

**Becoming a  
Supple  
Leopard**

**The Ultimate Guide  
to Resolving Pain,  
Preventing Injury,  
and Optimizing  
Athletic Performance**

**Dr. Kelly Starrett**  
with **Glen Cordoza**

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This book is for educational purposes. The publisher and authors of this instructional book are not responsible in any manner whatsoever for any adverse effects arising directly or indirectly as a result of the information provided in this book. If not practiced safely and with caution, working out can be dangerous to you and to others. It is important to consult with a professional fitness instructor before beginning training. It is also very important to consult with a physician prior to training due to the intense and strenuous nature of the techniques in this book.

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# TABLE OF CONTENTS

## ACKNOWLEDGMENTS

## INTRODUCTION

A New Human-Performance Epoch  
How to Use This Book

## CHAPTER 1 THE MOVEMENT AND MOBILITY SYSTEM

It's About Performance  
The Gym Is Your Lab  
You Are an Amazing, Adaptable, Healing Machine  
You Cannot Make Basic Adaptation Errors

## CHAPTER 2 MIDLINE STABILIZATION AND ORGANIZATION

Three Reasons for Bracing Your Spine  
The Bracing Sequence  
The Two-Hand Rule  
Braced-Neutral Standing Position  
Braced-Neutral Sitting Position  
Abdominal Tension  
Breathing Mechanics

## CHAPTER 3 ONE-JOINT RULE

Braced Spinal Extension and Flexion  
Global Spinal Extension and Flexion

## CHAPTER 4 LAWS OF TORQUE

The Two Laws of Torque  
Torque Tests

Shoulder-Stability Torque Tests

Hip-Stability Torque Tests

## **CHAPTER 5 MOVEMENT HIERARCHY**

Skill Progressions and Movement Complexity

Category 1 Movements

Category 2 Movements

Category 3 Movements

Upright-Torso Demands

### **CATEGORY 1 MOVEMENTS**

Air Squat

Box Squat

Back Squat

Front Squat

Overhead Squat

Deadlift

Pushup

Ring-Pushup

Bench Press

Floor Press

Dip

Ring Dip

Strict-Press

Handstand Pushup

Pull-Up

Chin-Up

### **CATEGORY 2 MOVEMENTS**

Wall Ball

Push-Press

Jumping and Landing

Kettlebell Swing

One-Arm Swing  
Rowing  
Kipping Pull-Up  
Snatch Balance Progression

## CATEGORY 3 MOVEMENTS

Burpee  
Turkish Getup  
Clean  
Power Clean  
Hang Clean  
Push-Jerk  
Snatch  
Muscle-Up

## CHAPTER 6 THE TUNNEL

Identifying the Problem

## CHAPTER 7 THE SYSTEMS

A Movement-Based Approach

The Mobility Systems

*Joint Mechanics*

*Sliding Surface*

*Muscle Dynamics*

Mobilization Methods

*Pressure Wave*

*Contract and Relax*

*Banded Flossing*

*Smash and Floss*

*Paper-clipping (Oscillation)*

*Voodoo Flossing (Compression)*

*Flexion Gapping*

Upstream and Downstream Approach

**AREA 1: THORACIC SPINE (UPPER BACK, NECK, SCAPULA)**

**AREA 2: POSTERIOR SHOULDER (LAT, POSTERIOR DELTOID)**

**AREA 3: ANTERIOR SHOULDER (PEC, ANTERIOR DELTOID)**

**AREA 4: DOWNSTREAM ARM (TRICEPS, ELBOWS, FOREARM, WRIST)**

**AREA 5: TRUNK (PSOAS, LOW BACK, OBLIQUE)**

**AREA 6: POSTERIOR HIGH CHAIN (GLUTES, HIP CAPSULE)**

**AREA 7: ANTERIOR HIGH CHAIN (HIP FLEXOR, QUADRICEPS)**

**AREA 8: MEDIAL CHAIN (ADDUCTOR)**

**AREA 9: POSTERIOR CHAIN (HAMSTRING)**

**AREA 10: KNEE**

**AREA 11: MEDIAL AND ANTERIOR SHIN**

**AREA 12: CALF**

**AREA 13: ANKLE AND PLANTAR SURFACE**

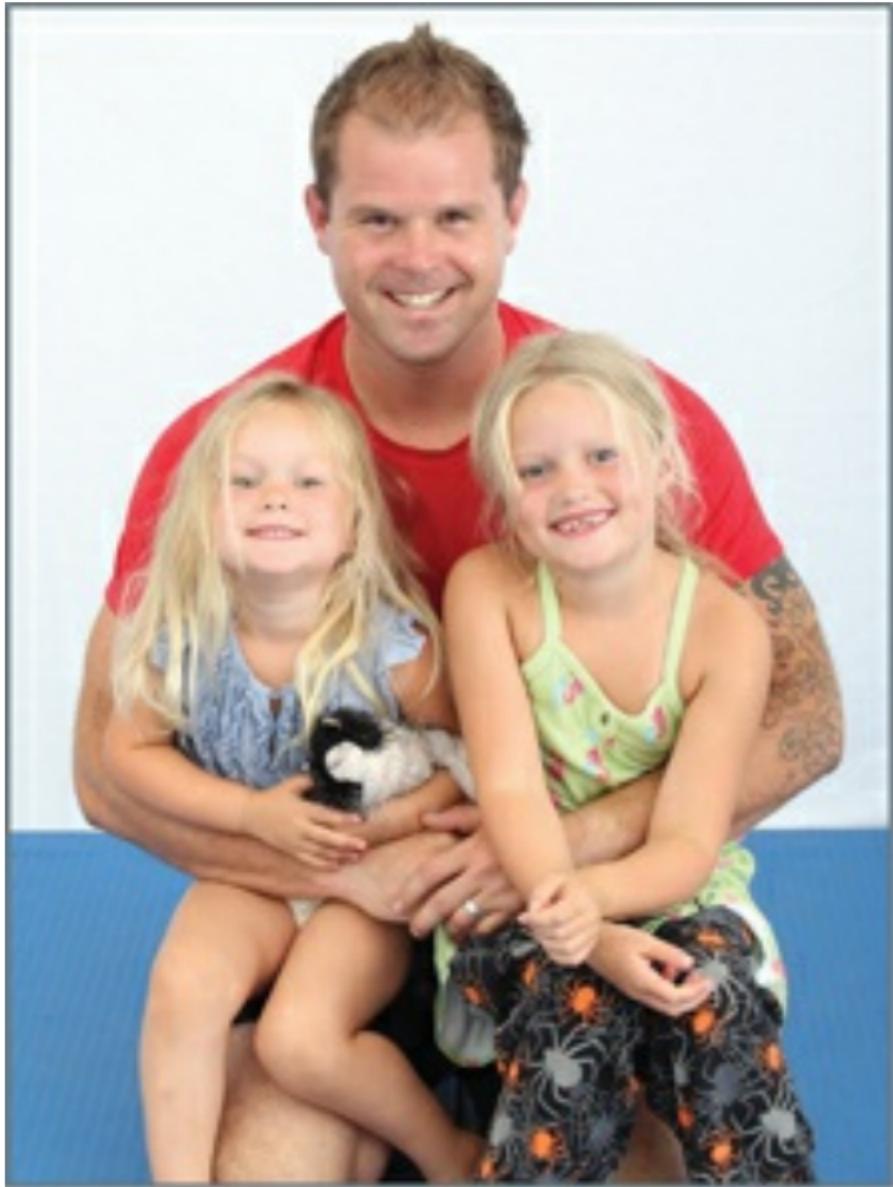
**GLOSSARY**

**ABOUT THE AUTHORS**

***This book is ultimately dedicated to my daughters, Georgia and Caroline.***

***This book is your primer. Go burn the world to the ground and build a better one. Your secret mermaid names will always be safe with me.***

# ACKNOWLEDGMENTS



A little over two years ago, I sent back my signed copy of the publishing contract for this book and realized it was time to wrestle what I had in my head onto the printed page. I knew that wouldn't be a walk in the park, but what I really dreaded, even then, was the day I'd have to sit down and begin the impossible task of trying to thank all of the people to whom I owe a debt of gratitude. That day has come.

One thing that many people don't know about me is that I have a strangely accurate memory for interpersonal interaction and events. This means that I can recall most of the feelings, lessons, and experiences that have come to shape the thinking behind *Becoming a Supple Leopard: The Ultimate Guide to Resolving Pain, Preventing Injury, and Optimizing Athletic Performance*. Apparently, I'm not alone. I remember reading a story about what the great American discus thrower Al Oerter said in his acceptance speech as he was being inducted into the Track and Field Hall of Fame. If memory serves me right, Mr. Oerter said, essentially, that every coach and training partner he'd ever had should have been on the stage accepting the award with him. He made it clear that he could never have achieved his extraordinary career without the tens of thousands of mostly pedestrian hours he and his coaches and training partners had spent together, pushing and refining their training. I feel the same way about this book. Certainly it draws on my personal experience, including my own athletic success and failure. But it's also the synthesis of thousands of conversations and as many, if not more, hours spent learning with and from others in training, competition, coaching, and graduate school. Trying to whittle down all that experience and give proper and adequate thanks is a little overwhelming.

I often say that we are not the first people to have taken a real and thoughtful crack at solving the problems that attend human movement and performance. The difference is, I have had the benefit of living in this age. Technology, in combination with a modern, classical, doctoral level education in physiotherapy, has equipped me to create what I believe is

a fresh, new, and integrated model for understanding and interpreting the work of the thousands of brilliant physios and coaches who came before me and who work around me. I had the foresight and good luck to open one of the first fifty CrossFit gyms with my wife, Juliet. It has since provided me with tens of thousands of practical hours in human movement pattern recognition—something I could never have achieved even a decade ago. (*Ursul, we have worm-sign the likes of which even god has never seen...*)<sup>1</sup> I remember reading the seminal textbook *Maitland's Peripheral Manipulation* when I was in the second year of my doctoral program and having my mind blown: Someone had conceived of an idea based on his study and clinical practice and integrated that idea into a cohesive and cogent model. Now, nearly two years into the process of writing this book, I can see the moment I felt like I had something to say, a sort of “concept” inflection point. I hope this book makes a significant contribution to the incredible bodies of work already out there—and those to come.

I should be frank. While it's easy to say with certainty that I can recall thinking I should write this book, it would never—and I mean *never*—have happened without the confluence of two specific events and two very special people. The first of these events is the regular trainer course that I teach for CrossFit. Several times a month, I get to stand in front of fifty or so extraordinary coaches and athletes from around the world, each with a different background and story. These coaches and athletes are fierce in their passions and brilliant in their capacity to seek out and integrate better movement practices into their own training. They are a ruthlessly experienced and inquisitive mob and every day that I have the pleasure of teaching them is a bit of a trial by fire. There is no place to hide. Every idea I teach must withstand clinical validation and must be built on observable, measurable, and repeatable experience. If not, I will be torn to pieces by wild dogs. What the thousands of attendees don't realize, of course, is that they are part of my own, large-scale experiment. I never would have been ready to open my thinking to

the larger world without their tacit support over this last half decade.

Event two is the Mobility Project. In the fall of 2010, I made a foolhardy commitment to film a video about position, mobility, and human mechanics every day for a year. I don't know the last time you tried to perform a public creative act for 365 days in a row, but you have to get really competent, quickly. With nearly 1.5 million unique users on the site, the real time feedback is unmatched. There is no place to hide on camera so you'd better be sure in your thinking lest the Internet destroy you and expose you for a fraud.

That said, this book would never have happened without the patience and friendship of Glen Cordoza. For the last eighteen months, Glen forced me to organize and clarify my thinking. He pressed me ruthlessly to explain and simplify the complex processes of my practice and coaching. It would have taken me another, oh, ten years to solidify my thoughts without his constant questioning and unshakeable faith in me. I actually believed that I could pull this book off by myself at one point. Then I realized I didn't even own a camera that wasn't attached to my phone. Sure I had some ideas about human movement and performance, but I sure as hell didn't know how to write a book about it. Where some people have a weekend or go on vacation, I worked on the book with Glen. He has become a confidant, brother, fellow revolutionary, brother to my wife, and uncle to my children. I shudder to think how much Glen has been exposed to my brain. I'm not sure he will ever recover and I know I'll never be able to repay him his effort or friendship.

And then there's Jstar. As I've come to find out, writing any book is an act of will and of hope. It's like planting bulbs in the fall, hoping that you'll be around in the spring to see them bloom. During the long, dark, wet winter, it's really, really difficult to remember that you actually planted the bulbs *and* that they actually might bloom into something beautiful. From the first time I turned our home's back office into a scene from the movie *A Beautiful Mind*, my wife Juliet didn't flinch. After a

week balancing a life, the gym, my work travel, and our children, Juliet would stoically pick up the additional slack that fell to her when I was “working on the book.” The spine of this book should really just read “Starretts.” If you are reading this, be sure to remember to email my wife your thanks. Trust me, in a million ways, I could not have written a single word without her steadfast stewardship, cheerleading, counsel, keen eye, and hard work. I’d still be sleeping in a truck and selling Kayaks somewhere in Colorado if Juliet hadn’t had the faith to plant a few bulbs for the spring. The first flowers of this book are for her.

There are a few really important coaches who influenced me. I would be remiss if I did not mention Mike Burgener and Mark Rippetoe. They spent a great deal of time with a hungry young kid seeking to understand what they already knew. Coach Rip once answered the phone when I called his gym and talked to me for thirty minutes about how he thought the adductors worked in squatting. To this day, this blows my mind and I always think of his kindness toward me when a young coach comes to me wanting advice or guidance. Coach B is my sensei. He has shown me that I need to be able to coach everyone, and that my thinking has to work for everyone, from children to Olympians. Thank you both.

Greg Glassman and the incredible people behind the scenes at CrossFit have created, supported, and nurtured literally thousands of coaches. I am proud to call myself one of these. Greg created a template that was broad and complete enough to leave room for my own thinking and discovery. I will never be able to repay him, his faith in me, or his incredible generosity. He challenged me to validate what I thought to be true in the hard, cold light of observable, measurable, and repeatable human function. I have often said it, but finding CrossFit and Greg’s early writing was like discovering the unified field theory of human performance. I had the good fortune to train at the original CrossFit Santa Cruz when Greg was still coaching every day. His counsel—that the most important research I could do was right there in front of me, in

the athletes and coaches I was working with—continues to serve me well. Greg's work has forever changed my life and the lives of my family. His thinking is at the core of this book.

Thanks also go to:

The coaches of SFCF: Tonya, Ty, Roop, Connie, Maggie, Kelsi, Diane, Sean, John, Tuller, Bmack, Erin, Kristin, Courtney, Nate, Boz, Kimmie, Patrick, Debbie, and Carl. I would be nothing without you guys. POD.

Tom and Lisa Wiscombe. They were vital in the production and overall coolness of this work. I'm pretty sure they invented the computational leopard. Their brilliance inspires me.

Janet and Ed. From making the invisible visible, to lagging indicators, your love and support make it possible for this family to work. Thank you.

TJ Murphy: Any creative project of this scale is like a miracle of emergence, serendipity, and machine-like precision. Frankly, I can't imagine pulling this off without your humor, advocacy, and keen brain. It's like a butterfly flapped its wings somewhere and I ended up with you on my team.

Carl Paoli, Brian MacKenzie, John Welbourn, Jill Miller, Mark Bell and Jesse Burdick. Every good coach I know has a few close friends who can call bullshit, open doors, and make the journey worth it for each other. The archetype of the monk-coach—someone working things out by themselves in isolation—is total crap. I am surrounded by some of the best thinkers and coaches on the planet. Don't worry, guys: I'll happily smash your quads for life. Thanks for having my back.

Mom and Don. I knew that I didn't want to kayak forever. Sorry I didn't share that part of the plan with you right away. You were right; grad school was a good choice. Knowing you guys are in my corner is like having a formidable secret weapon.

***Kelly Starrett***

# INTRODUCTION

Often these days, I find myself crammed into an airplane seat on my way across the country to work with athletes, coaches, professional sports teams, CrossFit gyms, corporations, and elite military forces. Inevitably I end up making small talk with the poor soul imprisoned next to me. Soon enough I get the question: “What do you do for work?”

Dozens of answers run through my head.

“I make the best athletes in the world better.”

“I work with the government to improve our military’s force protection and force resiliency.”

“I work with athletes and coaches to help them understand and resolve common and preventable losses of torque, force, wattage, and output.”

“I’m trying to change the world’s movement-based economy from subsistence tension-hunting to sustainable, high-yield torque farming.”

“I’m fomenting revolution. I’m trying to empower people to live more integrated, pain-free, self-actualized lives.”

No, I don’t mention anything about farming torque or self-actualization, which I’ll spend plenty of time on in the pages to come. I keep it simple. “I’m a teacher,” I say.

Typically eyes glaze over, and the conversation sputters to a halt. But once in a while, my seatmate is curious enough to ask the obvious follow-up—“What do you teach?”—unaware of the depths of my obsession with human movement and performance, but he soon finds out.

What I teach—and what you will learn in this book—is a multi-function, extraordinarily effective movement and mobility system. Learn, practice, and apply it and you will understand how to move correctly in

all situations. And I mean *all*. It will serve you at rest *and* when you are executing a demanding physical feat—say, in the midst of an Olympic competition, or in a strenuous combat or rescue operation.

This is a strength-and-conditioning system that is also diagnostic in nature: It can help you—or your coach—detect movement and positioning errors even as it improves your performance and brings you to the top of your game. My system gives you the tools to dissolve the physical restrictions that prevent you from fully actualizing your potential. With enough practice, you can develop yourself to the point at which your full physical capabilities will be available to you *instantaneously*. You will develop the motor-control and range-of-motion to do *anything* at any time.

You could ultimately become the human equivalent of a *supple leopard*, always poised and ready for action.

You might ask, “What does it mean to become a *supple leopard*?” It’s a good question, one that warrants an explanation.

I’ve long been fascinated with the idea of a leopard: powerful, fast, adaptable, stealthy... badass.

When I was fourteen I watched the movie *Gallipoli* with my dad. It’s about two Australian sprinters who go off to fight in Turkey during World War I. There’s a memorable scene at the beginning where Archy, a rising track star, is being trained by his uncle Jack. The pep talk goes like this:

**Jack:** What are your legs?

**Archy:** Springs. Steel Springs.

**Jack:** What are they going to do?

**Archy:** Hurl me down the track.

**Jack:** How fast can you run?

**Archy:** As fast as a leopard.

**Jack:** How fast are you going to run?

**Archy:** As fast as a leopard!

**Jack:** Then let's see you do it!

For whatever reason, the “fast as a leopard” mantra stuck with me. But it wasn't until a Navy SEAL buddy of mine said, “You know, Kelly, a leopard never stretches,” that this notion of becoming a supple leopard drifted into my consciousness.

Of course a leopard doesn't stretch! A leopard has full physical capacity available at all times. It can attack and defend with full power at any moment. Unlike humans, it doesn't need to prep for movement. It doesn't need to activate its glutes; it doesn't have to foam-roll; it doesn't have to raise its core temperature—it's just ready.

Obviously, we do not share the same physical playing field with leopards. We have to warm-up for strenuous activities and practice and ingrain good movement patterning. But that doesn't mean we can't be working toward the goal of having full physical capabilities available to us instantaneously, or having the motor-control and the range-of-motion to perform any physical feat at any time. Leopards don't have to work at being supple; they naturally are. But people are brutally tight and missing key ranges of motion that prevent them from moving as pliantly and powerfully as a leopard.

Metaphorically speaking, if you want to become a supple leopard, you need to understand how to move correctly in every situation. You also need the tools to deal with stiff and adaptively short tissues that restrict range-of-motion. This is the basis of my Movement and Mobility System.

## A New Human-Performance Epoch

Is what I teach radically new? Yes, and then again, no.

I see myself as one of the latest in a long line of teachers concerned with organizing and optimizing movement to maximize physical performance—consistently and without injury.

Certainly, human beings have explored this for eons. In fact, I've seen a thousand-year-old image on a coin that shows a man sitting in full lotus—a posture that creates more stability for the spinal system. More recently, some three hundred and fifty years ago, a famous Japanese swordsman, Miyamoto Musashi, wrote about the importance of keeping your belly firm and your knees and feet in a good position: “Make your combat stance your everyday stance.” It is strange yet perfect advice from Musashi's famous text, *The Book of Five Rings*.

What's exciting about being alive today is that we're in the midst of a human-performance epoch. Physical mastery is not limited to the few. As I see it, we are experiencing a quantum leap in the quality, reproducibility, and ubiquity of absolute human physical potential. In fact, if we imagine the peak expression of human potential to be some kind of golden ratio, then the current generation of coaches, athletes, and thinkers have achieved the equivalent of a Fibonacci jump at light speed.

It's crazy. I mean, even my mother is gluten-free and casually brags about her latest deadlift personal record.

What's going on? What's so different about the time in which we live?

What's different is that we've seen a convergence of factors create a new golden age in human physical performance. Four key factors are responsible.

First, the advent of the Internet and modern media has enabled the sharing of ideas globally. Isolated pockets of embodied knowledge are more easily transferred and shared. Ten years ago, finding an Olympic-lifting coach required bloodhound-like determination or luck. Most likely both. Now the clean and snatch—the two core Olympic-lifting movements—are widespread practices.

Second, for the first time in the modern training era, there is an unparalleled cross-discipline exchange among training practices and theories of human movement. For example, our gym, San Francisco CrossFit, is an interdisciplinary melting pot: physiotherapists hang out

with elite powerlifters, Olympic-lifting medalists talk to champion gymnasts, and ballet dancers train with elite endurance coaches. This phenomenon is the strength-and-conditioning equivalent of the great systems theorist Buckminster Fuller's concept of mutual accommodation: that correctly organized, functionally sound systems are never in opposition. They mutually support one another.



Everyone shares the same basic design and body structure. People's shoulders all work the same way: the principles that govern a stable shoulder position while vaulting in gymnastics are the same in the bench press; how you organize your shoulders to sit in lotus posture while meditating is the same way you organize them when working at your computer. It's just that the same set of problems have been solved from radically different angles and approaches. Until now.

Third, we appear to be living at a time when there is growing interest in the body. While this topic probably merits its own book, there can be no doubt that the accessibility of online and mobile tools that make it possible to measure our behavior—as well as our lifestyle, nutrition, and exercise habits—has shifted the responsibility for keeping our bodies in the best shape possible back where it belongs: on the individual.

Elite and recreational athletes alike can track and measure nearly any aspect of their performance and biology with little effort and cost.

Want to know how that afternoon coffee affects your sleep quality? No problem. Want to fractionate your cholesterol and find out if you are eating too much bacon? No problem (although I'm pretty sure that it's impossible to eat too much bacon). Whether people are tracking their own blood chemistry or daily step totals, or trying to get to the root of their own knee pain, there has been an enormous shift in consciousness, leading to a greater sense of self-control. Eating, sleeping, and moving correctly are not gimmicks or fads. The dam has burst and the personal biological revolution is here.

It's a brave new world. We don't have to wait decades or endure multiple knee surgeries and heart attacks to find out that we're running poorly, eating poorly, sleeping poorly, and training poorly. Peter Drucker—world-renowned management consultant, educator, and author—was right, “What gets measured, gets managed.”

The fourth factor contributing to this golden age is the evolution of strength-and-conditioning. People have been lifting heavy weights, moving quickly, and working very hard to real effect for some time. The difference now is that a good strength-and-conditioning program *has all of the elements of human movement covered*. That is, an intelligently structured strength-and-conditioning program gives the athlete full range-of-motion in his joints, limbs, and tissues; the motor-control to express those ranges; and the ability to do so under actual physical load, metabolic demand, cardio-respiratory demand, speed, and stress. Couple this complete physical paradigm (the CrossFit model holds that people should look and train like Olympic-lifting-sprinter-gymnasts, for example) with the number of people now using a common language of movements and movement paradigms, and you have the largest-scale model experiment in human movement in the history of the world.

Let's put this in perspective. In the seven years our gym, San Francisco CrossFit, has been open, we estimate that we've facilitated nearly seventy thousand athlete training sessions. The sheer volume of pattern recognition this is capable of generating is staggering and could

take a clinician or a coach a lifetime to accumulate. Now multiply this by thousands of locations, across hundreds of sports platforms, and suddenly a simple strength-and-conditioning system also becomes the world's most potent diagnostic tool with unmatched test and retest capabilities. This accumulated wisdom is what has given rise to my system. The gym is suddenly the laboratory.

We are able to eliminate correlates for human movement and performance and replace them with actual human movement. You don't have to demonstrate an active straight-leg raise (a common physical-therapist tool for assessing hamstring range-of-motion); you just need to demonstrate that you can pick something up off the ground while keeping your spine organized and flat (in other words, a deadlift). This is how you bring it down to the bare essentials.

Realize what a huge shift in thinking this is.

Our previous model of strength-and-conditioning was predicated on the fact that if you were just stronger and fitter, you'd be a better athlete and better at your chosen sport. Clearly, that's not true. In fact, anterior cruciate ligament (ACL) injury rates in children continue to increase. Running injury rates are estimated to be as high as 70 percent in some studies. And therein lies the problem.

In the past, it has been difficult to understand the nuances of poor technique and biomechanics as expressed by athletes. Anecdotally, basketball is the most dangerous sport a middle-aged man can play. Why do middle-aged guys so readily tear their Achilles playing pickup B-ball? Because it's hard to see the underlying poor movement patterns while they're playing. They're changing shapes, transitioning from one position to another at high speeds.

To prevent these injuries, we need a tool to make the invisible visible. We need to bring athletes into the lab (i.e., the gym) to assess their movement patterns before the catastrophe occurs—an ACL tear, herniated disk, or torn rotator cuff. In addition, we need a model that allows us to identify the problem, be it motor-control or biomechanical in

origin.

By consistently and systematically exposing athletes to the rigors of full-range movements and optimal human motor-control, we're able to quickly identify force leaks, torque dumps, bad technique, motor inefficiency, poorly integrated movement patterns; holes in strength, speed, and metabolic conditioning; and restrictions in mobility. Best of all, the tool we use to detect and prevent injury is the same tool needed to improve an athlete's performance. The middle-aged "tore my heel cord" syndrome is a lot less likely to happen if an athlete's ankle is regularly exposed to full ranges of motion in movements like pistols or overhead squats ([see here](#)).

But there's even more to it than that. This complete and modern strength-and-conditioning system has not only become the most complete way to systematically test and retest athletic performance, and to diagnose movement inefficiencies and dysfunction; it has also created a formal, universal language of human movement. In short, if you understand the principles that govern full-range strength-and-conditioning exercises and can apply them in this low-risk environment (like a gym), you understand and can apply them to the activities and positions of life, sports, dance, combat, and play.

Take the squat for example. Squatting isn't just a movement performed in the gym; it's how human beings lower their center of gravity. A full-range squat (with hips below the knee crease) with loads overhead, in the front of the torso, on the back, or on one leg pretty much covers the human range of squatting activities. If you understand the principles of this formal movement training language, then you are better prepared to express a more informal or applicable form of human movement everywhere else. You can start to connect the dots between the safe, stable positions practiced in the gym to the movements you perform outside the gym. For example, if you understand how to organize your spine and stabilize your hips and shoulders correctly while performing a deadlift or clean, you have a ubiquitous model for

picking something off the ground. If you understand how to create a braced-neutral trunk and generate torque off of a bar when performing a pull-up, you will have no problem applying the same principles when climbing a tree.

This is the rub: If you only ever climb trees, it may be impossible to know if you are working in the safest and most efficient positions—with a stable shoulder and stable trunk—unless you also do formal pull-ups. In other words, it's a lot harder to identify whether someone is moving in a safe, stable position when climbing a tree than when performing a pull-up in the gym, even though both activities abide by the same fundamental movement principles. So in addition to being a lab in which to identify, diagnose, and treat poor movement practices, the gym is a safe and controlled environment in which we can teach and layer these ubiquitous concepts with accelerated learning capabilities and reduced potential for injury.

Moreover, the idea of creating a common movement language based on formal strength-and-conditioning principles is why there can suddenly be so much interdisciplinary, movement-based discussion and collaboration. We are able to move beyond “people should train in gymnastics,” to “people should train in gymnastics because the handstand position easily teaches and exposes shoulder stability and organization and has the same finish position and shoulder demands as the jerk.” The commonality and universality of “formal” human movement is easily understood by coach and athlete alike, and it is easy to track and test changes in positional quality by measuring the very thing we are chasing in the gym anyway—performance. This is precisely why we keep track of work output, wattage, poundage, reps, and time.

Brilliant people have spent their entire lives developing systems that help us understand how and why humans move the way they move and have the ailments they do. Do these systems work? Of course they do. They work to varying degrees and with varying application. Should we

discard them? No, of course not. But there is a significant disconnect between our older models of human movement and our current understanding about how to best maximize human physical potential.

Here's a real-life example. Recently I was on a working vacation to Australia with my wife and two daughters. We booked a few days at a beautiful spa along Australia's west coast. My wife, Juliet, noticed that there was a free yoga class the following morning at 8 a.m. and thought it would be amusing for me to attend. I showed up ten minutes before the hour as I was instructed but found that I was the last person to arrive. The instructor sighed in resignation when she saw 225-pound me walk into her yoga class "late." (There were already fifteen or so intense I-do-yoga-looking women there; I was the only man.)

In a fake-pleasant voice, she asked me if I'd ever done yoga. I said I had, which was true: I'd done a lot of yoga when I was much younger. Not five minutes into the session she started making very complimentary comments about the abilities of the "bloke" in the back row. "Great job back there!" "Wow!" And the more effusive and surprised the instructor became, the more I became the hated target of all the skinny women struggling with the postures.

At the end of class, the instructor rushed right up and apologized for not recognizing that I was obviously an advanced practitioner. (I mean clearly I'm a beginner, but I was loads better than everyone else, and I do lift weights and perform gymnastics.) When she asked me where I practiced, I laughed a little and said that I didn't. In my nicest voice I said that I actually hadn't done yoga in over ten years. She was a little taken aback: I could clearly perform the movements in her class, but didn't actually practice. So she had to ask, "What do you do?"

**I said I was a teacher.**

## HOW TO USE THIS BOOK

To help you navigate this book, it's important that you understand the basic construct and function of my Movement and Mobility System.

There are three movement principles: midline stabilization and organization (spinal mechanics), one-joint rule, and laws of torque. Think of the movement principles as the master blueprint for creating safe and stable positions for all human movements. You will learn about these in chapters 2, 3, and 4. If you practice them in the order presented, you will know how to stabilize your spine in a braced, well-organized position; how to maintain good posture during loaded, dynamic movements; and how to create stability in your joints to generate maximum force, power, and speed. Then you will have the necessary foundation to properly execute the strength-and-conditioning exercises in chapter 5.

Realize that you can immediately apply the movement principles to the actions of sports and life. Once you understand position as a skill and the underpinnings of stability, you can start to bring consciousness to your position in all situations, whether you're trapped behind a desk at work, picking up your child, carrying groceries, or playing volleyball. But mastering the movement principles takes practice. And you need to be able to identify restrictions in range-of-motion and motor-control dysfunction so that you can isolate and solve your unique problems. That's why the movement principles are practiced in a safe, controlled environment (the gym) using fundamental (transferable) strength-and-conditioning movements.

In chapter 5, "Movement Hierarchy," you will learn how to properly execute functional full-range strength-and-conditioning movements—squatting, pulling, and pressing iterations—as well as how to identify and correct common movement errors. Once you understand and can apply the movement principles to functional movements, you will have no problem using those skills to correct

errors and optimize movement efficiency for all of your movements.

The key is to prioritize position and movement first. Most of you will probably want to skip right to the mobilization techniques later in the book. And if you have a tight muscle or a painful joint that needs to be dealt with, by all means go there. (See chapter 7, “The Systems.”) But know that you will never get to the bottom of your pain and dysfunction if you don’t correct the movement or position that is causing the problem. It’s like treating a symptom without addressing the disease. The problem will still be there.

**Note:** The evolution of the Movement and Mobility System continues to progress at an exponential rate. New ways of improving performance and torturing athletes are being developed every day in the San Francisco CrossFit laboratory. For the latest and most up-to-date mobilizations, go to [MobilityWOD.com](http://MobilityWOD.com).

# CHAPTER 1

## THE MOVEMENT AND MOBILITY SYSTEM

How do you know you have some sort of musculoskeletal problem? More specifically, how do you know when what you are doing or how you are doing it is wrong? Typically, the average athlete uses a set of cues like pain, swelling, loss of range-of-motion, decreased force, or numbness and tingling. The medical community calls these “pathognomonic” signs or cues. The conversation with yourself begins something like this: “When I run lately, my knee hurts. I wonder what’s wrong with my knee?” While typical, there are many errors in this line of thought.

The first problem is that pain and the other symptoms of injury are all lagging indicators. For example, swelling might indicate tissue overuse or strain from poor mechanics. But swelling is an after-the-fact sign. The tissue damage has already occurred. It’s too late to go back. It’s helpful to have a diagnostic tool, something that will highlight your dysfunction and let you know something is wrong, but only if it is applicable before the fact.

Imagine having to blow up your car engine to know if you should add oil. Or a soldier having to wait for his weapon to jam in the middle of a firefight before he knows if he should perform some preventative maintenance. That would be ridiculous, right? Of course. But in general terms, this is how modern sports medicine operates. We wait until

something is broken, sometimes horribly so, before we expect our physician or physiotherapist to fix it. This paradigm keeps orthopedic surgeons very busy.

You can imagine what the doctor thinks when you come into his office with a hole in your kneecap from years of poor movement practices and overly tight tissues. Seriously? That bone in your knee was designed to last 110 years. You managed to wear a hole in it in twenty (true story). Imagine waiting until you are suffering from unrelenting back pain and having your leg go numb to find out that you used poor spinal mechanics carrying that 100-pound pack as a young marine (true story).

It's like this: Our bodies are set up to go through millions of movement cycles. Every time you squat, bend over, or walk in a compromised position, you're burning through those cycles at an accelerated rate. Think of turning on and off the lights in your house. That light switch is set up for tens of thousands of cycles. Well, your body is set up for millions of cycles. Seriously, millions! So by the time you've worn a hole in your kneecap, herniated your disk, or torn your labrum, chances are good that you've expended millions of cycles. In other words, your tissues and joints didn't just wear out; your body put up with your crappy positions and movements for the equivalent of millions of cycles. Everyone is different—genetics, training volume, and other lifestyle factors have a profound impact—but if you learn to move the way the body is designed to move, there's less stress on the system, reducing the number of cycles you burn through.

The second issue is that the human animal is set up for survival. Your central nervous system (CNS) controls the sensory and mechanical information for the entire body. It's not an accident that the pain and movement pathways in the brainstem are one and the same. If a child bangs her finger, the first thing she does is to start moving it around. Why? She can no longer hear the pain signal along with the movement signal. This is a very elegant system to keep people moving

and surviving because it literally relegates those pesky pain signals to background noise, which you can't hear until you stop moving. Put another way, movement (sensory input) overrides the pain signal so that you can continue moving, exercising, and training. No wonder your shoulder starts to throb when you lie down and go to sleep. Your brain is no longer receiving any movement signal input. All your brain gets now is full-blown pain.

Now imagine training like an athlete your whole life. You've spent countless hours ignoring the horrible pain signals your body is sending while you train and compete. There is little chance that you can actually hear the pain of tissue injury failure amid all that movement and other pain noise. Pain doesn't actually work during periods of high movement load and peak output demand. Add stress into the equation, and it's a recipe for disaster. If you've ever been in a fight, you know that one of the great secrets of fighting is that you probably won't feel any immediate pain. If you talk to professional fighters, they'll tell you that they feel violent impacts and concussion but don't immediately feel pain. Humans are designed to be able to take the hit, keep fighting, and deal with the consequences later. And there are certainly consequences to getting haymaked in the face.



In actuality, exercise presents a similar scenario. What you can count on is an absolute assuredness that when you start to lose position and compromise your tissues—like rounding your back during a deadlift—you may not feel it at the time, especially if you're under competition stress. However, just as a fighter feels the abuse from combat after his adrenaline has worn off, an athlete's back will scream in pain when he cools down from a workout where he did twenty improperly executed deadlifts. Just as you could say that the more skilled fighter usually suffers the least amount of damage and as a result doesn't feel as much—if any—pain after battle, the better you are at deadlifting, the less likely you are to tweak your back.