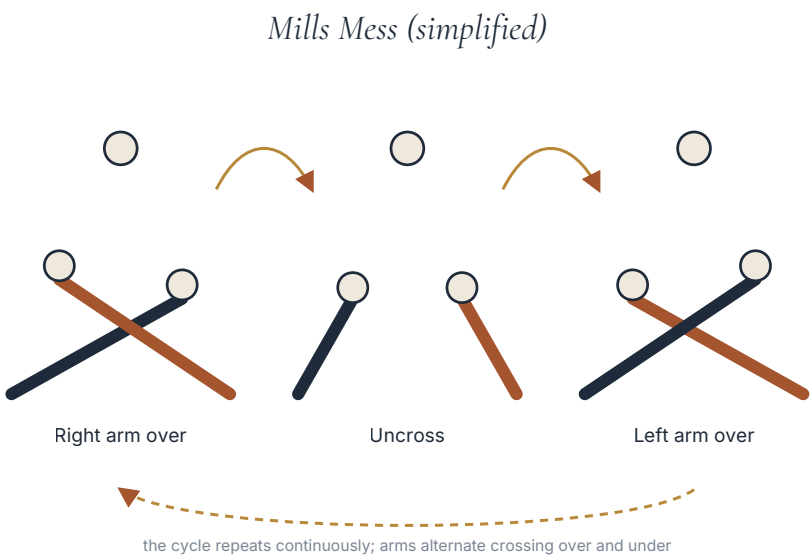
That shift, from watching everything to sensing the whole, will come up again and again in this book. It is what happens to attention when skill matures.

The three patterns of the System

The System of Inevitability names three patterns. Each asks something slightly different of the body.

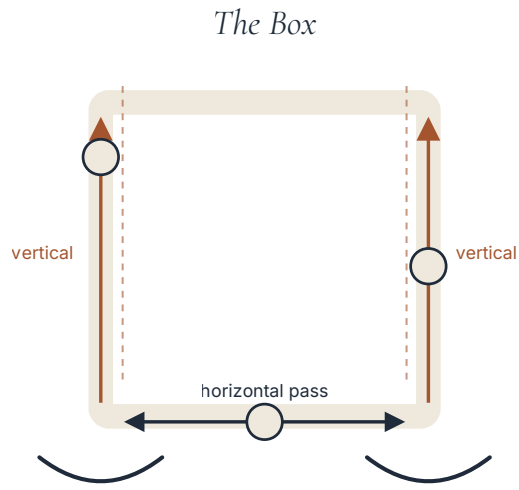
The Cascade is the foundation: symmetrical, alternating, endlessly repeatable. Its demand is rhythm. In ordinary juggling it is the first pattern anyone learns, and it is the pattern used in the brain-imaging studies described below.

Mills Mess is a cascade in which the arms continuously cross over and under one another, so that each throw is made from a crossed or uncrossed position. To an onlooker the balls seem to weave around each other. To the juggler, the pattern demands rotation through the shoulders and forearms and an unusually rich sense of where each hand is in space. It is a pattern of spirals.



Mills Mess, simplified. The forearms take turns crossing over one another, so each ball is thrown from a crossed or uncrossed position. The balls appear to weave; the arms trace continuous loops.

The Box breaks the cascade's symmetry. Two balls are thrown straight up, one on each side, while the third is passed horizontally between the hands. The result is a rectangular pattern, with a distinct vertical rhythm on each side and a horizontal exchange through the middle. Its demand is coordination of two different kinds of throw at once.



The Box. Two balls rise and fall vertically at the sides while the third passes horizontally between the hands, tracing a rectangle.

Taken together, the three patterns train rhythm (Cascade), rotation (Mills Mess), and asymmetry (Box). In motor-learning terms, practicing several related variations rather than a single pattern is also a form of *variable practice*, which tends to produce more robust and flexible learning than repeating one thing in isolation (Shea & Morgan, 1979; see Chapter 7).

The brain that learned to juggle

In January 2004, a short paper in *Nature* changed how scientists thought about the adult brain. Bogdan Draganski, Arne May, and colleagues recruited 24 young adults (mean age 22) with no juggling experience and divided them into two groups. One group was given three months to learn the three-ball cascade. When they could sustain it for at least 60 seconds, their brains were scanned with MRI. They were scanned again three months later, after a period without practice.

The jugglers showed a significant, *transient* expansion of grey matter in two regions: the mid-temporal area known as hMT/V5, which processes visual mo-

tion, on both sides of the brain, and the left posterior intraparietal sulcus, involved in linking vision to action. Non-jugglers showed no such change. Three months after practice stopped, the expansion had decreased, and most jugglers could no longer juggle fluently (Draganski et al., 2004).

This was among the first clear demonstrations that learning a new skill could produce a *structural* change, visible on an MRI scan, in the healthy adult human brain. Later studies extended it:

- The changes can appear within **seven days** of starting to learn, and seem to depend on *learning something new* more than on continued exercise of an already-learned skill (Driemeyer et al., 2008).
- **Older adults** (around 60) can learn the cascade too, though less proficiently than young adults, and show similar grey-matter changes in hMT/V5, plus transient increases in the left hippocampus and in the nucleus accumbens (Boyke et al., 2008).
- **White matter** changes too. After six weeks of juggling practice, Scholz and colleagues (2009) found increased fractional anisotropy, a measure of white-matter microstructure, beneath the right posterior intraparietal sulcus, and this was still evident four weeks after training ended.
- **Expert jugglers**, who could juggle at least five balls, had higher grey-matter density than non-jugglers in visual-motion and intraparietal regions, and within the experts, performance correlated with grey-matter density in right hMT+/V5 (Gerber et al., 2014).

● EVIDENCE: WELL-ESTABLISHED

Well-established, with caveats. Learning to juggle ordinary balls is associated with measurable, region-specific, and partly transient changes in adult brain structure, in young and older adults (Draganski et al., 2004; Driemeyer et al., 2008; Boyke et al., 2008; Scholz et al., 2009). The changes are mainly in regions for *seeing motion and linking vision to action*, not in "fighting" or general-intelligence regions. Chapter 6 discusses the important methodological debates about such findings.

Now make them iron

Here is where honesty matters most.

Every one of those brain studies used ordinary juggling balls. Typical juggling balls weigh on the order of a hundred-odd grams. A six-pound iron ball weighs about 2.7 kilograms, roughly twenty times as much. Three of them together weigh more than eight kilograms. *No published study has examined the brain, the body, or the injury risk of juggling balls this heavy.*

That does not mean heavy juggling has no effects. It almost certainly has large ones. But they are not the same effects, and they cannot be borrowed from the light-ball studies. Consider what changes when the ball gets twenty times heavier:

- **The physics of the catch.** Kinetic energy scales with mass. A ball falling about half a metre arrives with roughly twenty times the energy if it is twenty times heavier. For a 2.7 kg ball dropped from 0.5 m, that is about 13 joules, compared with well under one joule for a light juggling ball. The hand, wrist, elbow, and shoulder must absorb that energy on every catch, over and over.
- **The pattern.** Heavy balls cannot be thrown as high or as fast. The pattern becomes lower and tighter, more like a series of cradled catches and drives than airy throws. The timing relationships that Beek and Turvey studied will be different.
- **The demand.** Light juggling is overwhelmingly a visuomotor skill. Heavy juggling is also a strength-endurance task, an eccentric (lengthening) loading task for the forearms and shoulders, and a test of grip.
- **The risk.** A dropped juggling bag is a joke. A dropped six-pound iron ball is a broken toe, a damaged floor, or, if it is mis-thrown toward the face, a serious injury.

◐ EVIDENCE: SUGGESTIVE · EMERGING

Plausible but untested. It is reasonable to expect heavy-ball juggling to train grip endurance, eccentric control of the forearms and shoulders, and trunk stability, because those tissues are clearly loaded. It is also reasonable to expect it to retain *some* of juggling's visuomotor and attentional demands. But there are no studies of heavy-ball juggling. The size, nature, and safety of its effects are unknown.

Regenerative power

The System's central claim for the iron balls is *continuous regenerative power*: the ball is absorbed on the catch and its momentum is reversed into the next throw, so that force is recycled rather than wasted.

As physics, this is a real and elegant idea. Muscles and tendons act partly like springs. In many movements, from running to jumping, the body stores elastic energy when a muscle-tendon unit is stretched under load and releases some of it in the following shortening, a pattern sports scientists call the stretch-shortening cycle. A heavy ball caught with a yielding hand and immediately redirected upward fits that pattern well. A juggler who learns to "give" with the catch and turn the give into the throw is learning to use the elastic and reflexive properties of the arm, rather than fighting the ball with stiff muscle.

○ PRACTITIONER EXPERIENCE · PHILOSOPHY

Practitioner claim. That this regenerative pattern transfers to striking ("chamber-to-impact without energy leakage"), blocking ("receive and redirect force"), clinch, trapping, and awareness of multiple threats is the system's claim. It has not been measured. There are no studies of heavy juggling and fighting outcomes, and no recorded bouts or force data. See below for why such transfer cannot be assumed.

Tracking many things at once

One of the claimed benefits of juggling is *predictive tracking of multiple objects*. There is a real science of this. Since the 1980s, psychologists have studied "multiple object tracking": people's ability to follow several moving targets at once among distractors. Pylyshyn and Storm (1988) showed that people can track

several independently moving targets in parallel. And research on expert athletes shows that experts are better at picking up perceptual cues and anticipating what will happen next, using fewer, longer visual fixations than novices (Mann et al., 2007).

Juggling clearly exercises a version of this capacity: three objects, predicted, intercepted, and released in rhythm. But there is a crucial gap between "juggling trains the ability to track juggling balls" and "juggling trains the ability to track opponents." That gap is the problem of *transfer*.

The problem of transfer

Generations of educators hoped that training one skill would improve many others, that Latin would sharpen the mind, that chess would make children smarter. Modern research has been sobering. Meta-analyses of chess, music, and working-memory training find that apparent "far transfer" to unrelated abilities mostly disappears in well-designed studies with active control groups (Sala & Gobet, 2017). A major review of commercial "brain training" found strong evidence that people get better at the trained tasks, weaker evidence for improvement on closely related tasks, and little evidence for improvement in everyday cognitive performance (Simons et al., 2016).

Motor skills follow a similar principle, often called *specificity*: we get best at what we actually practice. Juggling trains predictive visuomotor timing with objects on ballistic arcs. Dropping an opponent requires contact, structure, and timing under live, unpredictable resistance, which in practice means sparring and partner work.

That does not mean heavy juggling is useless for a fighter. It may well build tissue capacity, grip, endurance, rhythm, and composure that a fighter can use. But the honest statement is this: *the transfer of juggling to fighting is a hypothesis, not a finding.* If you care about fighting, you will need to train fighting, too, and the System, wisely, includes the heavy bag and dummy for exactly that reason.

We get best at what we actually practice. Everything else is a hypothesis worth testing.

What the iron balls offer

Set the unmeasured claims aside, and a great deal remains.

The cascade, Mills Mess, and Box are among the richest coordination patterns a human being can learn. Learning them, even with ordinary balls, is associated with measurable changes in the adult brain. Juggling demands, and rewards, a quality of attention that is total but relaxed, focused on the whole pattern rather than any single ball. And, once a body has been properly prepared over a long time, heavier balls add a strength-endurance and grip dimension that the light-ball studies never touched.

The path in, as Chapter 12 describes, begins exactly where the science begins: with light balls, and a single minute of cascade.

CHAPTER 4

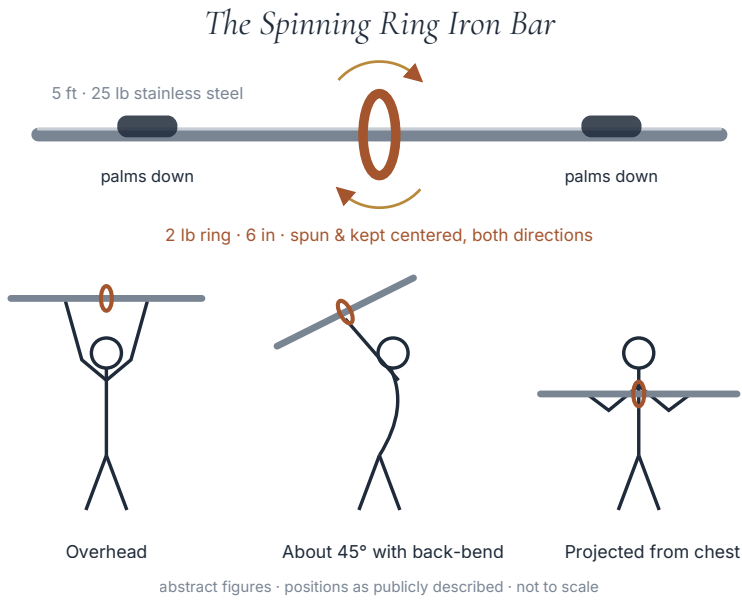
The Spinning Ring Iron Bar



A ring that will not stay centered unless you do.

The second tool of the System of Inevitability is, as far as this book can determine, unique. There are maces, clubs, staffs, and barbells in every strength tradition on earth. But a five-foot stainless-steel bar weighing 25 pounds, held palms-down, with a 6-inch, 2-pound iron ring kept *spinning around it*, centered, in both directions, while the body walks and turns, is something else.

What the bar asks



The Spinning Ring Iron Bar. A 5-ft, 25 lb bar is held palms-down; a 2 lb ring spins around it and must be kept centered. Shown in three positions described in the System's public materials: overhead, at about 45 degrees with a back-bend, and projected from the chest.

Think about what is required to keep that ring spinning in the middle of the bar.

The ring does not spin by itself. It must be driven by small, rhythmic, circular movements of the bar: a continuous wobble transmitted from the hands through the steel. Too little drive and the ring slows and drops. Too much in one direction and it drifts toward one hand. Any tilt of the bar sends it sliding. So the practitioner must, all at once:

- hold a long, heavy lever steady against gravity, with the weight spread across a wide grip;
- produce a continuous, small-amplitude circular motion in the wrists, forearms, and shoulders;
- sense, mostly by feel, where the ring is and how fast it is spinning;

- correct the bar's tilt and drive continuously to keep the ring centered;
- reverse the direction of spin at will;
- and do all of this overhead, at an angle with the back arched, or pushed out from the chest, sometimes while walking and turning.

That is a remarkable combination. It is a strength-endurance task for the grip, forearms, and shoulders; an *instability* task, because the load is always shifting; and a *perceptual* task, because success depends on reading subtle feedback through the hands.

The family resemblance: maces and clubs

The bar's closest relatives with any scientific literature are the **steel mace** (a long handle with a weighted head, swung in circles and arcs) and the **Indian club** (a bottle-shaped club swung in loops around the body). Both come from long traditions of wrestling and martial conditioning in South and West Asia, and both have seen a modern revival.

Until recently, there was almost no controlled research on them. That has started to change.

THE 2026 MACE TRIAL

In January 2026, *BMC Sports Science, Medicine and Rehabilitation* published a randomized controlled trial by Akaras and colleagues on mace training in elite wrestlers. This is the trial referenced in the System of Inevitability's viability assessment, and its details were verified for this book.

Thirty national- and international-level male wrestlers (aged 18 to 30) were randomized; 27 completed the study. Thirteen added mace training to their normal wrestling programme three times a week for twelve weeks; fourteen continued their normal programme. Each mace session lasted about 15 minutes, with the mace set at 20% of body weight. The programme progressed from basic two-handed swings to single-arm, multi-planar, and "360" swings over the twelve weeks.

Compared with the control group, the mace group improved significantly more in:

- **grip strength** in both the dominant and non-dominant hands;
- **shoulder flexibility** (on the dominant side, for external rotation);
- **shoulder internal and external rotator strength**;
- **closed-kinetic-chain upper-extremity stability** (the CKCUEST, a test we will use in Chapter 12);
- **push-up endurance**.

One outcome did *not* improve: **shoulder proprioception**, measured as the ability to reproduce joint angles of 60 and 120 degrees without vision. The authors suggested that mace work emphasizes dynamic, global stability rather than the precise, angle-specific sense of position that this test measures (Akaras et al., 2026).

> ◐ EVIDENCE: SUGGESTIVE · EMERGING
>
> **Suggestive.** One randomized trial in 27 elite male wrestlers found that 12 weeks of added mace training improved grip strength, shoulder rotator strength, shoulder flexibility, CKCUEST stability, and push-up endurance, but not shoulder joint-position sense (Akaras et al., 2026). The authors themselves note a small sample, a single training environment, no follow-up, and no measures of match performance or injury.

There is one more detail worth knowing. According to the published methods, the mace group followed a *progressive* programme, while the control group's training volume and intensity stayed constant for twelve weeks. That means part of the mace group's advantage may come simply from having a progressive, extra training stimulus, rather than from the mace as such. This does not make the trial worthless. It makes it a promising first step, not a final word.

INDIAN CLUBS AND CLUBBELLS

Two small randomized studies by Walter and colleagues have examined light club training for the shoulder. In female handball players, an eight-week clubbell programme (three days a week, twenty minutes a day, with clubs of only 0.5

kg and then 1 kg) improved dominant-arm internal-rotator strength compared with handball training alone, and within the club group, internal-rotation range of motion and rotator strength improved (Walter et al., 2023). A similar study examined cricket fast bowlers' shoulder kinematics after Indian-clubbell exercise (Walter, Moltchanova, & Petersen, 2023).

Notice the loads: **half a kilogram to one kilogram.** These are light tools, used carefully and progressively, and they produced measurable changes in shoulder strength and mobility. That is a useful lesson for anyone tempted to start heavy.

> ◐ EVIDENCE: SUGGESTIVE · EMERGING
>
> **Suggestive.** Small randomized studies suggest that light club training (0.5–1 kg) can improve shoulder rotator strength and range of motion in throwing athletes (Walter et al., 2023; Walter, Moltchanova, & Petersen, 2023). The samples are small and the populations specific.

What the mace and club studies do *not* tell us

It is tempting to say: maces improve grip and shoulder stability, so the spinning ring bar must too. That inference is understandable, and possibly even correct, but it is not evidence. The differences are large:

- A mace concentrates its weight at one end of a lever and is *swung*. The ring bar spreads 25 pounds across a five-foot bar held in two hands, and the ring is *spun* on it.
- The mace trial used a load of 20% of body weight, swung in large arcs. The ring bar involves small, continuous oscillations to drive the ring, plus static holding of a long lever.
- The bar's unique element, a freely moving ring that must be kept centered, introduces a perceptual-control demand that has no analogue in the mace studies.

- The bar is also worked at about 45 degrees *with a back-bend*, a position that loads the lumbar spine in extension. No study of maces or clubs addresses that.

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **Practitioner claims.** The System of Inevitability claims that the spinning ring bar builds grip, forearm, and wrist resilience; rotator cuff and scapular stability; rotational core power; proprioceptive acuity; and tendon durability under persistent multiplanar instability. Several of these are *plausible* given what the bar demands and given related research on maces, clubs, instability, and tendon loading. None has been measured for this implement. Interestingly, the one trial on a related implement found *no* improvement in a standard proprioception test, which is a reason for caution about the proprioceptive-acuity claim specifically.

Instability and the shoulder

Why might an unstable load be valuable at all? The shoulder is the most mobile joint in the body, and that mobility is paid for with reduced passive stability. The rotator cuff and the muscles that control the shoulder blade (scapula) must constantly fine-tune the position of the joint. Movements that require continuous small corrections, as the ring bar does, plausibly exercise exactly that control.

Research on proprioceptive and neuromuscular training supports the general principle. Systematic reviews find that training programmes designed to challenge balance and joint control reduce some sports injuries, particularly ankle sprains and knee injuries in pivoting sports (Hübscher et al., 2010), and that proprioceptive training can improve sensorimotor function (Aman et al., 2015). But, as Chapter 8 explains, those findings come mostly from lower-limb programmes in young athletes, and they do not automatically apply to a heavy overhead implement.

The back-bend

The System describes working the bar "at 45 degrees with back-bend." This deserves a plain warning.

⚠ CAUTION

Caution: overhead load in spinal extension. Holding a 25 lb lever overhead or at an angle while arching the lower back combines two demanding things: a long, heavy lever on the shoulders, and extension load on the lumbar spine. Done by an adapted practitioner with control, it may be an excellent challenge. Attempted by a beginner, or when fatigued, it is a recipe for low-back strain or shoulder injury. Begin with a broomstick or a light dowel, without a back-bend, and add extension only gradually and only if it is pain-free. See Chapter 12.

What the bar offers

Strip away the claims and the bar remains a brilliant piece of design. It turns strength into a *conversation*. The ring is a feedback device, an honest and immediate reporter of whether your hands, wrists, shoulders, and trunk are organized. It cannot be fooled by effort. It responds only to control.

That property, immediate, unambiguous feedback about a continuous action, is one of the classic preconditions for skill learning (Wolpert et al., 2011) and for flow (see Chapter 9). It may be the most important thing about the bar. You cannot spin the ring centered while thinking about something else.

The ring cannot be fooled by effort. It responds only to control.

The path in is gentle: a broomstick, a light ring or even a loose hoop of rope, short sets, no back-bend, and patience. The bar, like the iron balls, is a destination, not a starting point.

CHAPTER 5

Bag, Dummy, and Stone



Sooner or later, force has to meet something.

The iron balls and the ring bar train the body to *produce and recycle* force in the air. But a fighter, a mason, or anyone who works with the physical world must also learn what happens when force *meets resistance*. That is the role of the System's "overlay" tools: the heavy bag, the metal-armed dummy, and, beneath both, the long apprenticeship of stone.

The heavy bag

A heavy bag is, in a sense, the simplest piece of honest equipment in martial arts. It pushes back. Strike it with poor alignment and the wrist folds, the elbow jars, or the shoulder feels the shock. Strike it well and force travels cleanly from the ground through the legs, hips, trunk, and arm into the bag.

That is exactly the kind of feedback a solitary practitioner needs. The bag cannot coach you, but it reports every structural mistake in the language of discomfort. Over time, a practitioner learns to align the body so that impact is absorbed by structure rather than by small joints.

The metal-armed dummy

The wooden dummy (in Cantonese, *muk yan jong*) is a classic training tool of Wing Chun: a post with protruding arms and a leg, against which a practitioner

rehearses blocks, traps, and strikes in continuous flowing sequences. The System of Inevitability uses a custom version with arms made of schedule-40 steel pipe.

A dummy trains something the bag does not: *contact geometry*. Its arms occupy fixed angles in space. Working around them, a practitioner learns to receive, deflect, and redirect, to move the body around a fixed structure, and to keep the arms in alignment while turning and stepping. Metal arms are less forgiving than wood. They teach precision through consequence.

What the research says about hard martial arts

There is a modest research literature on the health effects of martial arts. A systematic review of 28 studies of "hard" martial arts (those that use body-contact techniques) in adults found that most reported benefits for balance, cognitive function, and psychological health, and that benefits appeared regardless of the age at which people began. The reviewers also cautioned that the quality of evidence is limited by methodological weaknesses across the studies (Origua Rios et al., 2018).

Related traditions with slower, more meditative movement have been studied more extensively. A meta-analysis of tai chi in older adults found improvements in executive function and global cognition, while calling for larger and more rigorous trials (Wayne et al., 2014).

> ◐ EVIDENCE: SUGGESTIVE · EMERGING
>
> **Suggestive.** Martial arts practice is associated with improvements in balance, cognition, and psychological health in adults, but the studies are of variable quality (Origua Rios et al., 2018). No study has examined bag-and-dummy training as practiced in the System of Inevitability.

The specificity of contact skill

Here we return to the most important lesson in Chapter 3. In motor learning, we get best at what we actually practice. The bag and dummy are valuable precisely because they bring the System *closer to the real task of contact*. They supply

something juggling and the ring bar cannot: force meeting resistance, structure under impact, timing against an object.

But even the bag and dummy are not opponents. They do not move unpredictably, they do not hit back, and they do not try to deceive you. In every combat tradition that has been tested against resistance, skill in actually *using* technique against a person requires training with people: partner drills, pressure testing, and sparring. Expertise in sport depends heavily on reading an opponent's movement and anticipating their actions (Mann et al., 2007), and that perceptual skill is built in the presence of real opponents.

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **Practitioner claim, untested.** The System's statement that its tools build "opponent-dropping" capacity is the practitioner's claim. There are no recorded bouts, force measurements, or independent practitioners who have been tested. Anyone whose goal is self-defense or combat should combine conditioning practices like these with qualified, supervised partner training.

Stone: the occupational base

Beneath all of this lies something easy to overlook: twenty-five years of stonemasonry.

Occupational loading is training. A mason lifts, carries, rotates, and places heavy, irregular objects for hours a day, year after year. That is a vast accumulated dose of grip work, forearm loading, trunk stabilization, and carrying. As Chapter 8 explains, tendons and other connective tissues adapt to loading slowly, over months and years, and the ability to tolerate high loads is built gradually through exactly this kind of long, consistent exposure (Bohm et al., 2015; Magnusson & Kjaer, 2019).

This has a direct, practical implication. The loads used in the System of Inevitability, 6 lb balls and a 25 lb bar, sit on top of a body prepared by decades of manual work. A beginner who copies the loads without copying the decades is skipping the foundation. That is not a criticism of the System. It is simply an honest reading of how bodies adapt.

A beginner who copies the loads without copying the decades is skipping the foundation.

Hands that are cared for

Bag work and dummy work load the hands, wrists, and forearms with repeated impacts. Juggling heavy balls loads them with repeated catches. Stonework loads them all day. Hands are precious. A few principles, drawn from general good practice rather than from any study specific to this System:

- Build up impact gradually: light contact before hard contact, short rounds before long ones.
- Protect the wrists: keep them aligned with the forearm on impact; consider hand wraps and gloves on the bag, especially early.
- Respect pain in small joints. Joint pain that persists into the next day is a signal to reduce load, not to "push through."
- Rest. Tissues adapt between sessions, not during them.

Chapter 12 turns these principles into a structured, suggested progression.

What the contact tools offer

The bag and dummy are where the System's air-borne geometry is asked to become *structure*. They are its reality check. And by including them, the System implicitly acknowledges something wise: that rhythm and spiral, however beautiful, must eventually meet resistance to become useful.

In that sense the overlay tools are not an afterthought. They are where the practice becomes honest with itself.



Part III · The Science

What changes in a brain that learns, a body that adapts, and a mind that pays attention?

CHAPTER 6

The Brain That Learns



Learning is not something that happens to the brain. It is something the brain becomes.

For much of the twentieth century, a common assumption held that the adult brain was essentially fixed. You could learn facts and habits, of course, but the physical structure of the brain was thought to be largely set after childhood, changing afterward mainly through ageing or disease. Learning was imagined as rearranging the furniture, not rebuilding the house.

That picture has changed profoundly, and juggling played a starring role in changing it.

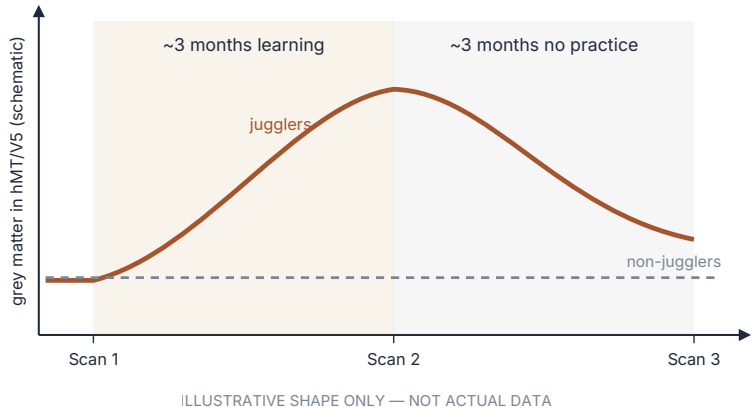
Three months, three balls

We met the key study in Chapter 3. In 2004, Draganski and colleagues taught young adults the three-ball cascade over three months and scanned their brains before training, after they could juggle for at least 60 seconds, and three months after they stopped. The jugglers' grey matter expanded transiently in hMT/V5, a region specialized for perceiving visual motion, and in the left posterior intraparietal sulcus, which helps link what we see to how we act. The expansion was related to juggling performance, absent in non-jugglers, and decreased once practice stopped (Draganski et al., 2004).

The authors drew a striking conclusion: juggling, and "consequently the perception and spatial anticipation of moving objects," was a stronger stimulus

for structural change in *visual* areas than in the motor areas one might expect. Learning to juggle, in other words, changes how the brain *sees* moving things.

Use it, or it recedes



Illustrative shape of the juggling findings (not actual data). Grey matter in visual-motion areas increased while people learned the cascade and receded after practice stopped (Draganski et al., 2004). Later work found changes within seven days of starting (Driemeyer et al., 2008).

What followed

Over the next decade, the juggling paradigm became a workhorse of plasticity research.

Fast. A follow-up with 20 adults found that grey matter in the occipito-temporal cortex could change after just *seven days* of juggling practice. Neither performance level alone nor amount of exercise alone explained the changes, leading the authors to suggest that "the qualitative change (i.e. learning of a new task) is more critical for the brain to change its structure than continued training of an already-learned task" (Driemeyer et al., 2008).

That is a profound and practical idea. The brain seems to respond most to *novelty*: to the challenge of learning something it cannot yet do.

At any age. The same group then studied healthy older adults, around 60 years old. They learned the cascade, though less proficiently than 20-year-olds,

and showed similar grey-matter changes in hMT/V5. They also showed transient increases in the left hippocampus, a structure central to memory, and in the nucleus accumbens, involved in motivation and reward (Boyke et al., 2008).

A very large behavioural study supports the same message. Voelcker-Rehage and Willimczik (2006) taught a juggling task to 1,206 people aged 6 to 89 with no prior juggling experience. After instruction and six practice sessions, older adults improved clearly, reaching performance comparable to children aged 10 to 14 and adults aged 30 to 59. The authors concluded that older adults "exhibit high reserve capacity," that is, "a potential for learning 'new' motor skills."

● EVIDENCE: WELL-ESTABLISHED

Well-established. Older adults can learn new, complex motor skills like juggling, and show measurable training-related changes in brain structure, though typically less pronounced performance than young adults (Boyke et al., 2008; Voelcker-Rehage & Willimczik, 2006).

In the wiring. Grey matter is where neurons' cell bodies and synapses concentrate. White matter is the brain's wiring: bundles of nerve fibres, many wrapped in insulating myelin. After six weeks of juggling, Scholz and colleagues (2009) found increased fractional anisotropy, a diffusion-MRI measure of white-matter microstructure, in the white matter underlying the right posterior intraparietal sulcus, persisting four weeks after training ended. This was, as the authors put it, among the first evidence "for training-related changes in white-matter structure in the healthy human adult brain." White-matter plasticity in adults has since become an active field in its own right (Sampaio-Baptista & Johansen-Berg, 2017).

In experts. Expert jugglers who could juggle at least five balls had higher grey-matter density than non-jugglers in visual-motion and intraparietal regions, and in the jugglers, the density in right hMT+/V5 correlated with performance (Gerber et al., 2014).

Who learns fastest. In a six-week juggling study, people with more grey matter in medial occipito-parietal regions at the start learned faster, and better performers showed larger grey-matter increases in parietal and motor cortex in

the weeks after training (Sampaio-Baptista et al., 2014). Brains differ, and practice and performance both shape how much they change.

What is actually changing?

When an MRI scan shows "more grey matter," what is physically different? The honest answer is that MRI cannot see individual cells, so we do not know for certain. Researchers have proposed several possibilities, based mostly on animal studies: growth of new synapses and dendritic spines, changes in supporting glial cells, growth of blood vessels, and, in white matter, changes in myelination and in the organization of axons (Zatorre et al., 2012). The likely truth is some combination, varying by region and timescale.

A necessary caution

Science advances partly by doubting its own exciting findings. In 2013, Thomas and Baker published a critical review of training-dependent structural plasticity in humans. They argued that limitations of experimental design, statistical methods, and imaging artefacts "may underlie many of the reported effects," and that the most robust evidence then available was for changes in *hippocampal volume with exercise* in older adults, rather than in the neocortex (Thomas & Baker, 2013).

That critique does not erase the juggling findings. Several of them have been repeated in different samples, and they fit with animal research. But it is an important reminder that MRI measures of brain structure are indirect, that effects in small studies can be overestimated, and that the step from "a region looks slightly different on a scan" to "this person has become better at something important" is long.

◐ EVIDENCE: SUGGESTIVE · EMERGING

Where the debate lies. That adult brains change *functionally* with learning is beyond doubt. That they change *structurally* in ways visible on MRI is supported by multiple studies, including several with juggling, but the size, reliability, and cellular meaning of these changes are still debated (Thomas & Baker, 2013; Zatorre et al., 2012).

Exercise and the brain

Juggling is not the only path to a changing brain. Physical exercise itself has some of the best evidence in the field.

In a randomized controlled trial with 120 older adults, a year of aerobic exercise training increased the size of the anterior hippocampus by about 2%, "effectively reversing age-related loss in volume by 1 to 2 years," and improved spatial memory. The control group's hippocampal volume declined (Erickson et al., 2011). This is the finding Thomas and Baker identified as among the most robust.

How might exercise do this? One candidate messenger is **brain-derived neurotrophic factor (BDNF)**, a protein that supports the survival and growth of neurons. A meta-analysis of 29 studies found that a single session of exercise produced a moderate increase in BDNF levels, that regular exercise intensified that effect, and that regular exercise produced a small increase in resting BDNF (Szuhany et al., 2015).

And the cognitive benefits are not limited to the young. A meta-analysis of 36 randomized trials in adults over 50 found that physical exercise improved cognitive function, with aerobic exercise, resistance training, multicomponent training, and tai chi all showing benefits; sessions of 45 to 60 minutes at least at moderate intensity were associated with better results (Northey et al., 2018).

● EVIDENCE: WELL-ESTABLISHED

Well-established. Regular physical exercise improves cognitive function in adults over 50 (Northey et al., 2018), and aerobic training can increase hippocampal volume and memory in older adults (Erickson et al., 2011). Exercise raises BDNF, a plausible contributor (Szuhany et al., 2015).

The System of Inevitability is not primarily aerobic. But heavy juggling and continuous bar work, sustained for many minutes, are physically demanding whole-body activities. They plausibly combine two of the brain's favourite stimuli: *novel skill learning* and *physical effort*. That combination is attractive, though, again, it has not been studied directly.

Sleep: where practice becomes skill

There is one more ingredient in the plastic brain, and it happens when you are not training at all.

In a well-known study, Walker and colleagues (2002) found that a night of sleep after practicing a motor sequence produced about a 20% increase in speed without a loss of accuracy, while an equivalent period awake produced no significant benefit. The improvement correlated with the amount of a particular stage of sleep (stage 2 non-REM), especially late in the night.

The practical meaning is simple and lovely: **practice, then sleep.** Some of the learning you start in the evening is finished while you dream.

Spacing: the patience of plasticity

If novelty triggers change and sleep consolidates it, how should practice be *distributed*? Motor-learning research consistently favours spreading practice out. In one study, spacing practice sessions across days produced better learning of a motor skill than massing the same practice into one session (Shea et al., 2000).

This, too, has a direct practical implication. Twenty minutes a day for a week is generally better for learning than two hours on Sunday.

Use it, or it recedes

The most sobering juggling finding is also the most motivating. In Draganski's study, the grey-matter expansion *receded* after three months without practice, and most participants could no longer juggle fluently. The brain invests in what you use, and withdraws investment from what you abandon.

That is not a reason for despair. It is a reason for *practice*: steady, lifelong, and renewed with fresh challenges. The brain, it seems, is less a monument than a garden.

The brain is less a monument than a garden. It invests in what you use.

What this means for a practitioner

Let us gather the threads into a few honest principles.

1. **Learning new things changes the brain.** The strongest stimulus appears to be learning something you cannot yet do, not repeating what you already can (Driemeyer et al., 2008). Each new pattern, from Cascade to Mills Mess to Box, is a fresh invitation.
2. **It works at any age.** Older adults learn new motor skills and show brain changes, though perhaps more slowly (Boyke et al., 2008; Voelcker-Rehage & Willimczik, 2006).
3. **Exercise helps the brain in its own right** (Erickson et al., 2011; Northey et al., 2018).
4. **Sleep and spacing matter.** Short, frequent sessions with good sleep beat marathon sessions (Walker et al., 2002; Shea et al., 2000).
5. **Changes are specific and can recede.** Juggling changes regions for seeing and acting on motion. Those changes fade without practice. Nothing here shows that juggling builds general intelligence or fighting skill.

None of this requires six-pound iron balls. Every one of these findings was made with ordinary juggling balls, ordinary walking, ordinary sleep. The door to a changing brain is open to everyone.

CHAPTER 7

How Skill Is Built



The body is a prediction machine that learns from its mistakes.

Why does a juggler's tenth attempt go better than the first, and the thousandth better than the tenth? The science of motor learning has spent more than a century on that question. Its answers are practical, sometimes surprising, and directly useful to anyone practicing alone.

The predicting body

Every skilled movement depends on prediction. When you throw a ball, your nervous system does not wait to see where it lands before preparing the catch. It predicts the ball's path, sends commands to the catching hand in advance, and then compares what actually happens with what it expected.

In a widely cited review, Wolpert, Diedrichsen, and Flanagan (2011) described several principles that seem to govern how the brain learns movement. Among them:

- **Error-based learning.** The nervous system uses the difference between predicted and actual outcomes, the "prediction error," to update its internal models of the body and the world. Each slightly mis-thrown ball teaches.
- **Reinforcement.** Successful outcomes strengthen the movements that produced them.
- **Use-dependent learning.** Simply repeating a movement biases future movements toward it.

- **Optimal control.** Skilled performers do not control every detail rigidly. They control what matters for the goal and let the rest vary.

That last principle is beautifully visible in juggling. Experts do not throw each ball identically. They allow natural variability and correct only what threatens the pattern. It is also, perhaps, what the System of Inevitability means by *continuous motion*: not a fixed form repeated, but a living pattern sustained.

> ● EVIDENCE: WELL-ESTABLISHED
>
> **Well-established.** Motor learning involves predictive internal models updated by error, reinforcement of successful actions, and use-dependent changes; skilled control focuses on task-relevant variables (Wolpert et al., 2011).

Variety beats repetition, in the long run

Here is one of the most counter-intuitive findings in the field. In 1979, Shea and Morgan had people learn three different movement patterns. One group practiced them in *blocks*: all of pattern A, then all of B, then all of C. Another group practiced them in a *random*, interleaved order. During practice, the blocked group performed better. But on later tests of retention and transfer, the random group did better. This became known as the **contextual interference** effect (Shea & Morgan, 1979).

The likely reason is that switching between tasks forces the brain to retrieve and rebuild each movement plan fresh, which is harder in the moment but builds more durable learning.

For a practitioner, the lesson is to *mix it up* once the basics are in place. Alternating Cascade, Mills Mess, and Box within a session, rather than drilling one for an hour, may feel clumsier, and is likely to produce more robust skill.

● EVIDENCE: WELL-ESTABLISHED

Well-established, with nuance. Interleaved (random) practice of several related skills often impairs performance during practice but improves later retention and transfer, compared with blocked practice (Shea & Morgan, 1979). The effect is strongest once learners have basic competence; complete beginners may benefit from some blocked practice first.

Where you put your attention

What should you think about while practicing? Gabriele Wulf and colleagues have studied this for decades. A large body of experiments finds that directing attention to the *effect* of a movement on the environment, an **external focus** (for example, "the arc of the ball" or "the ring staying centered"), tends to produce better performance and learning than directing attention to the body's own movements, an **internal focus** (for example, "my wrist" or "my elbow") (Wulf, 2013).

This finding is remarkably well-suited to the System's tools. The ring on the bar is a perfect external focus. You cannot keep it centered by thinking about your wrists. You keep it centered by attending to *the ring*.

Wulf and Lewthwaite later combined this with two motivational factors in the **OPTIMAL theory** of motor learning ("Optimizing Performance Through Intrinsic Motivation and Attention for Learning"). The theory proposes that learning is enhanced by an external focus, by **enhanced expectancies** (confidence that one can succeed), and by **autonomy** (some choice and control over one's practice) (Wulf & Lewthwaite, 2016).

● EVIDENCE: WELL-ESTABLISHED

Well-established (external focus); influential theory (OPTIMAL). An external focus of attention generally improves motor performance and learning compared with an internal focus (Wulf, 2013). OPTIMAL theory adds confidence and autonomy as contributors (Wulf & Lewthwaite, 2016); its motivational components are more debated than the external-focus findings.

Choosing your own practice

The System of Inevitability is radically self-directed: no instructors, no syllabus. Is there any science on whether choosing your own practice helps?

There is, and it is more interesting than a simple yes.

Early experiments suggested that learners who could choose aspects of their own practice, for instance when to receive feedback, learned better than "yoked" learners who received the same practice schedule without choosing it (Chiviacowsky & Wulf, 2002). Later studies even found benefits from choices unrelated to the task itself, such as the colour of golf balls, suggesting a motivational effect of autonomy (Lewthwaite et al., 2015).

But in 2022, McKay and colleagues published a careful meta-analysis that corrected for publication bias, the tendency for positive results to be published and null results to be filed away. A naive analysis of 52 experiments found a moderate benefit of self-controlled practice. After correcting for selective reporting, the estimated effect shrank to a small one ($g \approx 0.11$), and the authors concluded that "the benefit of self-controlled practice on motor learning is small and not currently distinguishable from zero" (McKay et al., 2022).

> ◐ EVIDENCE: SUGGESTIVE · EMERGING
>
> **Contested.** Choosing aspects of your own practice may help motor learning, possibly through motivation (Chiviacowsky & Wulf, 2002; Lewthwaite et al., 2015), but a bias-corrected meta-analysis found the average benefit to be small and uncertain (McKay et al., 2022).

What should a solitary practitioner take from that? Perhaps this: autonomy is not a magic accelerator of learning, but it may be crucial for something else, *staying with practice at all*. People persist with activities that feel like their own. We return to that, and to the broader evidence on autonomy and motivation, in Chapter 11.

How much does practice matter?

Popular culture loves the idea that ten thousand hours of practice makes an expert. It traces partly to a classic paper by Ericsson, Krampe, and Tesch-Römer (1993), which argued that expert performance reflects long periods of **deliberate practice**: effortful, focused activity designed specifically to improve, typically with feedback.

That paper transformed how people think about expertise. But a later meta-analysis put numbers to the idea and found that deliberate practice explained about 26% of the variance in performance for games, 21% for music, 18% for sports, 4% for education, and less than 1% for professions. The authors' conclusion is a good one to keep: "deliberate practice is important, but not as important as has been argued" (Macnamara et al., 2014).

Other things also matter: when you started, your body, your genes, your teachers, your opportunities, your sleep, your luck. That is not discouraging. It simply means that practice is the part of the equation you control, and that comparing yourself with anyone else is pointless.

> ● EVIDENCE: WELL-ESTABLISHED
>
> **Well-established.** Deliberate practice substantially contributes to skill in games, music, and sport, but explains well under half of individual differences in performance (Macnamara et al., 2014).

Expertise is mostly seeing

What separates experts from novices in sport? A meta-analysis of 42 studies found that experts are better at picking up perceptual cues, responding more accurately and more quickly, and that they use fewer visual fixations of longer duration, including longer "quiet eye" periods before acting (Mann et al., 2007).

Combine this with the juggling gaze study in Chapter 3, where experts tracked each ball *less* than intermediates did (Huys & Beek, 2002), and a picture emerges. With skill, perception becomes economical. The expert does not look harder. The expert looks *less*, and sees more, because prediction fills the gaps.

That is perhaps the most beautiful finding in this chapter, and the one closest to what contemplative traditions mean by *soft eyes* or a *wide gaze*: attention that rests on the whole rather than grasping at the parts.

The expert does not look harder. The expert looks less, and sees more.

The limits of transfer, revisited

If skill is built through specific practice, how far does it spread? Chapter 3 introduced the evidence: far transfer from one trained skill to unrelated abilities is rare in well-controlled studies (Sala & Gobet, 2017; Simons et al., 2016).

This does not mean that nothing transfers. General capacities, such as strength, endurance, tissue tolerance, and perhaps calm under pressure, can carry over to many activities. But specific *skills*, the fine-tuned predictions and timings that make a juggler a juggler or a fighter a fighter, are largely built by practicing them specifically.

For the System of Inevitability, the honest formulation is this. The tools almost certainly build general physical capacities that a martial artist can use. Whether they build *martial skill* is an open question that only testing against resistance can answer.

Practical principles for the solitary learner

From all of this, a handful of evidence-based principles follow. They are summarized here and built into the progression in Chapter 12.

1. **Make errors safely.** Error drives learning, so practice at the edge of your ability, but with tools light enough that errors cost nothing.
2. **Focus outward.** Attend to the ball's arc or the ring's centre, not your joints (Wulf, 2013).

3. **Mix it up once the basics are in place.** Interleave patterns and tools (Shea & Morgan, 1979).
4. **Space your practice.** Short sessions on many days (Shea et al., 2000).
5. **Sleep on it** (Walker et al., 2002).
6. **Own your practice.** Choose your path, because it keeps you practicing, even if it does not magically speed learning (McKay et al., 2022).
7. **Measure.** Without measurement, self-directed practice cannot tell improvement from hope. Chapter 12 gives you three simple tests.
8. **Test transfer, don't assume it.** If you want a skill, practice that skill.

CHAPTER 8

The Body That Adapts



Tissues are not built in the session. They are built in the days after it.

The System of Inevitability talks about grip, tendons, rotator cuffs, proprioceptive acuity, and structural integrity. These are not abstractions. They are tissues and senses, each with its own biology, its own speed of adaptation, and its own way of breaking when pushed too fast. This chapter looks at what science knows about each.

The sixth sense: proprioception

Close your eyes and touch your nose. You can do it because of **proprioception**, your sense of the position, movement, and force of your own body. It relies on receptors in muscles (muscle spindles, which sense stretch), in tendons (Golgi tendon organs, which sense tension), in joints, and in the skin, together with the brain's own record of the commands it has sent. A major review describes proprioception as a family of senses signalling "body shape, body position and movement, and muscle force" (Proske & Gandevia, 2012).

Proprioception is what lets a juggler catch without looking at the hand, and what lets a practitioner feel the ring drifting on the bar before seeing it. It is, quite literally, the body's awareness of itself.

CAN PROPRIOCEPTION BE TRAINED?

A systematic review of 51 studies of proprioceptive training found an average improvement of about 52% across outcome measures, with joint-position and target-reaching training consistently improving joint position sense. The authors described "converging evidence that proprioceptive training can yield meaningful improvements in somatosensory and sensorimotor function," while noting that much more work is needed (Aman et al., 2015).

There is a caveat close to home. In the mace trial described in Chapter 4, twelve weeks of mace training did *not* improve a standard test of shoulder joint position sense, even while it improved strength and stability (Akaras et al., 2026). Proprioception, it seems, may improve most when it is trained *specifically*, which is, once again, the principle of specificity.

> ◐ EVIDENCE: SUGGESTIVE · EMERGING
>
> **Suggestive.** Targeted proprioceptive training appears to improve sensorimotor function (Aman et al., 2015), but general strength or implement training does not necessarily improve standard proprioception tests (Akaras et al., 2026). Whether heavy juggling or the ring bar improves proprioception has not been tested.

BALANCE, INJURY, AND FALLS

The practical payoff of training balance and body control is best documented in two areas.

Sports injury. A systematic review of high-quality trials found that multicomponent neuromuscular training reduced lower-limb injuries, acute knee injuries, and ankle sprains in young athletes in pivoting sports, and that balance training alone significantly reduced ankle sprains (Hübscher et al., 2010). A broader meta-analysis of 25 randomized trials with over 26,000 participants found that strength training reduced sports injuries to less than one-third, proprioception training roughly halved them, and stretching had no clear benefit (Lauersen et al., 2014).

Falls in older people. A Cochrane review of 108 randomized trials with more than 23,000 participants found, with high-certainty evidence, that exercise

reduces the rate of falls in community-dwelling older people by about 23%, with balance and functional exercises particularly effective (Sherrington et al., 2019).

● EVIDENCE: WELL-ESTABLISHED

Well-established. Exercise programmes that include balance and strength reduce falls in older people (Sherrington et al., 2019) and sports injuries in athletes (Lauersen et al., 2014; Hübscher et al., 2010). Strength training is among the most protective interventions.

These findings concern balance and strength programmes generally, not the System's tools specifically. But they establish something important: *the capacities the System aims at are worth having*, and they are trainable.

The handshake that predicts the future

Of all the measures of physical health ever studied, one of the simplest is also one of the most revealing: how hard you can squeeze.

In midlife. In the Honolulu Heart Program, grip strength was measured in 6,089 healthy Japanese-American men aged 45 to 68, starting in 1965. Twenty-five years later, men in the lowest third of grip strength had nearly three times the odds of very slow walking speed compared with men in the highest third, and more than twice the risk of self-care disability (Rantanen et al., 1999).

Across the world. The PURE study measured grip strength in 139,691 adults in 17 countries of varying income. Over a median of four years, every 5 kg lower grip strength was associated with a 16% higher risk of death from any cause, and grip strength was a stronger predictor of all-cause and cardiovascular death than systolic blood pressure (Leong et al., 2015).

In half a million people. In the UK Biobank, with 502,293 participants aged 40 to 69, each 5 kg lower grip strength was associated with a 20% higher hazard of death from any cause in women and 16% in men, and with higher risk from cardiovascular disease, respiratory disease, and several cancers (Celis-Morales et al., 2018).

Strength in general. In 8,762 men followed for an average of nearly 19 years, higher muscular strength was associated with lower death rates from all causes and from cancer, even after accounting for cardiorespiratory fitness (Ruiz et al., 2008). And a meta-analysis of 16 cohort studies found that doing muscle-strengthening activities was associated with 10–17% lower risk of death from any cause, cardiovascular disease, total cancer, diabetes, and lung cancer, with the greatest risk reduction at around 30–60 minutes per week (Momma et al., 2022).

Grip strength has been described as "an indispensable biomarker for older adults" (Bohannon, 2019).

● EVIDENCE: WELL-ESTABLISHED

Well-established association. Lower grip strength and lower muscular strength are consistently associated with higher risk of disability, disease, and death across large populations (Rantanen et al., 1999; Leong et al., 2015; Celis-Morales et al., 2018; Ruiz et al., 2008; Momma et al., 2022).

AN IMPORTANT SUBTLETY

These are *associations*. Grip strength is probably a window onto overall muscle health, activity, nutrition, and the absence of illness, rather than a magical property of the hands. The PURE authors explicitly call for research "to test whether improvement in strength reduces mortality." Squeezing a gripper every day will make your grip stronger. It is not proven that this alone will make you live longer.

What the evidence does support is broader: building and keeping muscular strength across the body, through regular resistance activity, is associated with a longer, healthier life, and resistance training has well-documented benefits of its own. A practice like the System's, which loads the grip heavily *as part of* whole-body work, is aligned with that evidence, even if it has not been studied directly.

Grip strength is a window onto the whole body's health. Build the whole body, and the window brightens.

Tendons: the slow learners

If muscles are quick students, tendons are slow, careful ones.

Tendons transmit force from muscle to bone. They are made mostly of collagen arranged in a densely organized extracellular matrix, with relatively few cells and a modest blood supply. They adapt to mechanical loading, becoming stiffer and sometimes thicker, but the biology of that adaptation is complex and comparatively slow (Kjaer, 2004; Magnusson & Kjaer, 2019).

How tendons respond to training. A systematic review and meta-analysis of 27 studies in healthy adults found that exercise interventions of at least eight weeks increased tendon stiffness (standardized mean difference 0.70), elastic modulus (0.69), and, to a smaller degree, cross-sectional area (0.24). Stiffness adaptation depended significantly on *loading intensity*, and effects tended to be larger with interventions lasting twelve weeks or more (Bohm et al., 2015).

How slowly the core renews. A remarkable study used the carbon-14 released by nuclear bomb tests in the 1950s and 1960s as a natural tracer. Analysing Achilles tendons from people born between 1945 and 1983, the researchers found that the tendon core retained carbon-14 levels reflecting the first ~17 years of life, indicating that the core of the tendon "is formed during height growth and is essentially not renewed thereafter," in contrast to muscle, which turns over continuously (Heinemeier et al., 2013). Adaptation in adulthood still occurs, but likely more at the tendon's periphery and in its mechanical properties than through wholesale replacement.

● EVIDENCE: WELL-ESTABLISHED

Well-established. Tendons adapt to progressive, sufficiently intense loading over months, becoming stiffer (Bohm et al., 2015), but their biology is slow, and the adult tendon core turns over very little (Heinemeier et al., 2013; Magnusson & Kjaer, 2019).

WHY THIS MATTERS SO MUCH HERE

Muscles get stronger in weeks. Tendons take months to years to catch up. That mismatch is a classic setup for injury: an enthusiastic beginner builds enough muscle strength to move a heavy load before the tendons, and the small structures of the wrist, elbow, and shoulder, are ready to absorb it repeatedly.

The System of Inevitability's claim of "tendon durability under persistent multiplanar instability" is plausible for a practitioner who has accumulated decades of gradual loading through stonemasonry and training. It is precisely what a beginner does *not* have. This is the single most important biological reason why the suggested progression in Chapter 12 begins with light tools and moves slowly.

LOAD, PAIN, AND TENDONS

Tendon research also offers a hopeful note about pain. In a small, randomized crossover study of six volleyball players with patellar tendinopathy, a single session of isometric (static, holding) contractions reduced tendon pain immediately and for at least 45 minutes, more than isotonic contractions did (Rio et al., 2015). This is a small study and should not be over-applied, but it reflects a broader shift in sports medicine: well-dosed loading is often part of tendon *treatment*, not only a cause of tendon problems. If you have tendon pain, a physiotherapist can guide you.

The training-injury paradox

If load can injure, should we avoid it? The evidence says the opposite. In a widely cited review, Gabbett (2016) described a "training-injury prevention paradox": athletes accustomed to high training loads often have *fewer* injuries

than those training at lower workloads. The danger lies not in high load itself but in **excessive and rapid increases** in load. Gabbett argued that a large proportion of non-contact soft-tissue injuries are likely caused by such spikes.

◐ EVIDENCE: SUGGESTIVE · EMERGING

Well-supported principle, debated details. Rapid spikes in training load are a common contributor to soft-tissue injury, while gradually accumulated high capacity is protective (Gabbett, 2016). The specific metrics used to monitor load (such as acute-to-chronic workload ratios) are debated; the core principle of gradual progression is not.

This is the paradox at the heart of the System of Inevitability. A body that has been gradually prepared for decades may thrive under loads that would injure a beginner. The loads are not the problem. The *jump* to the loads is.

The adapting body, summarized

1. **Proprioception** is the body's awareness of itself. It is trainable, especially with specific practice, but general strength training does not guarantee improvement on standard tests.
2. **Balance and strength** training reduce falls in older adults and injuries in athletes. These are among the best-supported findings in exercise science.
3. **Grip and muscular strength** are powerful markers of long-term health. Building whole-body strength is wise; grip alone is not a guarantee.
4. **Tendons** adapt slowly, over months to years. Muscles outpace them, which is why beginners get hurt.
5. **Gradual progression** is protective. Spikes in load are dangerous.

The body is listening to everything you do. It adapts to what you ask of it, if you ask patiently.

CHAPTER 9

Attention, Flow, and Awareness



You cannot spin the ring centered while thinking about something else.

We now arrive at the part of this book closest to its deepest hope: that practice can change not only what a body can do, but how a person *experiences being alive*. This is the territory of attention, flow, and awareness. It is also the territory where enthusiasm most easily outruns evidence. We will go carefully, and the view is worth it.

The wandering mind

In 2010, Matthew Killingsworth and Daniel Gilbert used a smartphone app to ask thousands of people, at random moments throughout their days, what they were doing, what they were thinking about, and how they felt. Their finding was summarized in the title of their paper: *A wandering mind is an unhappy mind.* People were "thinking about what is not happening almost as often as they are thinking about what is," and doing so "typically makes them unhappy" (Killingsworth & Gilbert, 2010).

This is one of the most quietly radical findings in modern psychology. It suggests that a great deal of everyday unhappiness comes not from our circum-

stances but from our *absence* from them: ruminating on the past, rehearsing the future, narrating ourselves to ourselves.

◐ EVIDENCE: SUGGESTIVE · EMERGING

Robust finding, with interpretive caution. Mind-wandering is common and is associated, in experience-sampling data, with lower momentary happiness (Killingsworth & Gilbert, 2010). The association is clear; the direction of causation in daily life is more complex, since unhappiness can also cause mind-wandering.

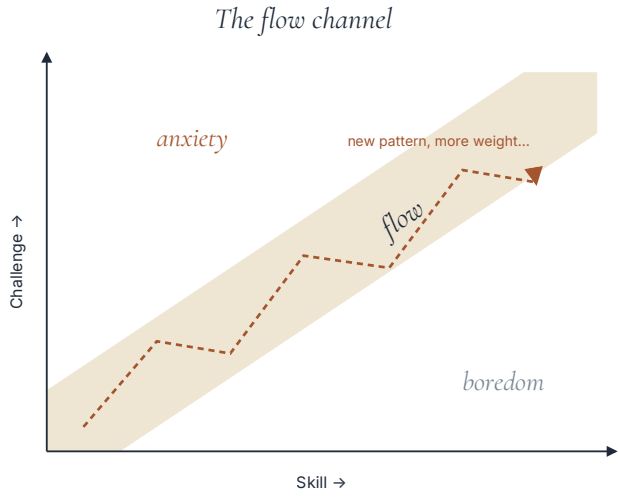
Now consider three iron balls in the air. Or a ring spinning on a bar that will slide off the moment your attention drifts. These are activities that *do not permit* mind-wandering. They demand presence the way water demands that you swim.

Flow

The psychologist Mihaly Csikszentmihalyi spent decades interviewing climbers, surgeons, chess players, dancers, and factory workers about the moments when they felt most fully alive. Again and again they described a similar state: complete absorption in a challenging activity, a merging of action and awareness, a loss of self-consciousness, a distorted sense of time, and a feeling that the activity was rewarding in itself. He called it **flow** (Csikszentmihalyi, 1990).

Flow is most likely when three conditions meet:

1. **Challenge matched to skill.** Too easy, and we are bored. Too hard, and we are anxious. Flow lives in the narrow channel between.
2. **Clear goals.** We know what we are trying to do, moment to moment.
3. **Immediate feedback.** We know, instantly, how well we are doing.



The flow channel. When challenge and skill rise together, practice stays in the channel between anxiety and boredom. Adapted from the general model described by Csikszentmihalyi (1990).

Juggling and the ring bar satisfy these conditions almost perfectly. The goal is clear: keep the pattern going, keep the ring centered. Feedback is instant: the ball is caught or dropped; the ring holds or drifts. And the challenge can be adjusted endlessly: more balls, new patterns, heavier tools, walking while juggling, turning while spinning.

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **The practice in practitioners' words.** The System of Inevitability's emphasis on *continuous motion*, spirals "revealed in practice," and movement in which each action flows from the last, reads very much like a description of flow from the inside. This is the practitioner's experience and philosophy, not a measured outcome, but it fits the psychological description closely.

WHAT HAPPENS IN THE BRAIN DURING FLOW?

Flow has been studied in the laboratory. In one brain-imaging study, 27 participants solved mental arithmetic problems under three conditions: too easy (boredom), too hard (overload), and continuously adjusted to their skill (flow). The flow condition was associated with *increased* activity in parts of the left in-

ferior frontal gyrus and putamen, and *decreased* activity in the medial prefrontal cortex and the amygdala. The authors interpreted these as reflecting a deeper sense of control, *decreased self-referential processing*, and *decreased negative arousal* (Ulrich et al., 2014).

That interpretation is striking. The medial prefrontal cortex is part of a network associated with thinking about oneself, the inner narrator. The amygdala is involved in threat and anxiety. In flow, both quieted.

An influential hypothesis, proposed by Arne Dietrich, suggested that flow involves "transient hypofrontality," a temporary down-regulation of the brain's explicit, analytical systems, allowing well-practiced implicit skills to run without interference (Dietrich, 2004). Later reviewers have found the neuroimaging evidence for hypofrontality "equivocal," and have proposed instead that flow is best understood in terms of *attention*: efficient, absorbed engagement of higher-order attentional networks, with reduced activity in regions linked to self-referential processing (Harris, Vine, & Wilson, 2017).

◐ EVIDENCE: SUGGESTIVE · EMERGING

Emerging. Neuroimaging studies associate flow with reduced activity in brain regions linked to self-referential thought and negative arousal (Ulrich et al., 2014; Harris, Vine, & Wilson, 2017). The "transient hypofrontality" hypothesis (Dietrich, 2004) remains a hypothesis, with mixed evidence.

DOES FLOW MAKE US PERFORM BETTER?

A systematic review and meta-analysis of 22 studies in sport and computer gaming found a medium-sized relationship between flow and performance ($r = 0.31$). But the authors stressed that the evidence "is unable to determine the causal direction" (Harris et al., 2023). Flow may improve performance; good performance may produce flow; probably both.

Either way, flow is worth cultivating for its own sake. People describe it as among the most rewarding experiences of their lives.

In flow, the inner narrator falls quiet, and the activity itself becomes the reward.

Mindfulness and moving meditation

Mindfulness, broadly, is the practice of attending to present-moment experience with openness rather than judgment. It has been studied extensively, and its evidence base is both genuinely positive and frequently overstated.

A rigorous systematic review and meta-analysis examined 47 randomized trials with active controls, totalling 3,515 participants. It found **moderate evidence** that mindfulness meditation programmes improved anxiety, depression, and pain, with effect sizes in the small-to-moderate range (for example, about 0.38 for anxiety and 0.30 for depression at eight weeks) (Goyal et al., 2014). A major neuroscience review describes mindfulness as involving at least three interacting components: enhanced attention control, improved emotion regulation, and altered self-awareness (Tang, Hölzel, & Posner, 2015).

At the same time, a group of fifteen researchers published a paper titled *Mind the Hype*, warning that "misinformation and poor methodology" in mindfulness research could leave the public "harmed, misled, and disappointed," and calling for clearer definitions and better studies (Van Dam et al., 2018).

> ● EVIDENCE: WELL-ESTABLISHED
>
> **Moderately established.** Mindfulness meditation programmes produce small-to-moderate improvements in anxiety, depression, and pain (Goyal et al., 2014). Claims beyond this, especially about dramatic brain or life transformations, are often overstated (Van Dam et al., 2018).

Is heavy juggling a form of mindfulness? Not by definition. Mindfulness practices usually cultivate open, non-judging awareness, while juggling demands narrowly focused task attention. But there is a family resemblance, and traditions of *moving meditation*, such as tai chi and qigong, sit somewhere between

the two. As we saw in Chapter 5, tai chi has been associated with improved executive function in older adults (Wayne et al., 2014), and in a large network meta-analysis of exercise for depression, tai chi and qigong, yoga, walking, and strength training all reduced depressive symptoms (Noetel et al., 2024).

The honest claim is this: rhythmic, absorbing, whole-body practices share some features with meditation, especially present-moment attention and reduced self-narration, and some of them have been shown to benefit mood and cognition. Whether the System's specific tools do so is untested.

Feeling from the inside: interoception

If proprioception is the sense of the body's position, **interoception** is the sense of the body's *internal state*: heartbeat, breath, hunger, temperature, tension, the visceral feel of emotion. Neuroscientist A. D. (Bud) Craig proposed that the anterior insula, a region deep in the brain, integrates these signals into a moment-by-moment representation of "how you feel," and that this may be fundamental to human awareness itself (Craig, 2009).

Interoception is now a major research field. A consensus roadmap from leading researchers describes interoception as providing "a moment-by-moment mapping of the body's internal landscape across conscious and unconscious levels," and notes that disturbances of interoception are increasingly recognized in anxiety, depression, eating disorders, and addiction (Khalsa et al., 2018). Importantly, researchers distinguish between *interoceptive accuracy* (how precisely you can detect internal signals, such as your heartbeat) and *interoceptive awareness* (how well your confidence matches your accuracy), which can differ in the same person (Garfinkel et al., 2015).

> ◐ EVIDENCE: SUGGESTIVE · EMERGING
>
> **Emerging science.** Interoception is a real and important dimension of awareness, linked to emotion and mental health (Craig, 2009; Khalsa et al., 2018). Whether movement practices improve interoceptive accuracy or awareness is an open research question, and it has not been studied for the System's tools.

Why mention interoception in a book about iron balls? Because practitioners of demanding physical arts often describe exactly this: a growing ability to *feel* what is happening inside, fatigue before failure, tension before injury, breath before panic. That sensitivity, whether or not it has been measured in this practice, is also a large part of what keeps a practitioner safe. Chapter 12's stop rules depend on it.

Embodied mind

A broad movement in cognitive science, often called **embodied cognition**, argues that thinking is not something that happens only in the head, but is shaped by the body and its interactions with the world. A careful review distinguished six different claims made under this banner, from the modest (cognition is situated in real-world activity) to the bold (the environment is part of the cognitive system), and argued that some are far better supported than others (Wilson, 2002).

The modest versions are well-grounded and fit this book's themes: perception and action are tightly coupled; skills are stored partly in the body's patterns of movement; and the way we move shapes the way we perceive. A juggler literally *sees* motion differently after learning to juggle, as the brain studies in Chapter 6 suggest.

Can attention be trained?

The System claims that juggling trains predictive tracking of multiple objects and "multi-threat awareness." What does the science of attention training say?

People can track several moving targets at once (Pylyshyn & Storm, 1988), and some training clearly improves aspects of visual attention. In a famous study, playing action video games improved performance on several measures of visual selective attention (Green & Bavelier, 2003). But the broader "brain training" literature urges caution: training reliably improves the trained tasks, sometimes improves closely related tasks, and rarely improves distant, everyday abilities (Simons et al., 2016).

So: attention is trainable, but often specifically. Juggling probably makes you better at attending to juggling-like situations. Whether it makes you more aware of threats in a crowded room has not been tested.

What "consciousness" means in this book

We can now say precisely what this book means when it speaks of an "upgrade in consciousness."

It does *not* mean a proven change in the metaphysical nature of mind. Nothing in the scientific literature supports such a claim for juggling, bar work, or any physical practice.

It *does* mean the cultivation of capacities that science recognizes and, in several cases, has measured:

- **Presence**: less mind-wandering, more absorption in what is actually happening (Killingsworth & Gilbert, 2010).
- **Flow**: the experience of total, rewarding engagement, with reduced self-referential chatter (Ulrich et al., 2014; Harris, Vine, & Wilson, 2017).
- **Bodily awareness**: proprioceptive and interoceptive sensitivity (Proske & Gandevia, 2012; Khalsa et al., 2018).
- **A changing brain**: the plasticity that comes with learning new skills (Draganski et al., 2004).
- **A steadier mood**: the well-documented effect of physical activity on anxiety and depression (Chapter 10).

If many people cultivated those capacities, more present, more absorbed, more at home in their bodies, more resilient, it is not unreasonable to call that a collective change in human awareness. It would be a modest revolution, built one practice session at a time. And it would be real.

Not a metaphysical leap, but a modest revolution: more present, more absorbed, more at home in the body, one session at a time.

CHAPTER 10

Movement and Mood



The body is not a vehicle for the mind. It is half of the conversation.

Of all the claims in this book, one rests on the broadest foundation of evidence: moving your body is good for your mind. It may be the single most important scientific finding behind any practice of physical training, and it applies to the System of Inevitability as much as to walking, dancing, or gardening.

The evidence, at scale

An overview of overviews. In 2023, Singh and colleagues pooled the results of 97 systematic reviews, covering 1,039 trials and 128,119 participants. Physical activity had *medium-sized* effects on symptoms of depression (median effect size −0.43), anxiety (−0.42), and psychological distress (−0.60), compared with usual care, across healthy adults, people with mental health disorders, and people with chronic disease. Higher-intensity activity was associated with greater improvement. The authors concluded that physical activity "should be a mainstay approach in the management of depression, anxiety and psychological distress" (Singh et al., 2023).

For clinical depression. In 2024, a network meta-analysis in the *BMJ* compared exercise types for people meeting clinical criteria for major depression, across 218 studies and 14,170 participants. Compared with active controls, walking or jogging, yoga, strength training, mixed aerobic exercise, and tai chi or

qigong all produced moderate reductions in depression. Effects were proportional to the intensity prescribed, and strength training and yoga appeared to be the most acceptable to participants. The authors were also candid that confidence in the evidence was low or very low for most comparisons, because few studies had low risk of bias (Noetel et al., 2024).

For strength training specifically. A meta-analysis of 33 randomized trials involving 1,877 participants found that resistance exercise training was associated with a significant, moderate-sized reduction in depressive symptoms (Gordon et al., 2018).

At population scale. In a cross-sectional analysis of 1.2 million adults in the United States, people who exercised reported about 1.5 fewer days of poor mental health per month than otherwise similar people who did not, a difference of about 43% (Chekroud et al., 2018). Because this was a cross-sectional study, it cannot by itself show that exercise caused the difference, but it fits with the trial evidence above.

● EVIDENCE: WELL-ESTABLISHED

Well-established. Physical activity reduces symptoms of depression, anxiety, and psychological distress across many populations (Singh et al., 2023), and several forms of exercise, including strength training, are effective for clinical depression (Noetel et al., 2024; Gordon et al., 2018). The quality of individual trials varies, but the overall direction is consistent.

⚠ CAUTION

Exercise complements care; it does not replace it. If you are living with depression, anxiety, or another mental-health condition, exercise can be a powerful ally, but please work with a qualified professional. If you are in crisis or thinking about harming yourself, contact local emergency services or a crisis line right away.

Why might movement help?

Researchers have proposed many mechanisms, and probably several work together:

- **Biological.** Exercise affects neurotrophic factors such as BDNF (Szuhany et al., 2015), stress-hormone systems, inflammation, and sleep.
- **Psychological.** Exercise offers *mastery experiences*: concrete evidence that you can set a goal and achieve it. Albert Bandura's theory of **self-efficacy** proposed that such mastery experiences are the most powerful source of a person's belief in their own capability (Bandura, 1977).
- **Attentional.** Absorbing physical activity interrupts rumination and draws attention into the present (Chapter 9).
- **Social.** Exercise is often done with others, and social connection protects health (Chapter 11).

The particular gifts of a skill practice

Most exercise trials study walking, running, cycling, or lifting weights. A practice like the System of Inevitability is something different: it is *skill training under load*. It may combine several of the mechanisms above in unusual ways.

It is effortful, so it plausibly engages the biological benefits of exercise. It is absorbing, so it plausibly engages the attentional benefits of flow. And it offers mastery in an unusually vivid form. The day you first sustain a cascade for sixty seconds, or keep the ring centered through a full turn, you have unmistakable evidence that you can learn something hard. That is a mastery experience in exactly Bandura's sense.

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **Reasonable inference, untested.** That a skill-based, absorbing practice like juggling or ring-bar work combines the mood benefits of exercise with the attentional benefits of flow and the confidence benefits of mastery is a reasonable inference from the separate literatures. It has not been studied directly for these tools.

The day you first sustain a cascade for sixty seconds, you hold evidence in your hands that you can learn something hard.

Dose: how much is enough?

The evidence does not point to a single magic dose, but some themes recur:

- **Intensity matters.** Both of the large reviews above found larger effects with higher intensity (Singh et al., 2023; Noetel et al., 2024). "Higher intensity" here means effortful, not reckless.
- **Strength work counts.** Muscle-strengthening activities of roughly 30–60 minutes per week are associated with the largest reductions in mortality risk (Momma et al., 2022), and strength training reduces depressive symptoms (Gordon et al., 2018).
- **Consistency beats heroics.** The benefits come from regular practice over weeks and months, which is also how skills and tissues adapt.

For most people, a few sessions a week of 20 to 45 minutes, combining skill work, strength work, and some walking, would sit comfortably within the evidence. Chapter 12 suggests how.

Movement as a daily return

There is a gentle idea hidden in the System's phrase *training method is just walking and turning*. If the foundation of practice is walking, then practice is available every day, to almost everyone, in almost any condition. And walking, according to the largest network meta-analysis of exercise for depression yet published, is among the most effective forms of exercise for mood (Noetel et al., 2024).

You do not have to start with iron. You can start with a walk, and pay attention to the turning.



Part IV · The Spiral Outward

A spiral begins at a single point and widens with every turn.

CHAPTER 11

From One Practitioner to Many



"No hierarchy or competition required."

— SYSTEM OF INEVITABILITY, PUBLIC MATERIALS

The System of Inevitability was refined in solitude. Its originator describes no teachers, no students, no ranks. And yet the hope behind this book is collective: that a practice like this, shared freely, might help many people become more present, more capable, and more connected. How does a solitary practice become a shared one without losing what makes it valuable?

Why solitude works, and where it stops

There is real wisdom in solitary practice. With no audience, there is no performance. With no ranks, there is no climbing. With no instructor, every insight has to be discovered in your own body. Many traditions, contemplative and martial, have honored long periods of solitary training.

Self-determination theory, one of the most extensively studied theories of human motivation, offers a way to understand why. Ryan and Deci (2000) proposed that people flourish, and sustain motivation, when three basic psychological needs are met: **autonomy** (the sense that your actions are your own), **competence** (the sense of growing mastery), and **relatedness** (the sense of connection to others). A meta-analysis of 73 health-related intervention studies found

that interventions designed around these principles produced small-to-medium increases in motivation and health behaviour, and small improvements in physical and psychological health (Ntoumanis et al., 2021).

● EVIDENCE: WELL-ESTABLISHED

Well-established framework. Autonomy, competence, and relatedness support sustained motivation and wellbeing (Ryan & Deci, 2000). Interventions built on these principles produce modest but real benefits for health behaviour and wellbeing (Ntoumanis et al., 2021).

Solitary practice serves the first two needs superbly. It is entirely self-chosen, and it offers constant, honest evidence of growing skill. But it can leave the third need, relatedness, unmet. And as we will see, connection to others is not a luxury. It is one of the strongest influences on health ever measured.

The health of connection

In a landmark meta-analysis of 148 studies including 308,849 participants, Holt-Lunstad, Smith, and Layton (2010) found that people with stronger social relationships had a **50% greater likelihood of survival** over the follow-up periods studied. The association held across age, sex, health status, and cause of death, and the authors concluded that the influence of social relationships on mortality is "comparable with well-established risk factors for mortality."

● EVIDENCE: WELL-ESTABLISHED

Well-established association. Stronger social relationships are associated with substantially higher survival (Holt-Lunstad et al., 2010).

Moving together

There is also evidence that *moving in time with others* does something special. A meta-analysis of 42 experimental studies with 4,327 participants found that synchronous movement, compared with non-synchronous control conditions, in-

creased prosocial behaviour (a medium effect), perceived social bonding and social cognition (small-to-medium effects), and positive affect (a small effect) (Mogan, Fischer, & Bulbulia, 2017). Researchers studying music and dance have proposed that synchrony may blur the boundary between "self" and "other," and may involve the brain's endorphin system, as part of how human groups bond (Tarr, Launay, & Dunbar, 2014).

◐ EVIDENCE: SUGGESTIVE · EMERGING

Suggestive. Moving in synchrony with others tends to increase cooperation, bonding, and positive mood (Mogan et al., 2017). The proposed mechanisms, such as self-other merging and endorphin release, are still being investigated (Tarr et al., 2014).

Juggling has a whole social world built around exactly this. Jugglers pass clubs and balls to one another in shared rhythms, gather in informal clubs and festivals, and teach strangers freely. A practice built on rhythm and continuous motion is naturally suited to being shared in time with others, even if each person trains alone most days.

A practice built on rhythm is naturally suited to being shared in time with others.

Community without hierarchy

So how might people share a practice like this without building the very ranks and gatekeeping the System rejects? Here are some suggestions. They are the compiler's, offered in the spirit of the System's philosophy, not as its rules.

1. Share the tests, not the titles. Instead of belts, share simple, objective self-tests that anyone can run: cascade duration, grip strength, the CKCUEST (Chapter 12). These let people see their own progress and compare notes without anyone being ranked above anyone else.

2. Practice in parallel. Meet in a park or a garage and train side by side. Synchrony research suggests that simply moving in rhythm near others may foster connection.

3. Teach as a peer. Anyone who has learned the cascade can show someone else how to begin. Teaching is a form of practice, and no certificate is required to share what you know, as long as you are honest about what you don't.

4. Keep a shared injury log. This is perhaps the most important and the least glamorous suggestion. A community that records what hurt, when, and at what load can learn collectively what no individual could learn alone. It turns anecdote into data.

5. Film your standards. A short video of a practitioner performing a pattern, with the load stated, is a standard that anyone can see and anyone can check. It replaces authority with evidence.

6. Separate the claims. Keep a clear line between what the practice *does* (measurable things like cascade time and grip), what it *might do* (plausible but untested benefits), and what practitioners *believe or feel* (philosophy and experience). Respect all three. Confuse none.

From practice to evidence

There is an exciting possibility here. The viability assessment that preceded this book identified what was missing for the System of Inevitability to become a transmissible system: a written progression, simple repeatable tests, filmed standards, and an injury log.

A community of practitioners, each running the same simple tests, filming their standards, and logging their injuries, could create exactly that, and openly. Over time, such a community could begin to answer questions no one has yet answered:

- How do heavy-ball cascade times relate to grip strength?
- How quickly do people progress from light to heavy tools, and what injuries occur along the way?
- Do ring-bar practitioners improve on the CKCUEST?

- Do practitioners with martial-arts experience notice any transfer, and can it be measured in partner drills?

None of that would be a formal clinical trial. But it would be honest, shared, and cumulative, which is the spirit of science. It might also, one day, give researchers enough reason to run a proper study.

> ○ PRACTITIONER EXPERIENCE · PHILOSOPHY
>
> **A suggestion, not a finding.** Community-generated logs and filmed standards are not peer-reviewed evidence. They can, however, organize experience, reveal patterns, and generate questions worth testing properly.

Why this book is free

This book is released under a Creative Commons license that lets anyone copy, share, translate, and adapt it for non-commercial purposes, as long as they credit the sources and share their adaptations the same way.

That choice is not incidental. It follows from the logic of everything above. A practice without hierarchy should not be locked behind a paywall. A community that shares tests, logs, and standards needs shared materials. And if the hope is to help *many* people become more present and more capable, then the knowledge should move as freely as a ball passed from hand to hand.

The spiral outward

A spiral is a beautiful image for this. It begins at a single point, one person, alone, walking and turning, and with every revolution it widens. Each person who learns to juggle can teach another. Each practitioner who logs an honest result adds to what everyone knows. Each copy of this book given away may reach someone who needed it.

That is the most realistic and the most hopeful meaning of a collective "upgrade in consciousness": not a sudden leap, but a widening spiral of people becoming more attentive, more capable, more honest about what they know, and more connected to one another.

CHAPTER 12

The Safe Path: A Suggested Progression



Heavy objects are honest teachers. They do not negotiate.

> ⚠ CAUTION
>
> **Read this first.** Everything in this chapter is a *suggestion* compiled from general exercise science and common-sense safety practice. It is **not** the System of Inevitability's official progression, because, as far as the public record shows, no written progression exists yet. It is not medical advice. Before starting any new training programme, and especially before using heavy implements, **consult a physician, physiotherapist, or qualified strength coach**, particularly if you are pregnant, have high blood pressure or a heart condition, osteoporosis, eye conditions, joint or spine problems, a previous injury, or are new to exercise. A standard pre-exercise screening questionnaire, such as the PAR-Q+, is a sensible place to begin.

This chapter is the bridge between inspiration and practice. Its purpose is to let almost anyone begin a version of this practice *safely*, to progress at a pace their tissues can follow, to know when to stop, and to measure whether anything is changing.

Five principles

1. Start far lighter than you think. The System's tools, 6 lb balls and a 25 lb bar, rest on decades of adaptation. Your starting tools should be the ones the sci-

ence actually used: ordinary juggling balls and a light stick. The juggling brain studies used ordinary balls (Draganski et al., 2004). The clubbell studies used 0.5–1 kg clubs (Walter et al., 2023).

2. Progress gradually, and change one thing at a time. Progressive overload, gradually increasing demand, is a foundational principle of resistance training (American College of Sports Medicine, 2009). Rapid spikes in load are a major contributor to soft-tissue injury (Gabbett, 2016). Increase *one* variable at a time: weight, *or* duration, *or* complexity, *or* height of throw. Never two at once.

3. Let tendons set the pace. Muscles adapt in weeks; tendons in months (Bohm et al., 2015; Magnusson & Kjaer, 2019). Feeling strong enough is not the same as being ready.

4. Age is not a barrier, but it is a factor. Resistance training is effective and appropriate for older adults when it is properly designed, progressed, and, ideally, supervised (Fragala et al., 2019). Older adults learn new motor skills (Voelcker-Rehage & Willimczik, 2006). They may need longer at each stage.

5. Measure, so you know. Self-directed practice needs a mirror. The three self-tests below are that mirror.

Set up a safe space

- **Clear the area.** At least two metres around you, with no people, pets, glass, screens, or fragile objects. Nothing above you to hit with a bar.
- **Choose a forgiving surface.** Grass, rubber mats, or thick carpet. A dropped iron ball on a hard floor can bounce unpredictably and will damage the floor.
- **Protect your feet.** Wear sturdy closed-toe shoes once balls weigh more than about half a kilogram.
- **Never save a falling heavy ball.** This is the most important rule of heavy juggling. When a heavy ball goes wrong, *step back and let it fall.* Lunging, reaching, or trying to catch it with a bent wrist or a finger is how injuries happen.

- **Keep throws below face height** with any weighted ball. Low and controlled beats high and dramatic.
- **Train fresh.** Do your most demanding skill work early in a session, not at the end when you are tired.

Warm up

A systematic review found that warming up improved performance in the large majority of outcomes studied, with little evidence of harm (Fradkin et al., 2010). A simple 8–10 minute warm-up suited to this practice:

1. **Walking and turning** (2–3 min). Walk in a slow figure-eight, turning through the hips and shoulders. This *is* the System's foundation.
2. **Joint circles** (2 min). Wrists, elbows, shoulders, neck (gently), hips, knees, and ankles, in both directions.
3. **Grip wake-up** (1 min). Open and close the hands; spread the fingers; gentle wrist flexion and extension.
4. **Light pattern rehearsal** (2–3 min). One light ball tossed hand to hand, then two, then a light cascade. Or a broomstick held overhead, then at the chest, slowly turned.
5. **Breathing check.** Breathe steadily. Avoid holding your breath during heavy holds or throws.

The suggested stages

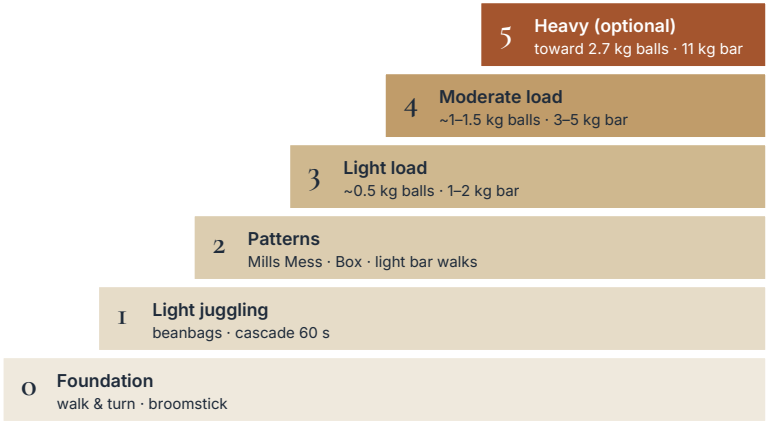
The table below sets out a suggested progression. The weights and times are deliberately conservative. They are starting points to adjust with a professional, not prescriptions. *Move to the next stage only when you meet the "ready to progress" standard for three consecutive sessions, with no pain flare the next day.*

Stage	Juggling	Bar & ring	Contact	Ready to progress when…
0. Foundation (2–4 weeks)	One ball, then two, hand to hand	Broomstick held palms-down: overhead, chest, slow turns	None	Pain-free walking-and-turning warm-up; basic mobility
1. Light juggling (weeks to months)	Ordinary juggling balls (~100–150 g). Cascade → 60 s	Broomstick with a light ring (e.g. plastic bangle or rope loop); spin it centered, both directions	Shadow striking, slow	Cascade 60 s; ring centered 30 s each direction
2. Patterns	Add Mills Mess, then Box, light balls; interleave patterns	Light bar walks: forward, back, turning	Light bag contact with wraps & gloves, short rounds	Each pattern 30 s; ring centered while walking 30 s
3. Light load (months)	Weighted balls ~0.5 kg (≈1 lb), low throws, short sets	Light pipe or dowel ~1–2 kg with a light metal ring	Moderate bag rounds	Cascade 30 s at this weight, smooth catches, no wrist pain
4. Moderate load (many months)	~1–1.5 kg (≈2–3 lb)	~3–5 kg bar	Dummy work introduced slowly	Repeatable standards; stable grip and CK-CUEST scores
5. Heavy load (adapted practitioners only, often years)	Toward 2.7 kg (6 lb), only after long adaptation	Toward 11 kg (25 lb); back-bend positions last and only if pain-free	Full overlay work	Filmed standards; clean injury log; professional input

Some notes on the table:

- **Durations are deliberately vague.** Some people will spend weeks at a stage; others, months. Your tissues decide, not your calendar.
- **The 60-second cascade** is the standard the Draganski study used for "skilled" juggling. It is a satisfying first milestone.
- **Stage 5 is optional.** Most people can enjoy almost all the benefits discussed in this book, skill learning, flow, strength, mood, at Stages 1 to 4. There is no obligation to reach the System's full loads.
- **Back-bend positions** with a heavy bar load the lumbar spine in extension. Introduce them last, with a light bar, small ranges, and professional guidance.

The safe path



Advance only after meeting each standard for three consecutive sessions with no next-day pain flare.

A suggested progression, read from the bottom up. Each step changes one thing at a time. The width of each step reflects time spent, not difficulty.

Stop rules

These are rules, not suggestions. Stop the session, or stop the exercise, when any of the following occurs:

1. **Sharp, sudden, or localized pain**, especially in the wrist, elbow, shoulder, or lower back.
2. **Pain that changes how you move**, making you guard, limp, or alter technique.
3. **Pain above about 3 out of 10** during an exercise, or pain that is worse the next morning than before you trained.
4. **Numbness, tingling, or loss of grip** in the hands or fingers.
5. **Dizziness, chest pain, unusual breathlessness, or palpitations.** Stop and seek medical attention.
6. **Fatigue that degrades form.** When catches get sloppy or the ring starts to wander constantly, the session is over. Practice tired, and you rehearse mistakes with heavy objects.
7. **Any blow to the head or face** from a ball or bar, however minor it seems.
8. **Two dropped heavy balls in quick succession.** Drop back to a lighter weight for the rest of the session.

If pain persists for more than a few days, or recurs every time you train, see a physiotherapist or physician. Do not train through it.

Specific injury cautions

- **Wrists and fingers.** Heavy catches load the wrist in extension and the fingers in flexion. Catch with a soft, yielding hand moving downward with the ball. Never catch a heavy ball on straight fingers.
- **Elbows.** Repetitive gripping can irritate the tendons at the inner and outer elbow. Rest at the first sign of persistent elbow pain.
- **Shoulders.** Overhead bar work and heavy throwing stress the rotator cuff. Build shoulder capacity gradually; avoid pain at the top of the range.

- **Lower back.** Avoid heavy bar work in back-bend until you have a long base of pain-free training at lighter loads.
- **Face and eyes.** Keep throws low. Train in good light. Consider eye protection when working on new heavy patterns.
- **Feet.** Wear sturdy shoes. Let dropped balls fall.
- **Blood pressure.** Long, heavy holds with breath-holding raise blood pressure. Breathe throughout, and discuss heavy isometric holds with your doctor if you have hypertension or heart disease.

Three simple self-tests

Self-directed practice cannot tell improvement from hope without measurement. These three tests are simple, cheap, and repeatable. Test every four to six weeks, at the same time of day, after the same warm-up.

TEST 1: CASCADE DURATION

What it measures: juggling skill and consistency at a stated weight.

How: Using balls of a known weight, juggle a three-ball cascade for as long as you can, up to a ceiling you choose (for example 120 seconds). Record the time in seconds, or the number of catches, for your **best of three** attempts. *Always record the ball weight*, because a 60-second cascade with beanbags and a 60-second cascade with 1 kg balls are completely different achievements. Repeat for Mills Mess and Box if you practice them.

TEST 2: GRIP STRENGTH

What it measures: maximum hand-grip force, a strong marker of overall muscular health (Bohannon, 2019; Leong et al., 2015).

How: Use a hand-held grip dynamometer (they are inexpensive and widely available). Sit with your shoulder relaxed at your side, elbow bent at 90 degrees, forearm in neutral, wrist straight or slightly extended. Squeeze as hard as you can for about three seconds. Perform three trials on each hand, with rest between, and record the best. This is the standard approach used in clinical research and in the mace trial (Akaras et al., 2026).

TEST 3: CKCUEST (CLOSED KINETIC CHAIN UPPER EXTREMITY STABILITY TEST)

What it measures: upper-body stability, coordination, and endurance in a closed-chain (weight-bearing) position. It was one of the outcomes that improved in the mace trial (Akaras et al., 2026).

How (adapted from Goldbeck & Davies, 2000, and Tucci et al., 2014):

1. Place two strips of tape on the floor, parallel, **91.4 cm (36 inches) apart**.
2. Get into a push-up position with one hand on each strip, body straight, feet about shoulder-width apart.
3. On "go," lift one hand, reach across and touch the other hand, return it to its line, then do the same with the other hand. Each touch counts as one.
4. Continue for **15 seconds**. Count the touches.
5. Rest **45 seconds**. Do one practice trial and then three measured trials, and record the average of the three.

In a reliability study, an improvement of **at least three touches** was needed to be considered a real change rather than measurement noise (Tucci et al., 2014).

> ⚠ CAUTION
>
> **CKCUEST caution.** The test is demanding on the shoulders and wrists. Do not perform it if you have current shoulder or wrist pain. Beginners can practice the movement from a kneeling push-up position, but record that modification, because kneeling scores are not comparable with standard scores.

OPTIONAL: PRACTICE-SPECIFIC MEASURES

You may also wish to record:

- **Ring-centered time**: seconds you can keep the ring spinning centered on the bar, in each direction, at a stated bar weight and position.
- **Bag rounds**: number of rounds at a given duration with good structure and no hand or wrist pain.
- **Session feel**: a simple 1–10 rating of effort, and a few words about mood and absorption. Over time, this can tell you how often you experience flow.

A printable log template is in Appendix A.

Keep an injury log

Every time something hurts beyond ordinary muscle soreness, write down: the date, what you were doing, the load, what hurt, how badly (0–10), and how long it lasted. Over months, patterns appear: a load that is too much, a pattern that strains a wrist, a time of day when you are careless. If practitioners ever share such logs, they will be the most valuable data this practice has.

A sample session (Stages 1–3)

Block	Time	Content
Warm-up	8–10 min	Walking and turning, joint circles, grip wake-up, light toss
Skill	10–15 min	Juggling patterns, interleaved (e.g. 2 min Cascade, 2 min Mills Mess, 2 min Box, repeat)
Bar	5–10 min	Ring spin centered, both directions; positions overhead and chest; slow walking turns
Strength	5–10 min	Simple grip and whole-body work appropriate to your level
Cool-down	3–5 min	Slow walking; breathing; note your session in the log

Frequency. Short, frequent sessions favour skill learning (Shea et al., 2000), and sleep helps consolidate it (Walker et al., 2002). Three to five sessions a week of 20 to 45 minutes is a reasonable rhythm for many people. Allow at least one full rest day a week, and more when you increase load.

Building the habit

How long does it take for a practice to become automatic? In a study of 96 volunteers who chose a daily behaviour and repeated it in a consistent context, the

time to reach 95% of maximum automaticity ranged from **18 to 254 days**. Crucially, missing a single opportunity "did not materially affect the habit formation process" (Lally et al., 2010).

So: practice at the same time and place, link it to something you already do every day, and when you miss a day, simply begin again the next. The habit is built in the returning.

The habit is built in the returning.

A final word on safety

The deepest safety rule is not on any list. It is *attention*. The same quality of presence that makes this practice valuable, feeling the ball, the ring, the breath, the fatigue, is what keeps you safe. A practitioner who is truly paying attention knows when to stop.

And when in doubt, ask a professional. There is no belt for training alone through an injury.

CHAPTER 13

A Closing Invitation



"Training method is just walking and turning."

We began with a single ball tossed from one hand to the other. Let us end there too.

Somewhere in your home there is probably something you could toss: a rolled pair of socks, an orange, a small beanbag. Pick it up. Toss it from hand to hand. Notice your eyes catching its arc, your other hand rising to meet it before you have decided to move it, the small give in your fingers as it lands. Notice that, for those few seconds, you are not anywhere else.

That is where this practice begins, and in a sense it is where it always stays.

What we have learned

The science gathered in this book does not prove that any particular tool will transform you. It shows something more modest and, in the end, more hopeful:

- **The adult brain changes when it learns**, and learning to juggle was one of the first demonstrations of that in humans. It happens in young adults and in older adults. It fades if practice stops, and returns when practice resumes.
- **Skill is built** through prediction, error, variety, outward attention, spacing, and sleep, and it is built *specifically*: we get best at what we practice.
- **The body adapts** when asked patiently. Strength protects health. Balance and strength training prevent falls and injuries. Tendons are slow, and must be respected.

- **Attention is precious.** A wandering mind tends to be an unhappy one; flow, the absorbed state that challenging skill practice invites, quiets the self-critical narrator and is rewarding in itself.
- **Movement lifts mood**, reliably, across hundreds of trials.
- **Connection matters to survival**, and moving together fosters it.

What remains unknown

We have also been honest about what we do not know:

- No study has examined juggling heavy iron balls.
- No study has examined a spinning ring on a steel bar.
- No study has measured whether these tools transfer to fighting skill.
- No study has measured whether they change awareness or consciousness in any lasting way.

Those are not failures of the practice. They are *open questions*, and open questions are invitations. Every practitioner who runs the simple tests in Chapter 12, films a standard, or keeps an honest injury log is helping to answer them.

The invitation

So here is the invitation, in four parts.

Begin. Pick up three soft balls, or a broomstick, or simply go for a walk and pay attention to the turning. Begin light. Begin today.

Pay attention. Let the ball's arc, the ring's centre, or the rhythm of your steps hold your attention. When your mind wanders, notice, and come back. That returning is the practice.

Measure. Keep a log. Time your cascade. Test your grip. Notice how you feel before and after. Let evidence, not hope, tell you what is changing.

Share. Teach someone the cascade. Train alongside a friend. Give this book away. A practice without hierarchy grows only by being shared.

Inevitability, again

There is one last meaning of "inevitable" worth keeping.

When a practice becomes part of your life, when you return to it day after day, through good weeks and bad, its effects become, in a quiet way, inevitable. Not because any single session is transformative, but because thousands of small sessions accumulate. The ball goes up and comes down. The ring turns. The foot falls and the next step follows. The catch becomes the throw.

That is the only kind of transformation this book can honestly promise. It is also, perhaps, the only kind that has ever really worked.

Walk. Turn. Catch what falls, and send it back up.

And then pass it on.

— with gratitude to Uki, for the practice; to the researchers whose work is cited here, for the evidence; and to you, for what you will do with both.

Appendix A · Practice Logs

Copy or print these pages. Fill them in honestly. Over time, your logs will become the most useful book you own.

Self-test log (every 4–6 weeks)

Date	Cascade (s) & ball wt	Mills Mess (s)	Box (s)	Grip L (kg)	Grip R (kg)	CK-CUEST (avg touches)	Ring centered (s) & bar wt	Notes

Session log

Date	Stage	Tools & weights	Minutes	Effort (1–10)	Absorption / flow (1–10)	Mood before → after	Pain? (where, 0–10)

Date	Stage	Tools & weights	Minutes	Effort (1–10)	Absorption / flow (1–10)	Mood before → after	Pain? (where, 0–10)

Injury log

Date	Activity & load	What hurt	Severity (0–10)	How long	What changed afterward

Appendix B · The Evidence at a Glance

A one-page summary of the main claims discussed in this book and the strength of evidence behind each.

Claim	Strength	Key sources
Learning to juggle (ordinary balls) changes adult brain structure in visual-motion regions, partly transiently	● Well-established, with methodological debate	Draganski et al., 2004; Driemeyer et al., 2008; Scholz et al., 2009; Thomas & Baker, 2013
Older adults can learn juggling and show brain changes	● Well-established	Boyke et al., 2008; Voelcker-Rehage & Willimczik, 2006
Aerobic exercise increases hippocampal volume in older adults; exercise improves cognition after 50	● Well-established	Erickson et al., 2011; Northey et al., 2018
External focus of attention improves motor learning	● Well-established	Wulf, 2013
Interleaved practice improves retention and transfer	● Well-established	Shea & Morgan, 1979
Self-controlled practice improves learning	◐ Contested; small effect after bias correction	Chiviacowsky & Wulf, 2002; McKay et al., 2022
Far transfer from one trained skill to unrelated abilities	◐ Rare in well-controlled studies	Sala & Gobet, 2017; Simons et al., 2016
Grip and muscular strength predict disability and mortality	● Well-established association	Leong et al., 2015; Celis-Morales et al., 2018; Rantanen et al., 1999
Strength and balance training reduce injuries and falls	● Well-established	Lauersen et al., 2014; Sherrington et al., 2019
Tendons adapt to progressive loading, slowly	● Well-established	Bohm et al., 2015; Magnusson & Kjaer, 2019
Mace training improves grip, shoulder stability, CKCUEST	◐ One small RCT	Akaras et al., 2026

Claim	Strength	Key sources
Light club training improves shoulder strength and mobility	◐ Small RCTs	Walter et al., 2023
Physical activity reduces depression and anxiety	● Well-established	Singh et al., 2023; Noetel et al., 2024
Flow is associated with reduced self-referential brain activity	◐ Emerging	Ulrich et al., 2014; Harris, Vine, & Wilson, 2017
Mindfulness programmes modestly improve anxiety, depression, pain	● Moderately established	Goyal et al., 2014
Synchronous movement increases bonding and prosocial behaviour	◐ Suggestive	Mogan et al., 2017
Heavy (6 lb) ball juggling produces the same brain effects as light juggling	○ Untested	None
Spinning ring bar improves proprioception and tendon durability	○ Untested (plausible in part)	None directly
These tools transfer to striking, clinch, or multi-threat awareness	○ Untested claim	None
These practices upgrade consciousness in a metaphysical sense	○ Not a scientific claim	None

● Well-established · ◐ Suggestive, emerging, or contested · ○ Untested, practitioner claim, or philosophy

Glossary

Autonomy — In self-determination theory, the sense that one's actions are self-chosen. One of three basic psychological needs, with competence and relatedness.

BDNF (brain-derived neurotrophic factor) — A protein that supports the survival, growth, and plasticity of neurons. Levels rise with exercise.

Box — A three-ball juggling pattern in which two balls are thrown vertically at the sides while the third is passed horizontally between the hands, tracing a rectangle.

Cascade — The basic three-ball juggling pattern. Balls are thrown alternately from each hand to the other in crossing arcs, tracing a figure-eight.

CKCUEST (Closed Kinetic Chain Upper Extremity Stability Test) — A field test of upper-body stability. From a push-up position with hands 91.4 cm apart, the person alternately touches one hand with the other for 15 seconds.

Contextual interference — The finding that interleaving several skills in practice often hurts immediate performance but improves later retention and transfer.

Deliberate practice — Effortful, focused practice designed specifically to improve performance, usually with feedback.

Eccentric contraction — A muscle contraction in which the muscle lengthens under load, as when the arm "gives" to absorb a heavy catch.

Embodied cognition — A family of ideas holding that thinking is shaped by the body and its interaction with the environment.

External focus — Attention directed to the effect of a movement on the environment (e.g. the ball's arc) rather than to the body's movements.

Flow — A state of complete absorption in a challenging activity, with clear goals and immediate feedback, in which self-consciousness fades.

Fractional anisotropy (FA) — A measure from diffusion MRI reflecting how directionally organized water movement is in tissue; used as an index of white-matter microstructure.

Grey matter — Brain tissue rich in neuronal cell bodies, dendrites, and synapses.

hMT/V5 — A region of visual cortex specialized for perceiving motion. It showed grey-matter changes in the juggling studies.

Interoception — The sense of the body's internal state: heartbeat, breath, hunger, temperature, visceral emotion.

Intraparietal sulcus (IPS) — A groove in the parietal lobe involved in linking visual information to action, including reaching and grasping.

Meta-analysis — A statistical method that combines the results of many studies to estimate an overall effect.

Mills Mess — A three-ball juggling pattern in which the forearms continuously cross and uncross, so that the balls appear to weave.

Mindfulness — Attention to present-moment experience, typically with openness and without judgment.

Neuroplasticity — The capacity of the nervous system to change its structure and function in response to experience.

Progressive overload — Gradually increasing training demand over time so the body continues to adapt.

Proprioception — The sense of the position, movement, and force of one's own body, from receptors in muscles, tendons, joints, and skin.

Randomized controlled trial (RCT) — A study in which participants are randomly assigned to an intervention or a comparison group, the strongest common design for testing cause and effect.

Self-efficacy — A person's belief in their capacity to succeed at a particular task. Strongly shaped by mastery experiences.

Specificity — The principle that training adaptations are specific to the type of practice performed; we get best at what we actually practice.

Spinning Ring Iron Bar — The System of Inevitability's 5-ft, 25 lb stainless-steel bar, held palms-down, with a 6-in, 2 lb iron ring kept spinning and centered.

Stretch-shortening cycle — A pattern in which a muscle-tendon unit is stretched under load and immediately shortens, often recovering some stored elastic energy.

System of Inevitability — A solitary training method developed over 25+ years by Uki (@ukigigi), based on iron ball juggling, the spinning ring bar, heavy bag, and metal-armed dummy, under the philosophy "training method is just walking and turning."

Systematic review — A structured review of all available studies on a question, using explicit methods to find and evaluate evidence.

Tendon stiffness — A tendon's resistance to stretching under load; it increases with appropriate training.

Transfer — The extent to which practice of one skill improves performance on another. "Near transfer" is to similar tasks; "far transfer" is to dissimilar ones.

White matter — Brain tissue made largely of myelinated nerve fibres connecting brain regions.

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About This Book

Title. *Walking and Turning: Iron, Spirals, and the Science of a Practicing Mind — An evidence-based companion to the System of Inevitability.*

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

Also in this series. Book 2: *Wave and Return: The Bent Fist, the Figure-Eight, and the Science of a Restrained Hand*, on the System of Inevitability's striking: the bent (J) fist, whole-body wave energy, figure-eight motion, breath, safe progression, testing, and the ethics of restraint. Book 3: *Shape and Choice: Everyday Geometry, Calm Presence, and the Science of a Choosing Mind*, on the system's everyday geometry, solitary training, calm presence, the originator's own list of dangers, and the science of keeping choice inside automatic skill. Book 4: *Lens and Lattice: Altered Perception, the Internal Arts, and the Science of a Curious Practice*, a harm-reduction companion on practising the internal arts with curiosity in altered states, responsibly, and on the science of psilocybin, perception, touch, pattern finding, and integration. Book 5: *Nucleus and Orbit: Atoms, Necessity, and the Science of an Interwoven Practice*, on the system's atomism, its 3-6-9 architecture, and its quantum language set beside the real science of atoms, necessity, chaos, the fractal body, and interdependence, tying the series together. The series continues. This book is Book 1 of the Companions to the System of Inevitability.

Independence. This is an independent, unofficial work. It has not been reviewed or endorsed by Uki. Descriptions of the System of Inevitability are based on his public statements of 30 and 31 July 2026 and on a project brief and viability assessment (October 2026) that summarize them. All progressions, tests, stop rules, and community suggestions in this book are the compiler's, drawn from general exercise and motor-learning science.

Method. Every peer-reviewed study cited was checked against its Crossref record (authors, year, title, journal, volume, pages, DOI), and the specific findings reported were checked against the published abstracts or full texts. Numbers are reported as the original authors reported them. Where a claim is untested, the text says so. No quotations have been invented; the short quotations attributed to the System of Inevitability come from its public materials as summarized in the project brief.

Illustrations. All diagrams are original schematics created for this book. Figures of people are abstract and do not depict any real person. The plasticity diagram shows an illustrative shape, not actual data.

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