SWIM

Ultra-Efficient Freestyle!

The '*fishlike*' technique from Total Immersion

Terry Laughlin

Founder, Total Immersion Swimming

Table of Contents

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Swim Ultra-Efficient Freestyle

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About the Author

Terry Laughlin, the founder and Head Coach of Total Immersion Swimming, is considered by many to be the world's leading authority on how to swim efficiently. He was credited with "revolutionizing how the Navy Seals teach swimming." The Army Rangers, Air Force Pararescue team, Coast Guard Rescue Swimmers, and U.S. Border Patrol have also sent instructors to Terry for Total Immersion training.

Terry showed little promise as a swimmer from age 12 to 20. In the fall of 1963, he was the only swimmer cut during tryouts for his grammar school team at St. Aidan's in Williston Park NY. After completing the Red Cross 50-Mile Swim Challenge the next two summers at his village pool, he was better prepared when his high school, St. Mary's in Manhasset NY, started a team two years later.

Terry Laughlin being congratulated by St. John's coach, Dick Krempecki. (1971)

Terry could never 'escape the slow lane;" his times were never good enough to qualify for the Catholic league championships. As a senior, he swam in the Novice championships, and earned his first medal, which remains a valued memento 45 years later. From 1968 to 1972, Terry swam for St. John's University, enjoying modest success in distance events, but his final season was disappointing, and he felt almost relieved to 'retire' as graduation approached.

Several months later—though lacking in any obvious qualifications—Terry was offered the position of head coach at the U.S. Merchant Marine Academy in Kings Point NY. He became the youngest head coach in the NCAA at age 21.

From Day One, Terry displayed an instinct for helping others succeed where he had failed—primarily by emphasizing technique to a degree rare among swim coaches. (Click here to read about a critical decision Terry made on his first day as a coach.)

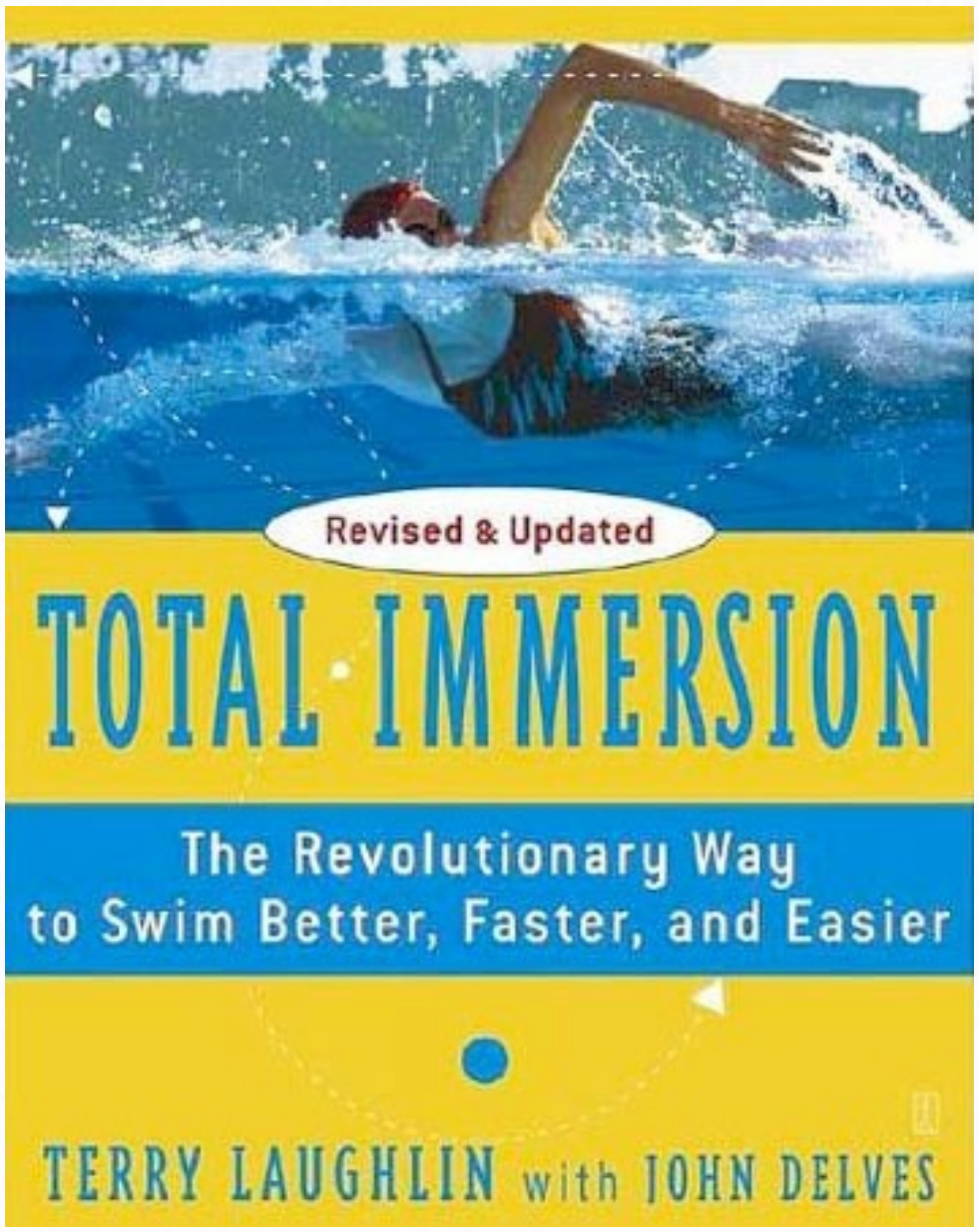
At the 1973 Metropolitan Collegiate Championships. Kings Point swimmers swept all freestyle events—five individual and two relay—shattering league records in each, won nine of 18 events overall—more than any other school—and placed 2nd among 15 teams, despite having fewer swimmers than other schools. This performance earned Terry selection as Coach of the Year—at the same meet where he'd finished far back in the pack as a swimmer just one year earlier.

Terry Laughlin was awarded in 1973, Coach of the Year, by his former coach, Dick Krempecki.

In 1975, at age 23, Terry coached his first national champion—and national record-holder—at the NCAA Division III Championships, This was the first national champion in the history of the Merchant Marine Academy, and the first of 24 national champions—in virtually every event and at all distances—Terry would develop during his years of coaching club and college teams. Several of his swimmers also achieved World Top 10 rankings.

Terry left competitive coaching in 1989 to found Total Immersion, and has devoted himself to coaching adults—mostly new to swimming—ever since.

In September 1988, Terry met the innovative coach Bill Boomer, whose unconventional ideas—capsulized in the maxim "the shape of the 'vessel' matters more than the size of the engine in swimming" would become the chief influence on how Terry would swim and coach forever after. Watch for the many references to 'vessel-shaping' in the chapters that follow.



Terry also resumed swimming after a 17-year layoff, to synthesize the many lessons he'd learned as a coach with this intriguing new idea of vessel-shaping. The success of these experiments was reflected in several Top 8 placings in distance events at Masters Nationals from 1989 to 1992—a level of success far beyond what he'd attained 20 years earlier. He also swam faster at age 41 than he had at 18, while training only half as much.

Terry stepped away from competitive swimming in 1992 to focus on developing Total Immersion techniques and managing a growing business. In 1996, he wrote the book *Total Immersion: The Revolutionary Way to Swim Better, Easier, and Faster*, to share the methods employed at TI workshops more widely. It has been the world's top-selling book on swimming ever since.

Terry devoted 10 years to *shaping his own vessel*, acting as the primary 'guinea fish' for refining the techniques taught at TI workshops. During this period he made a distinct shift from 'working out' to *practicing*, and experienced marked gains in efficiency, insight, and self-perception. This led him to embrace the ethos of *kaizen*—a Japanese philosophy that no skill is ever static or fixed, but can be improved continuously—and make it a TI core value.

In 2002, to celebrate having turned 50 a year earlier, Terry swam the 28.5-mile Manhattan Island Marathon. His decade of work on efficiency was reflected in completing a loop of

Manhattan in 26,000 strokes (8 hours and 53 minutes at an average of 49 strokes per minute)—compared to an average of 39.000 strokes for the rest of the field. On the strokes he saved, Terry could have *swum another length of Manhattan*! He completed the swim pain-free and felt fully recovered the next day—despite training about five hours, and 15,000 yards per week—a fraction of the training others had done.

After his Manhattan swim—and a decade of *vessel-shaping* (see Chapters 5, 6, and 8)—Terry began to focus on propulsion skills (see Chapters 7, 9, and 10). Four years later, at age 55, Terry's transformation as a swimmer culminated in a 4-month stretch of accomplishments that would have seemed wildly improbable 35 years earlier.

In May 2006, at U.S. Masters Nationals, he recorded pool times faster than he'd seen in 13 years. During the open water season, between June and August, he completed his second Manhattan Island Marathon, much faster than before (and in 25,000 strokes); won four National Masters Open Water championships, from 1 mile to 10km; broke national records for the 1- and 2-Mile Cable Swims; and placed 8th in the World Masters Open Water Championship.

At 63, Terry is focused more on swimming for health and happiness than competition—though he maintains a full schedule of open water events in the summer, including a swim across Gibraltar Strait—synchronizing TI strokes with two friends—in Oct 2013. One thing is unchanged: Terry still begins every swim (even the Gibraltar Crossing) with an explicit intention to *improve his swimming*—believing fully that he can be a better swimmer at the end of practice than at the beginning.

Introduction

The techniques you will learn in this book represent the most significant forward leap in the history of the stroke commonly known as freestyle or front crawl. On the surface, the Total Immersion version of this popular stroke retains familiar elements—alternating arm and leg actions, and breathing to the side.

But, over the past quarter-century, we've critically examined every facet of the stroke and meticulously 're-engineered' and refined them to a level that is dramatically more efficient than old-school freestyle. We describe this innovative technique as 'Fishlike' because part of our design inspiration came from studying how dolphins move through the water and adapting that to human anatomy.

Freestyle was long past due for an update. After rapid evolution in the 'overarm crawl' between 1870 and 1900, freestyle technique remained essentially static for 90 years. (Read

a brief history of 9,000 years of evolution in ‘overarm’ swimming at the end of this chapter.)

While freestyle was unquestionably faster than other strokes, it was so difficult to learn that fewer than 30 percent of American adults can complete a single length of a 25-yard pool. The vast majority has opted for the simpler, and far less tiring, breaststroke.

Distance freestyle was almost exclusively the province of the young, athletic and fit—mostly competitive swimmers being trained by coaches. Unfortunately, their power-oriented techniques and grinding workouts also led to dismaying rates of burnout and injury. But then a new class of swimmers emerged, for whom this price was neither viable nor acceptable.

The **Total Immersion** method emerged in 1989—coinciding with an unprecedented phenomenon in swimming history. Legions of ‘adult onset’ swimmers—new triathletes, aging baby boomers, and runners with creaky joints—aspired to swim long distances at brisker paces than breaststroke would allow, while remaining free from injury. And most were self-coached, with only a few hours per week to devote to swimming. Thousands turned to Total Immersion for help.

Over the past 25 years, we’ve painstakingly deconstructed freestyle, and rigorously tested every conceivable technique variation to find those that were easiest to learn, and produced the greatest endurance and speed, for the lowest energy cost.

We promise unequivocally and unconditionally, you will not find a better, more satisfying, more efficient way to swim than the techniques described herein.

We also promise you will not find a more comprehensively explained, precisely detailed, and abundantly illustrated description of any swimming technique than in this book.

Total Immersion Freestyle is distinguished by these characteristics:

1. It’s immediately and universally recognizable as a standard ‘form’—like yoga asanas. *Every* ‘signature’ element in Freestyle—from the neutral head position, extended

bodyline, and symmetrical arm recovery to the 2-Beat Kick—is there for a compelling reason, which the chapters that follow will explain.

2. It treats the human body as a system in which all parts are intricately interrelated—and thus the actions of all body parts should be seamlessly synchronized.

3. It's not 'naturally occurring.' Only a tiny number of elites swim this way by innate instinct. For everyone else, TI Freestyle is a *learned* skill and an intentional action.

4. However, the striking similarity in form attained by countless thousands of TI enthusiasts worldwide shows that it's a stroke *anyone* can learn (including Dr. Paul Lurie who took his first lesson at age 94). It doesn't require youth, athleticism, or special gifts.

5. A striking number of those who learn it become *passionately curious* and improvement-oriented (Kaizen) about swimming.

If you've been trying to swim freestyle and have experienced any of the following:

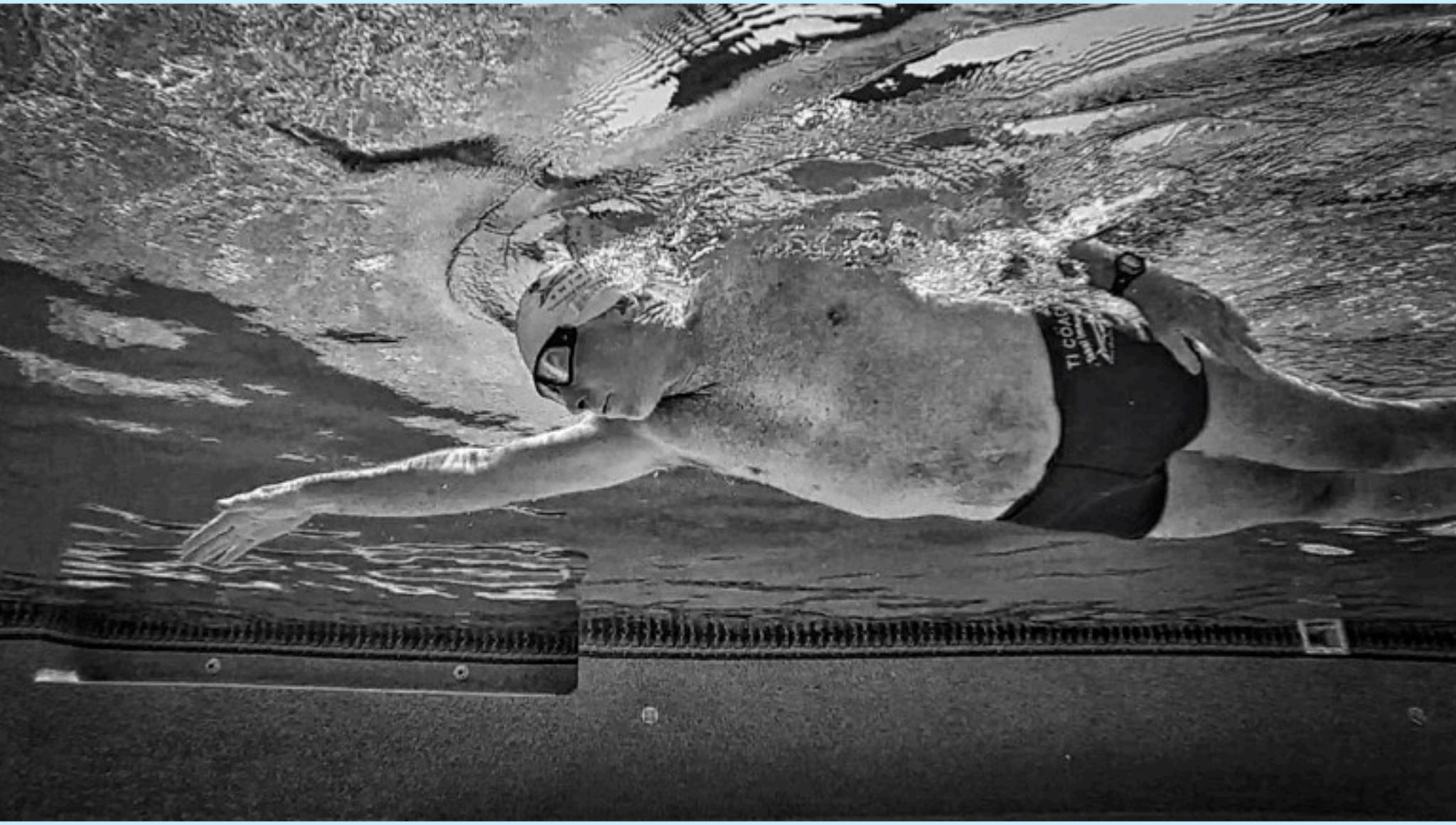
- Difficulty progressing from a few strokes to a full lap—or from first lap to first mile;
- Working hard for little or no improvement;
- So tired after a triathlon swim that it slows your bike and run;
- Swimming increasingly seems a chore;
- Pain (or injury) in neck, back or shoulders;
- You simply feel there must be a better way . . .

. . .you'll find answers and solutions in these pages. Welcome to Freestyle Mastery.

Note Chapters 5 to 11 explain, show, and teach the techniques that make Freestyle the most efficient swimming style ever devised. If you're eager to begin swimming better, by all means dive right into the technique chapters.

But make time as well for the four preceding chapters, as they'll bring you a 'big picture' understanding of swimming and how to be successful at it.

Total Immersion Freestyle:
A Revolutionary Technique



In most popular activities, a truly new idea emerges quite rarely. For example, the stroke known as front crawl or freestyle originated about 150 years ago, experienced rapid evolution between 1870 and 1900, then remained static for nearly 100 years. In the 1990s, another innovation—Total Immersion Freestyle—appeared. This brief survey of swimming history shows how that came about.

Dog Stroke

Wall drawings and clay plates dating between 4000 and 9000 B.C., depict men swimming with ‘dog-like’ form—head high to avoid choking, limbs churning to avoid sinking. This primitive style was even called "dog stroke." The fact that artifacts from many locations, and covering more than 5000 years of history, all show a similar style tell us that primal hu-

man instinct leads us to swim in a way far better suited to survival than locomotion. In fact, from the dawn of history to today, virtually every beginner has taken his or her first strokes this way.

Side and Breaststroke

Dog stroke sufficed for short swims, but was too tiring to allow sustained swimming—or to become a *pastime*. The first attempts to formalize standard techniques, in books published between 1538 and 1794 in England, France, Italy and Germany, showed two styles—sidestroke and breaststroke—both swum with the head above water. Unlike dog stroke, both permitted relatively restful glides. This allowed swimming to become a form of recreation. It also sparked interest in endurance swimming. In 1810, the poet Lord Byron was celebrated for swimming the Hellespont, between Europe and Asia, covering a mile in 1 hour 10 minutes.

Overarm Swimming

While Europeans stayed with breaststroke and sidestroke, natives of the Americas, West Africa, and South Sea islands had developed an overarm stroke with an up-and-down kick.

In 1844, the Royal Swimming Society brought two Native Americans, Flying Gull and Tobacco, to London for an exhibition of this ‘exotic’ technique. Flying Gull outswam Tobacco across a 130-foot pool in an unprecedented 30 seconds, then easily beat the British champion, who used the stately breaststroke. However, British observers dismissed Flying Gull’s overarm stroke as “grotesque antics” and “barbarically un-European."

For another 30 years, breaststroke remained the stroke of choice in the ‘civilized’ world. In 1875, Matthew Webb achieved worldwide celebrity by swimming the English Channel—using breaststroke and sidestroke—in a time of 21 hours 45 minutes, closely matching Lord Byron’s mile-an-hour pace.

The Dawn of a New Era

A few years before Webb's historic swim, the overarm stroke entered a 30-year period of brisk innovation, during which three distinct new styles—each faster than the previous—would succeed each other and establish front crawl as the fastest way to swim.

Trudgen Crawl

In 1870, while visiting Argentina, the British swimming teacher, J. Arthur Trudgen noticed that local swimmers generated much more speed swimming overhand than he could produce with breaststroke. Upon his return to England, Trudgen began teaching this style, while retaining sidestroke's scissor kick. Swimmers using the "Trudgen Crawl" improved the record for 100 yards from 70 to 60 seconds, which increased interest in swimming for speed.

Australian Crawl

In 1878, Frederick Cavill emigrated from England to Australia, where he built pools and taught swimming. Visiting the Solomon Islands, he noticed islanders swimming overhand as they foraged for food along the coral reef. Cavill taught his six sons the new stroke, replacing the scissor kick with an up-and-down kick. They began breaking records and traveling to other countries to teach the new style. In 1902, Dick Cavill brought the "Australian Crawl" to England and improved the 100-yard record to 58.8.

American Crawl

A year later, another son, Sidney Cavill, became coach at the Olympic Club in San Francisco, where he taught the Australian Crawl. Charles Daniels, a swimmer from the New York Athletic Club, learned the technique while visiting the Olympic Club for a competition. Daniels substituted a compact, fast flutter (the 6-Beat Kick described in Chapter 10) for the Australian Crawl's larger kick. Daniels swept the freestyle events at the 1904 Olympics, and improved the 100-yard world record to a stunning 54.8 seconds.

Daniels's "American Crawl" became the new standard in freestyle technique—and has remained so ever since. If you take traditional freestyle lessons today, or learn it by watching others, you swim virtually identically to the way Charles Daniels did over a century ago.

While trained swimmers swim dramatically faster now than in 1904, for the vast majority of swimmers, the American Crawl was too demanding for the *sustainable* pace required for longer swims. At the dawn of the 21st Century, the vast majority of non-competitive swimmers preferred breaststroke for any distance over 200 meters— as had been true for nearly 500 years.

Distance freestyle remained the province mainly of young, well-trained athletes. Freestyle offered no equivalent of the runner's relaxed, conversational pace. But the aging of the Baby Boomer generation and rapid growth in triathlon became the primary stimulus for the first significant innovation in freestyle in 90 years—by emphasizing drag reduction (vessel-shaping), rather than power production.

Swimming for Life

Baby Boomers were the first generation to pursue lifetime fitness in large numbers. As they entered middle age, and began seeking lower-impact fitness options, many took up swimming. While any stroke can improve fitness, they preferred freestyle it allowed them to complete more laps per hour of pool time. And as triathlon skyrocketed in popularity, by 2010, over a million inexperienced swimmers each year were attempting an open-water distance swim—a phenomenon unprecedented in the swimming history.

It became a matter of considerable urgency to be able to swim a mile or more of freestyle—often in open water—in safety, comfort . . . and sufficient ease to cycle and run many miles afterward. Tens of thousands came to Total Immersion for help. Our '*fishlike*' version of front crawl was the result. The *kaizen* evolution in TI Freestyle technique has continued uninterrupted ever since.

1

About Total Immersion

What you will learn about swimming technique in this book will probably differ strikingly from what you've heard elsewhere. This chapter explains why that is and how it came to be.

Total Immersion coaches and swimmers all began like everyone else—swimming the traditional way—and experienced the same limits and frustrations as you probably have. This led us to seek alternatives. Every technique shown here—for instance, striving to feel weightless—resulted from trying to solve a problem that nearly everyone experiences. When we found a workable solution, we asked these questions about it:

- Does this solution work for large numbers of swimmers?

- Is it soundly based in physical laws and principles—physics, fluid dynamics, or human biomechanics?
- Is it accessible to all—i.e. not requiring youth, athleticism, or special gifts?

Perhaps the biggest reason Total Immersion differs from traditional methods, is that we developed these techniques and learning methods in unique circumstances.

Traditional approaches evolved to serve the needs of adolescents, and their short-term goals and priorities—to pass a swimming test, join a team, win a race. Swimming for a lifetime—for fitness, enjoyment, and a means of aging healthfully—was seldom a consideration.

Total Immersion methods evolved primarily in response to the goals and needs of adults. TI is designed not only to allow you to achieve immediate or urgent goals—such as preparing for a triathlon—but also to enhance quality of life. TI technique is designed to suit you as well at age 85, as at 35. And TI teaching methods are designed to complement adult learning styles—learning and practicing mostly on your own, possibly with occasional input from a coach.

These influences resulted in a way of learning and swimming that is revolutionary in how you think, move through the water, and learn.

How to *Think* We believe that how you think about swimming should precede and guide all your physical efforts. ***When you set any swimming goal—for better technique, fitness, or speed—your first step should be to examine your 'mental model' for that aspect of swimming.***

Is your thinking based on sound evidence or reliable sources? Does it make sense? Does it help you make well-reasoned choices or answer questions in a consistent way? Will your mental model provide effective guidance decade after decade, and as your skills and goals evolve?

How to Move The revolutionary aspect of TI technique is that we use fish and aquatic mammals as our models for how to move through water—balanced, sleekly-shaped, and propelling with the whole body. Traditional technique is based on the way *terrestrial* mammals (a category including humans) instinctively behave in water—head up, to avoid choking, and limbs churning—as much to avoid sinking, as to propel.

Traditional teaching methods focus on trying to improve terrestrial technique. But terrestrial swimming is inherently so inefficient (humans waste as much as 97% of energy) that efforts to improve it can only lead to frustration and wasted efforts.

When you use aquatic mammals as your model for how to move through water, you learn much faster and develop form that allows you to swim any distance or speed with far greater ease and comfort.

How to Learn When you learn terrestrial technique, you focus mainly on kicking and pulling. When you learn the TI way, you begin by shaping and positioning your body to move through water with maximum comfort and minimum resistance, then learn to propel with seamlessly-integrated whole-body movements.

Because these techniques are counter-intuitive, we give equal emphasis to developing focus and awareness as to changing movement patterns. Without tireless and laser-sharp focus, it's easy to revert to instinctive terrestrial habits.

Kaizen In the Kaizen ethos, no skill is fixed or static. Rather we work tirelessly to improve it. Because of our terrestrial DNA, this may be more true for swimming skills than those for land-based activities. You should expect to still be gaining new insights or refining subtle skills in your 80s—or even 90s. Dr. Paul Lurie (see sidebar) took his first TI lesson at age 94 and is still improving at age 97!

In Total Immersion, Kaizen can apply to all of the following:

- Stroking and thinking skills.
- Your ability to coach yourself—and help others.

- The depth of satisfaction—and even joy—that swimming brings you.

Why Swim the TI Way?

Unlike all alternatives, TI has demonstrated the capacity to help everyone swim better and enjoy it more! Whatever your goal—to swim your first lap, first mile, a faster mile; to be comfortable in open water; master new strokes; or hone racing strategies and skills—in Total Immersion you can find common-sense principles and processes that will help you make confident and effective choices.

At the same time, we understand that you swim not only to improve skill, endurance or speed, but to live better. Thus we always focus on the ultimate goal – health, happiness, and a better life—and offer holistic and sustainable methods for achieving any swimming goal you may set.

Swim 25 Percent Faster? At Age 90-plus???

In 2010, at age 93, Dr. Paul Lurie retired after 25 years as a emeritus professor at Albany Medical College—following a distinguished 40-year career in pediatric cardiology, during which he'd pioneered several important procedures. He moved to Woodland Pond, a retirement center near his daughter's home in New Paltz NY—and undertook a third 'career' as an *improvement-minded swimmer*.

Terry Laughlin with Dr. Paul Laurie

Using a Total Immersion DVD, Paul taught himself to swim so efficiently that he was soon swimming 20 lengths in the Woodland Pond pool every morning—a practice he continues today at age 97. A year later, he appeared at the TI Swim Studio asking "Can someone here teach me a relaxing butterfly?"

After watching Paul attempt a few strokes of butterfly, I suggested that we work on backstroke as his second stroke. To sweeten the deal (and welcoming the opportunity to explore how to adapt TI methods to a student of very advanced age) I offered Paul the ultimate senior discount—complimentary lessons at the Woodland Pond pool.

We met on Tuesdays at 6:45 am for 30 minutes. (I kept our lessons short to avoid taxing Paul's stamina.) We worked on both backstroke and freestyle. Paul's balance and bodyline were already good from his self-coaching, so I was able to focus on recovery, 2-beat kick, and breathing. And the simplicity of backstroke allowed him to pick that up quickly. All told, we spent between four and five hours, over several months. Paul practiced faithfully between our sessions.

Several months later, I brought TI Coach Tracey Baumann, visiting from England, to Woodland Pond to 'show off' Paul's *amazing* grace. Tracey shot video while Paul and I synchronized our strokes. That video has been viewed over 40,000 times on youtube.

Besides swimming with fluency rare at any age, Paul has also demonstrated the possibility of improving your swimming at *any* age. In fact, by striving to improve his form *every time he swims*, Paul has also swum faster each year!

Paul swims 20 lengths each morning, alternating two lengths freestyle with one length backstroke. Like many people his age, he is subject to atrial fibrillation—the heart begins to race at even moderate exertion.

Taking care to let his heart rate slow after each lap, it initially took Paul over 20 minutes to complete 20 lengths. At 95, he was completing them in about 17 minutes. At 96, Paul asked me to teach him an efficient turn—because his increasing efficiency allowed him to swim two lengths at a time.

Using his new turn and needing fewer rest breaks, Paul dropped his time below 16 minutes—a time that made him wonder if he'd miscounted laps. Several days later, he asked his swimming partner Marilyn Bell to time him. Using her iPhone and counting laps, Marilyn timed him in 15:46! Paul decided to 'retire' the record, feeling it wouldn't be healthy to push himself to swim any faster.

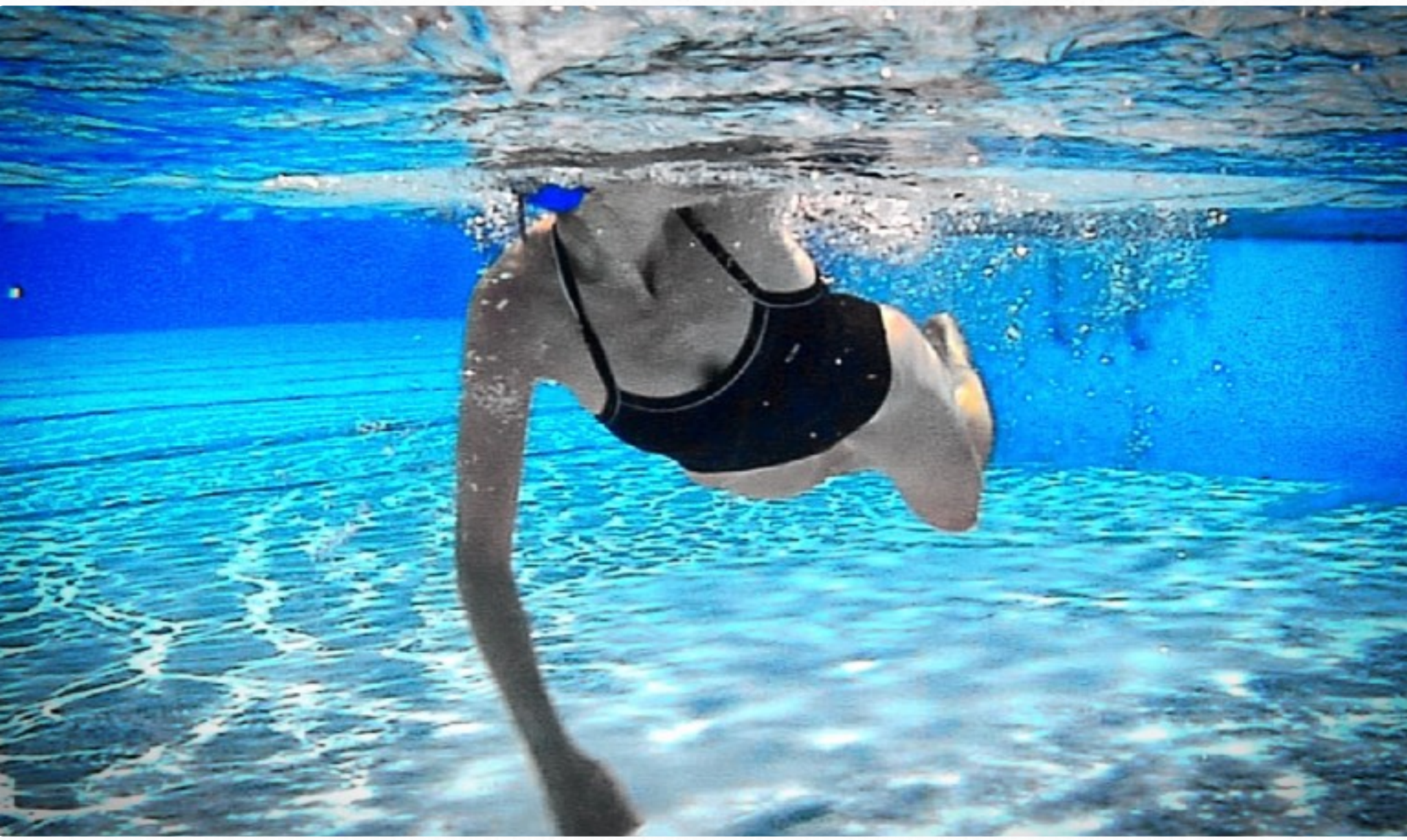
Paul Laurie using the Total Immersion Freestyle technique to swim 20 laps a day at age 97

Paul has the double distinction of being the oldest living pediatric cardiologist, as well as the oldest TI swimmer—both of which he's earned by simply living a long time. Paul also has a harder-won distinction as the first swimmer in history to have gotten faster by over 25 percent in his 10th decade (and likely for a decade or two younger too)! This makes Paul Lurie the world's leading exemplar of the limitless potential for kaizen in swimming.

How much can *you* improve your swimming?

2

Why Haven’t You (Me, and Everyone Else) Swum Better?



If you’ve been left high and dry by swim lessons, swum for years with minimal progress in skill, become exhausted (or had a panic attack) in a triathlon swim, or gotten injured while training, did you begin to doubt you had the inborn talent to be good at swimming?

We swimmers tend to blame ourselves for our shortcomings. As a college swimmer I worked long and hard, yet remained slower than some teammates who gave far less effort. This led me to conclude that these teammates must possess some innate talent for

swimming that I lacked. I began to think swimming potential might be as predetermined as height or eye color.

When we seek instruction from people who advertise their coaching credentials, we naturally assume they know what's best. If we fail to progress, the fault must be our own. But TI has helped thousands of people who had previously experienced frustration—or even outright defeat—with well-meaning instructors or coaches. When so many people dramatically change their swimming fortunes, it tells us that the fault was not with the student, but that traditional ways of teaching are fundamentally flawed.

Here are the stories of swimmers who learned that.

Beginning Swimmers

In the past quarter-century, thousands of students have come to Total Immersion as an admitted 'last resort,' after feeling defeated by adult lessons. Tim Ferriss and Vik Malhotra are representative of this group:

"TI changed how I looked at things I'd thought were impossible."

Tim Ferriss, author of the bestseller, "*4-Hour-Work Week"*, is recognized worldwide as a guru of what he calls 'meta-learning.' Tim has gained a following in the millions for mastering a dizzying array of skills thought to require years of study—languages, kickboxing, tango dancing, gourmet cooking. In each, he has achieved stunning competence in just weeks or months.

Terry Laughlin with Tim Ferriss, Hawaii, 2013

In best-selling books and talks at conferences, Tim has described the devastating exception to his record of success: "Despite having grown up five minutes from the beach

The form that helped Tim Ferriss swim a mile effortlessly

and won national championships in several sports, I'd reached my 30s unable to swim more than 20 yards in a pool without exhaustion. This was my greatest source of embarrassment and insecurity.

"I took countless lessons from lifelong swimmers, triathletes—even Olympians. None had a clue about how to teach the skills they performed effortlessly. They had me use kick-boards, hand paddles. All of it just left me feeling exhausted and further demoralized.

"What made this worse was, while the things I'd mastered with ease were diversions or games, swimming is a life skill—something I'd want to do with my children."

But in 2008, Tim progressed from struggling to complete 40 yards in a pool to effortlessly swimming over a mile in the ocean in only 8 weeks. While expert coaching was essential to his other accomplishments, Tim's swimming breakthrough came when he stopped taking lessons and began to teach himself, with the aid of a Total Immersion DVD. In Tim's words:

"*In my first practice, without a coach, I cut drag by 50% and swam farther than I ever had. By my fourth practice, I'd gone from over 25 flailing strokes for 20 yards to an average of 11 smooth and relaxed strokes. I swam with half the effort and no stress. In fact, I felt better after swimming than when I got in.*"

Two months later, Tim put his new skills to the test by swimming 2000 meters in the ocean, about which he wrote: "Walking up the sand, I have never felt prouder or more

alive. One of my deepest-seated lifelong insecurities was gone and would never return. The elation I felt was indescribable. TI completely changed how I looked at things I formerly thought were impossible."

"Some people just aren't built for swimming."

Vik Malhotra

Vik Malhotra took up swimming even later than Tim. He had never learned while growing up in India. In his 40s, living in New York, it bothered him deeply that he lacked this basic life skill. But his efforts to learn turned into an odyssey. He went from pool to pool in Manhattan, eventually taking over 60 lessons with multiple instructors. Yet after all these lessons, he still couldn't swim more than half a lap.

"I took lessons with at least six instructors. All were excellent swimmers, but none knew how to solve my problem. Each time I started swimming, my legs would sink and I stopped making headway.

"They said my legs were too weak and had me kick with a board to 'strengthen' them. My forward progress on the kickboard was even more pathetic and it did nothing for my sinking legs.

"One reason I went to so many teachers is because several just threw up their hands after a few lessons. One told me, 'Some people just aren't built for swimming.' That depressed me so much I quit for six months.

Then I was browsing in a bookstore and came across the Total Immersion book. I read the first chapter there in the aisle. It explained every problem I'd been having. I got so excited I immediately called my wife to tell her about it."

Weeks later, Vik took a TI weekend workshop. At the end, he swam 25 yards of freestyle for the first time. Within 18 months, Vik had become a TI Coach and was teaching other adult beginners and phobic swimmers.

Vik and Tim were non-swimmers, but learning TI techniques have also helped many swimmers who'd become quite accomplished swimming the traditional way, but had been injured or stagnated.

Adult Swimmers—The Top Two Percent

Between the growth of triathlon and Masters swimming, an influx of aging veterans of the 70s running boom, and wider appreciation of swimming as a prescription for healthful aging, more adults swim regularly than ever before.

Unlike Tim and Vik when they started, most can swim a quarter mile or farther, putting these swimmers in relatively rarefied company—the Top Two Percent of all swimmers. Despite representing the 'cream' of the swimming population, those who follow conventional training methods still get outcomes that are decidedly sub-par.

The two questions asked most often on triathlon forums are "*How do I get faster"* and "*How do I overcome boredom."*

Most dedicated lap swimmers truly enjoy their time in the water. But, in their pursuit of fitness, most have stagnated at what learning researchers refer to as the "OK Plateau." Their swimming is *good* enough to allow them to swim for 30 minutes or more but they don't realize their form could improve continuously—while providing the same or greater fitness benefits, and far more satisfaction. They can do so by beginning every pool session with a conscious goal and plan to improve their technique. While working on technique, fitness will *still* 'happen.'

The laps of fitness swimmers look about as monotonous (but much more awkward) as running on a treadmill. As a result, most lap swimmers swim for years with no expectation of improvement. Few have goals. Most do indeed *follow the black line* and would love to find greater inspiration and satisfaction.

One described his lap routine as “instinctive robot-like behavior; sometimes I feel like a mouse on a wheel.” Both triathletes and lap swimmers experience what one swimmer described as Terminal Mediocrity: “No matter how much I swim, I never improve.”

What We ‘Know’ About Swimming and Why

- Why did Vik and Tim’s instructors hand them kickboards—and persist in doing so despite their struggles?
- Why do competitive swimmers suffer injuries at such a high rate?
- Why do triathletes persist in doing repeats they find boring?
- And why do lap swimmers just follow the black line and seldom think about technique?

These poor outcomes are based on a fundamentally mistaken idea about swimming, which nonetheless has become so widespread that almost no one questions it. That mistaken idea can be summed up as follows:

1. The essential actions of swimming are pulling and kicking.
2. Our measure of progress is the ability to push through more laps.

And the outcomes that result can be summed up as:

1. If they’re lucky, those taking lessons (children or adults) end up with a stroke that strikes them as ‘good enough’—because, unlike Tim and Vik, they can complete a lap or two—yet which is, in fact, still staggeringly wasteful. (In the next chapter you’ll learn just how wasteful.)

2. Those who progress to lap routines—or ambitious training—may get exercise. But the hidden result of more laps is to simply make their struggling skills more permanent.

From my experience coaching elite swimmers, I had learned that I had an intuitive knack for solving common efficiency problems. If I was going to become a mentor for the much greater population of less experienced swim enthusiasts, I was going to have to help them solve the “Universal Human Swimming Problem.” I was going to have to examine struggle.

A Dancer Learns Total Immersion Swimming

Diana performing modern dance

by Diana Prechter

I grew up taking rigorous Russian ballet training in New Jersey and at American Ballet Theatre in NYC in the 1970's. I began teaching dance at age 16.

I went to college and received an undergraduate degree in Math; since then, I've worked as a business analyst and computer programmer. When I was 26, I was given a full scholarship to complete a Master's Degree in PE/Dance and since then have taught ballet and modern dance at two universities.

Then, in 1979, I met modern dance choreographer Deborah Hay in Austin, Texas. Deborah's choreographic approach demanded that we fine tune our perceptions, form complex mental images, and – above all – remain curious. "What if…" became the premise of many

moments in our dance practice. I danced and toured professionally in Deborah's company from 1980 to 1985.

Since then, I continued to dance, either barefoot with our local Body Choir, or swing dancing Lindy Hop, Charleston, Balboa and Blues. Yes, I enjoyed dancing, but more importantly, I learned how to practice. Dancing taught me how to apply myself with commitment and patience to develop a physical skill slowly, over a long period of time.

Curiosity brought me to Total Immersion Swimming at age 59. My mother had loved swimming all her life but now, at 80, she had two hip replacements and one total knee replacement. She was determined to get back in the water. She began her study/practice, guided by Total Immersion DVD lessons, and invited me to watch her swim "her new stroke."

It was good timing in my life as well. I had gravitated, like many dancers, to private Pilates classes where, under the watchful eye of a master teacher, I hoped to be able to exercise without adding injury to my well-worn joints. I had sensitive knees, old sprained ankles, an old broken wrist and a recent rotator cuff injury. More dramatically, I had L5/S1 discectomy (lower back) surgery decades before. My serious Pilates training lasted about 3 years, but my wrists were hurting with every class. It was time to find a new physical discipline.

I learned TI Swimming from the DVD's with my mom. We bought every TI instructional DVD! Prior to this, I could swim a graceful breaststroke but my overhand crawl was desperate and flailing. Breaststroke was no longer an option because it hurt my knees.

I began with the basic Superman glide and learned what it felt like to feel balanced while swimming. One time I made a few strokes across the pool and felt myself "fall off balance." Startled, I put my feet down and stood up – as if I'd fallen down!

The next discovery was that better balance allowed me to control stroke tempo. I could swim ‘super-slowly’ if I wished! This was both more relaxing and increased awareness of the interaction of my body and the water. My previous "panic" sensations were banished, replaced by a calm "presence of mind." For the first time I found myself noticing my alignment and position. Having my face underwater became interesting instead of scary.

Total Immersion Swimming has become my new form of dance. In TI Swimming, I fine-tune my perceptions, form complex mental images, and – above all – I remain curious. "What if…" I relax my head into alignment; reach further to the VW bumper; release one leg for an ankle flick…

The similarities to Pilates also struck me. TI's overhand crawl stroke – with its 2-beat kick – is a "contralateral motion" of the body, a muscular connection of opposite hip-to-shoulder. I began examining the way babies crawl and made comparisons to the Total Immersion 2-beat kick “crawl.” I found that, even while swimming slowly, I could create a core power workout comparable to taking a Pilates class. Pilates equipment typically creates an environment of instability and resistance; water's natural instability and resistance makes it a perfect "Pilates environment" to develop my body's deep torso-and-back muscle core power.

Diana ‘dancing’ the TI way.

After every TI swim practice, I feel long and strong, and I enjoy the exhilaration of better aerobic fitness. Dancing is still possible, and now I feel like I'm flying while dancing through the water.

About aerobic fitness: Some scientists say that dancers typically have a relatively low aerobic capacity compared to other athletes. Even male ballet dancers ranked only better than "sedentary" in this list:
[http://link.springer.com/article/10.2165/00007256-200434100-00003 The Dancer as a Performing Athlete by Prof. Yiannis Koutedakis, Athanasios Jamurtas; Sports Medicine, August 2004, Volume 34, Issue 10, pp 651-661; Date: 04 Sep 2012]

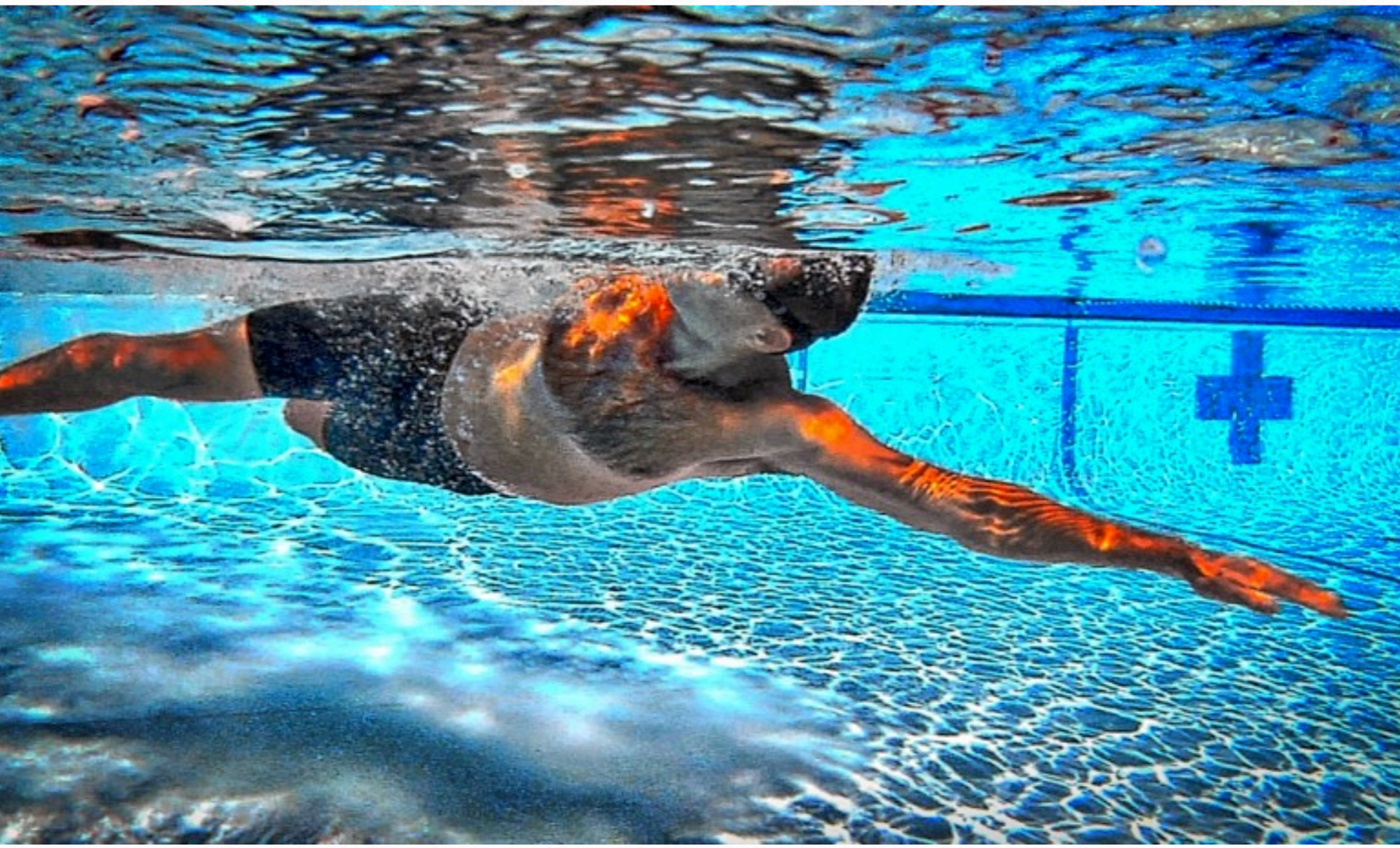
Aerobic fitness will be a whole new level of fitness for me to achieve. I'm working on it and excited about my progress. I became a certified Total Immersion Coach in 2014.

Overall, I feel that Total Immersion Swimming offers a subtle, powerful, coordinated and integrated action in the wonderfully buoyant and resistant environment of water. With good technique and bilateral breathing, ingrained habits of physical asymmetry can be "ironed out." With practice/repetition, TI swimming technique can help strengthen the body's core muscles with minimal potential for range of motion injury, can improve aerobic capacity, and can provide a rich system of nuanced movement that can be interesting and challenging to refine – and possibly perfect – over a long period of time.

My advice: Remain curious!

3

The Universal Human Swimming Problem



Tim Ferriss and Vik Malhotra were not outliers. Nor are triathletes who complain about being bored by their workouts, or long-time swimmers who swim for years with no improvement. And the instructor who told Vik “Some people just aren’t built for swimming” may have been utterly unhelpful, but he was more right than he knew.

Indeed, swimming poorly—or swimming *okay* without realizing you could be swimming *much* better—is so common we call it the ‘Universal Human Swimming Problem.’

Coaching in a Bubble

I first became interested in distance swimming in 1964, when I spent the summer swimming laps to earn the Red Cross 50-Mile Swim badge. For the next 25 years I kind of took for granted that, nearly anyone could gain the ability to swim continuously as I did. But in the early 1990s, I realized that just the opposite was true—that a minuscule part of the population at large could swim as well as I did. Indeed, only 30% of Americans can swim 25 meters and fewer than 2% can swim a continuous 400 meters.

As a college swimmer I thought my relatively mediocre results were due to lack of 'talent.' After I began coaching in 1972, I worked for two decades with swimmers who felt completely at home in the water. Until the early 1990s, I'd never encountered a phobic swimmer and had no idea how common that is.

This kind of blind spot is common among those who've spent their lives in the 'bubble' of competitive swimming, and explains why so many highly accomplished swimmers lack the ability to transfer even the most basic parts of the skills they possess to beginners. Few of those inside the bubble understand the struggles that prevail for those outside it.

Most swim coaches enter the bubble at a young age, upon joining a swim team, and never leave it. Consequently, few of them recognize that very few people are as comfortable in the water as those with whom we spend all our time.

When a coach whose experience has mainly been with those who learn easily encounters an 'outsider' like Vik or Tim, they lack awareness or tools for addressing the struggles and challenges that late-starting adults experience. That was true for me around 1990, just as increasing numbers of adult beginners began to attend TI camps

Lessons from Adult-Onset Swimmers

Though I began coaching at age 21 with no formal education or training, I discovered I possessed an intuitive feel for helping others succeed where I had failed. The first two sea-

sons of TI, most of our campers were Masters swimmers, many of whom had swum since an early age. But, when we began seeing large numbers of triathletes—most of them new to swimming— I was faced with challenges for which my 20 years of coaching experience provided few answers.

Difficulties with body position and breathing were common. And their legs churned energetically, while producing little propulsion. They took a long time to complete a single length of the drills we used at the time—and even longer to recover before they could attempt another *arduous* length. (Our solution at the time was to have them wear fins—but their struggles returned as soon as they removed the fins.)

I began to understand that, outside the bubble in which I'd spent the previous 20 years, struggle was almost universal. And unless we solved struggle, we wouldn't be able to teach skill.

An Unconventional Solution

In 1988, just months before the first TI camp, I'd crossed paths with an innovative coach named Bill Boomer. While speaking at a coaching clinic, Bill said something that I've come to believe is the most important core truth about swimming: "The 'shape of the vessel' matters more than the size of the engine."

Swimming Innovator, Bill Boomer

By *vessel*, Bill meant how the shape and position of a swimmer's body affect drag. By *engine*, he meant aerobic fitness as well as the traditional emphasis on high-powered pulls and kicks. In the chapters to come, you'll see repeated references to vessel-shaping and engine-building.

When I heard Bill's mantra, I saw exciting potential for breakthroughs in teaching skills and efficiency. A growing influx of inexperienced swimmers to TI workshops, less than two years later, provided the ideal opportunity to test the efficacy of vessel-shaping. When we replaced traditional drills with exercises to shape and position the body, the effect was immediate and dramatic. The new approach increased comfort; was easier to learn; and was far more forgiving if you had a weak kick.

We soon began referring to techniques that emphasized vessel-shaping as *Fishlike* Swimming; and to those that emphasized pulling-and-kicking as *Human* Swimming.

Six Causes for Energy Waste

Over several years, thousands more adult novices came to Total Immersion workshops. As it became apparent that nearly all of them displayed the same struggles, we coined the term *Universal Human Swimming Problem* to describe the challenges they faced—and the six common causes for wasted energy.

1. We're Heavier than Water. A human body typically achieves equilibrium with only 5% of body mass above the surface. With 95% of the body submerged, we swim *through* the water, not over it. *(Photo 3b)*. Streamlining turns that from a liability into an advantage. Aquatic mammals achieve far more efficiency and speed swimming *through* the water, than humans trying to swim over it.

The problem occurs because—when your 'heavy' body moves toward its natural equilibrium, primal instinct makes us lift the head to avoid choking and churn the arms and legs to avoid sinking.

Even years after we we've overcome that fear, and have even become quite accomplished, our strokes still show the effects of our early 'survival' swimming attempts. The tendency to hold the head high—then lift it further while breathing—is especially common. These habits eventually come to feel so normal, that we're unaware of doing it. (In Chapter 11, you'll read how even an Olympic champion may do this, slightly diminishing efficiency

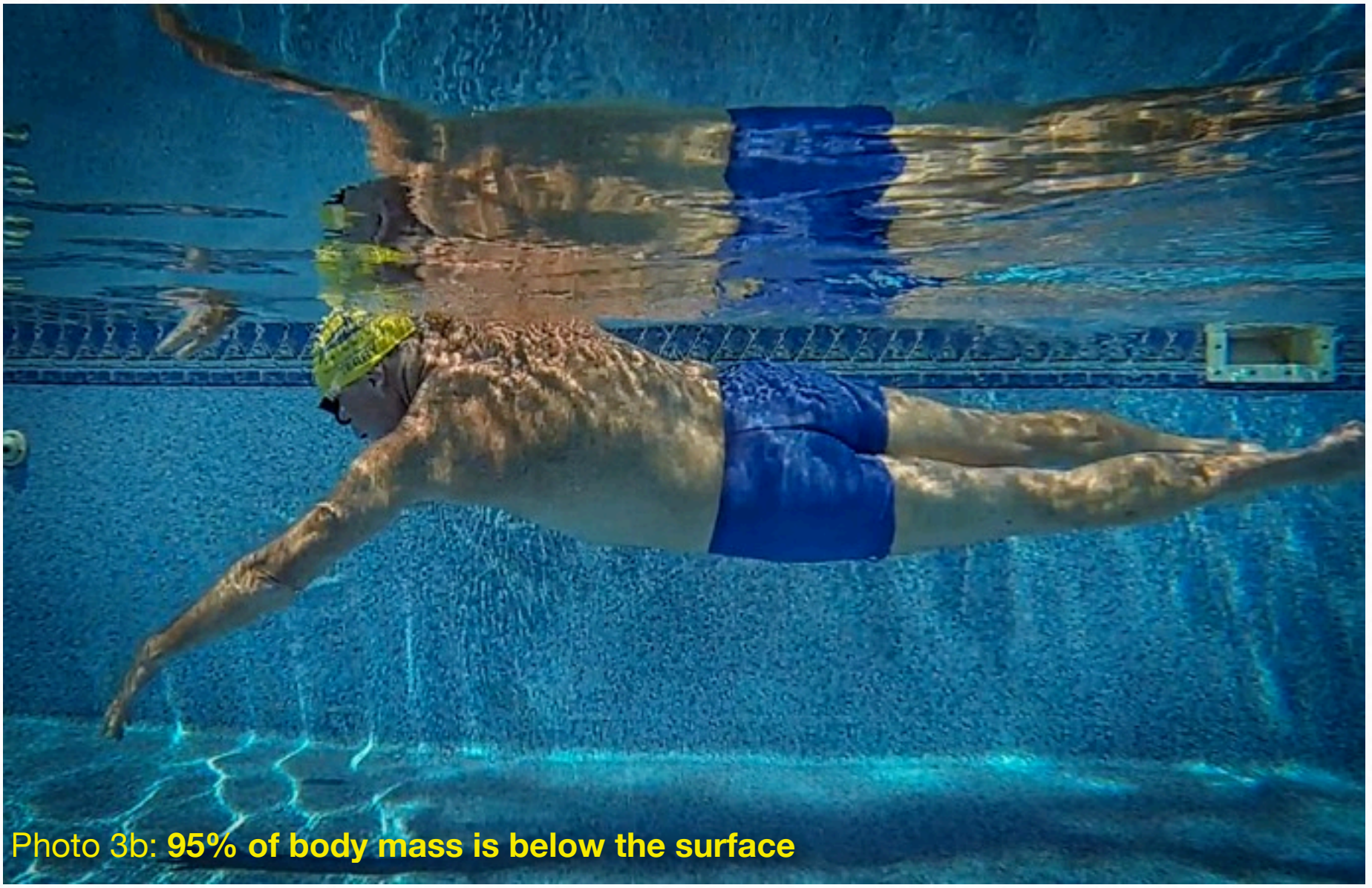


Photo 3b: **95% of body mass is below the surface**

on each breath.) By itself, the head accounts for 8% of body mass. The moment we lift it, other body parts are driven even deeper.

Our inborn sinking problem can be made even worse if we've been told that—in order to swim fast—you must 'ride high on the water.' That's an instruction to *fight gravity*—a battle you can only lose.

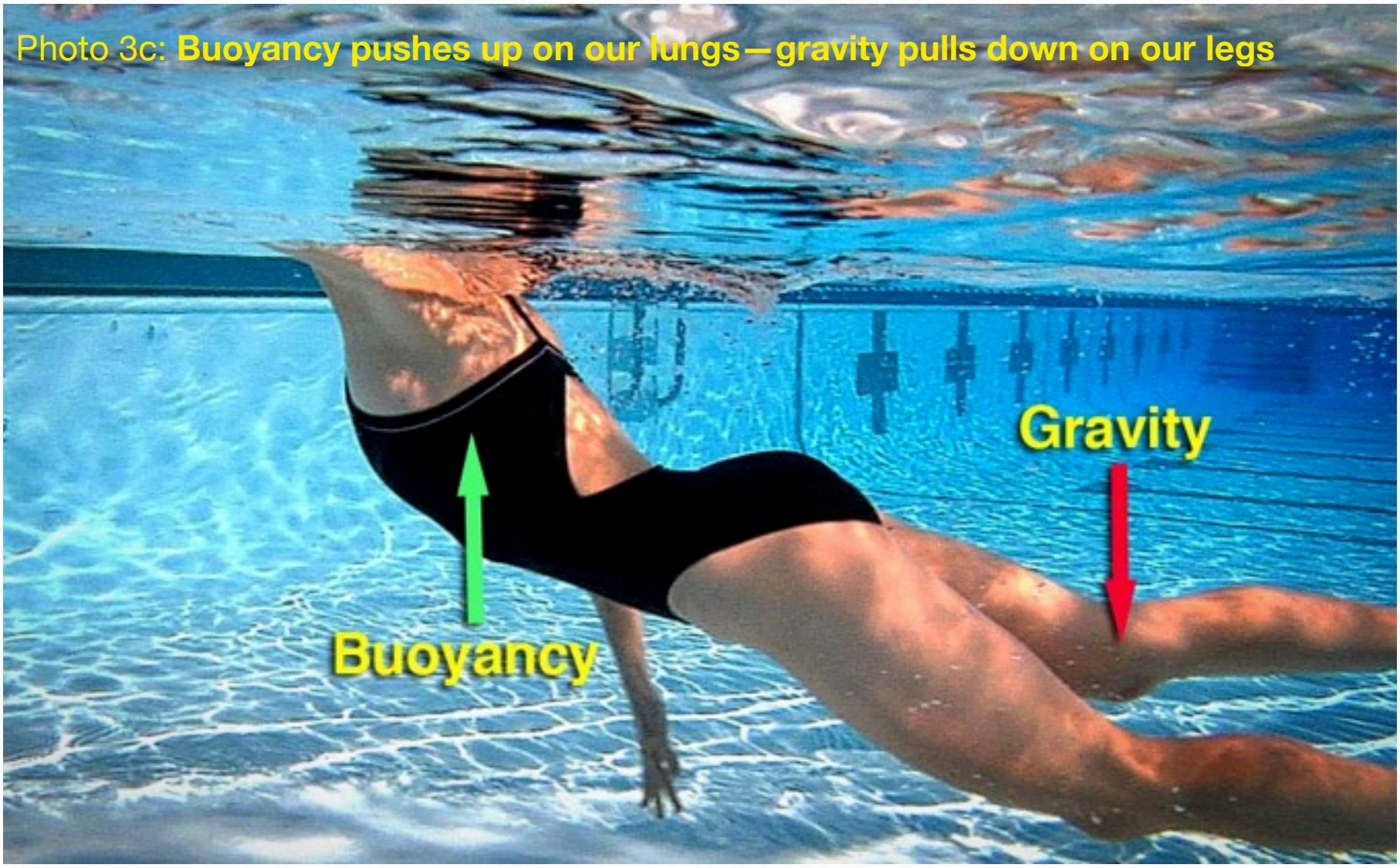
2. We're Unbalanced. Fish and aquatic mammals move through the water in a stable horizontal position. But the human body is designed for vertical balance on terra firma. Our upper torso is a hollow mostly filled with vital organs—one of which holds 6 liters of air. Our hips and legs are densely packed with muscle and bone. As we swim, gravity pulls down on our dense lower body, while buoyancy pushes *up* on our lungs. This dramatically

increases drag. To experience just how much increased drag, kick a length of the pool holding a kickboard flat first, then at a 45-degree angle. (You'll never again hear me suggest using a kickboard.)

As Vik and Tim discovered, no amount of 'strengthening the legs' with kickboard training can correct this. In contrast, small changes in weight distribution (I.E. using physics instead of heartbeats) can solve it instantly and effortlessly. However, as the next chapter explains, the simple act of releasing your head's weight to be supported by the water and using your extended arm as a 'trim tab' will immediately and effortlessly bring your body into *aquatic balance*.

3. We're Unstable. Land provides a solid base of stability for skilled or powerful movement. In water, we're highly unstable, which makes skilled movement—or use of our natural power—nearly impossible. It also sets off psychic alarms. Can you recall the adrenaline that shoots through you when you lose your balance, or how vulnerable you feel walking on ice? For most new swimmers, that sense of vulnerability is a full-time thing, instead of something that passes in an instant.

Photo 3c: **Buoyancy pushes up on our lungs—gravity pulls down on our legs**



Achieving a stable position in water requires skill. *Maintaining* stability while stroking and breathing is an exceptionally rare skill. Even the smallest movement—of head, arms, or torso—can upset the whole thing.

Our inherent instability is hugely magnified when we raise any body part above the surface—as when we swing the arms forward in crawl, or lift the head to breathe. When your arms or head lose the buoying effect of water, their weight increases by a factor of 10. In the "10X state" even small movement errors become hugely magnified.

Sensing instability, the brain sends an urgent message to the arms and legs to try to control this instability. They become fully preoccupied with *steadying* actions and can no longer perform far more critical roles—streamlining and propulsion.

4. Water is a Wall. Because water is nearly 1000 times denser than air, water resistance, or drag, significantly saps our energy at even the slowest speeds—then increases exponentially as we move faster. Swimming just 5 percent faster (e.g. improving 100-meter pace from 2:00 to 1:54), increases drag by *25 percent!*

In other words, swimming just a little faster takes a *lot* more effort. And when you push against the water, it pushes back even harder. So, rather than pull or kick harder to swim faster, your first thought should be to reduce resistance instead. We'll show you many ways to do that.

5. Moving Parts. Fish and aquatic mammals have a 'unibody' form, enabling them to maintain an unchanging, streamlined shape as they move through water. Humans have many moving parts—four limbs plus the head. While swimming freestyle, we change shape constantly, increasing drag each time.

The vessel-shaping techniques you'll learn here can dramatically increase the distance you travel on each stroke. You'll need fewer strokes—*and fewer shape-changes*—to swim any distance. If you cut your 25-meter stroke count from 25 to 20, that's 25% fewer shape changes—reducing drag still more.

6. Breathing is a *Skill.* On land we seldom give a thought to breathing. In the water, because of our primal fear of choking, breathing is not only an exacting skill; it's one with

Photo 3d: **How head-lifting affects body position.**

panic-inducing potential—especially for newer swimmers. But even experienced swimmers commonly breathe in ways that upset body position.

Breathing efficiently is more difficult in freestyle than other strokes for two reasons:

1. We must fit the breath into an alternating arm action; and

2. To reach the air, we move the head (8% of body mass) to the side while the rest of the body is going forward.

Unless you're highly skilled, this hurts body position, stability, and streamlining—and diverts arms and legs to corrective actions.

'Energy-Wasting Machines'

I'd recognized since the early 1990s that every swimmer who came to TI for help was wasting too much energy. But I'd never known precisely *how much* energy they were wasting. When I finally learned how much energy every *human swimmer* loses to the six problems

listed above, it became clear that, to swim our best, saving energy must become our highest priority.

Humans aren't just poor swimmers. ***We're energy-wasting machines.***

In 2009, I read a summary of research by engineers from DARPA (the research arm of the U.S. Defense Department) who compared the energy efficiency of dolphins and humans, while designing a swim foil for the Navy Seals.

They estimated that dolphins convert 80% of energy into forward motion. The human swimmers they studied (moderately experienced, not raw beginners) converted only 3% of energy into forward motion!

Dolphins are efficient because they move *through* water. We humans waste so much energy because we move *around in* water (sinking, instability, breathing); and move *the water* around (drag, moving parts).

If energy waste is the main challenge we face as swimmers, then the decisions we make on how to ration 'precious' practice time should prioritize finding and imprinting solutions to the problems described above. In other words, to swim better, farther, and faster by *smarter choices* rather than greater efforts.

Physician, Heal Thyself!

By Suzanne Atkinson, M.D.

My earliest swimming memory was wanting desperately to learn to swim at age 5. My parents signed me up for "tadpoles" at our local club. What remains etched in memory is jumping into the waiting arms of our swim teacher, Craig, in the deep end of the pool—and feeling terror as I did.

However, at my next lesson, I witnessed a miracle: Benji, a tow-headed 3-year old swam the length of the pool, crossing the deep end . . . without floaties! That was my turning point. If Benji could do it, I would too!

For the next 10 years, swimming became my passion—morning practices, weekly meets, winter training, learning all four strokes, and excelling at Butterfly . . . because I was one of the few eager to practice it and willing to swim it in a meet.

But by age 15, I'd become a burnout statistic. Though I was among the fortunate few to have escaped without sore shoulders from the relentless training, I'd wearied of the routine—and of going from a warm bed to cold water at 5 each morning. For the next 20 years, I swam only sporadically.

Then, when I needed surgery at age 36 for a herniated disc with nerve injury, swimming seemed an obvious choice for post-surgical rehab. After all, everyone says swimming is good medicine for bad backs. Finally all that swim experience would come in handy.

But my first swim brought a rude shock: My neck and back both hurt after swimming a

short distance. What was I doing wrong?

Fortunately, after I shared my frustration with a fellow physician, he urged me to check out Total Immersion. He loaned me a TI DVD and—intrigued by the possibility of learning a "Revolutionary Way to Swim Better, Faster & Easier"—I bought the TI book.

I read the book, and watched the DVD. Then, without even doing a single drill, I gave swimming another try. My neck and back felt great! I was an immediate convert: Any technique that was good to my body was worth studying and mastering. I took a coached TI workshop and soon after attended training to become a Total Immersion Certified Coach.

During and after my coach training, my swimming took a striking forward leap—in performance as well as technique. Encouraged by this improvement, I became a triathlete, completed an Alcatraz swim, and added certification as a triathlon coach to my growing athletic resume.

My journey has taken me from rehabbing swimmer, to kaizen swimmer, to competing in swimming and triathlon, and finally to teaching TI to swimmers, health seekers, triathletes and people recovering from injury.

Swimming has become the most enjoyable part of my triathlon training, and the highlight of any day I practice TI.

As a physician and swimmer, before finding TI, I knew the therapeutic benefits you can find only in the water. Moving through a nearly weightless medium, while working against constant, moderate resistance through a full range of motion should be ‘great medicine’ for a healthy musculoskeletal system.

Learning TI showed me that the right techniques maximize those benefits. That’s why I feel great—as both coach and physician—about teaching a form that’s so good to your body. The better you feel while swimming, the more you enjoy it. And the more you enjoy it, the better you'll swim.

4

How To Swim Efficiently

Five-time Olympic running coach Bobby McGee refers to running as ‘primal’ – something we do well by nature. ChiRunning founder Danny Dreyer talks of helping runners rediscover the instinctively relaxed and efficient way they ran as children.

Swimming is precisely the opposite: As you read in the last chapter, in the water we become *energy-wasting machines*. To develop a high-efficiency stroke, you must make a conscious choice to eliminate energy waste—and renew that choice every time you swim. You’ll need patience and persistence to resist a return to old habits so that new ones can take root.

This chapter details the origin and evolution of TI techniques; their foundations in the laws of physics, fluid dynamics, and biomechanics; and how they were refined over 25 years and thousands of swimmers.

While the efficiency principles described here apply to all strokes, this book focuses primarily on freestyle.

What Kind of Swimmer Do You Want to Be?

When you're at the pool, what kind of swimming catches your attention? A swimmer going fast, or one who swims with consummate ease and grace?

On youtube the most popular swim video is TI Coach Shinji Takeuchi's "Most Graceful Freestyle," which has been viewed 5.4 million times. In second place, with only 3.7 million views, is a video of Michael Phelps which was posted a year earlier.

Why are so many more people interested in watching a previously unknown, middle-aged man than the most decorated swimmer ever? Could it be because grace is a much rarer quality in swimming than speed? And because grace is also more attainable, while Phelps's kind of speed is available only to those with youth, strength, and special talents?

At the same time, a more efficient stroke is also the surest way to swim faster. Here's why: Swimmers who complete a nonstop mile for the first time, typically do so in a time of 40 to 45 minutes (a pace of 2:30 to 2:45 per 100 meters). Any swimmer could improve from there to a time of 30 to 35 minutes without ever focusing on speed.

With our baseline efficiency as low as it is, there are nearly limitless opportunities to improve it—with the result of swimming any distance with less exhaustion and in fewer strokes.

If you simply achieve a moderately greater stroke length—and because your muscles remain fresher—maintain the efficient stroke for the full duration of the swim, you can improve to a time of 30 minutes or better—even while focused on swimming with ease.

And when you do swim a steadily-paced mile—and feel energized upon finishing—your stroke is likely to display most of these characteristics:

Balanced You feel well-supported by the water—even weightless. This is the characteristic that enables those that follow.

Long You travel more than the length of your body on each stroke cycle (right plus left arm). When you do, your hand will exit the water, at the conclusion of each stroke, about where it entered.

'Slippery' You maintain a low drag profile—even while stroking and breathing.

Integrated You feel as if you're stroking with your whole body—because your limbs, head and torso work in seamless coordination, not disconnected parts.

Relaxed You appear relaxed—never strained—even while swimming at a brisk pace.

And finally, you always feel great while swimming—and better after swimming than before.

How T.I. Technique Evolved

Prior to 1990, I spent nearly two decades coaching club and college swimmers in their teens and early 20s. My highest-performing swimmers-–especially those who won national championships or achieved world rankings—had the best-looking strokes. That motivated me to prod all my athletes to swim with the best form possible at all times.

In maintaining high technique standards for my athletes, I had the luxury of coaching a group of just 15 to 25 swimmers six days a week. And finally, these swimmers were all from the rarefied group 'inside the bubble' who—seemingly from birth—were very much at home in the water.

In the early 1990s, I faced a challenge for which all these years of experience had left me unprepared. At TI weekend workshops, we were presented with a group of 10 to 20 or

more inexperienced and mostly self-coached swimmers. We had just two days to prepare these new swimmers to successfully coach themselves.

This required an entirely new way of teaching swimming technique—a process that:

1. Could be standardized for many swimmers;
2. Would quickly solve significant challenges; and
3. Be simple enough to follow on their own.

Using Bill Boomer's insights as a starting point, TI workshops became a laboratory for refining an all-new approach to improving technique.

Learning three skills—in a particular order—has proven to be virtually a sure thing in learning to be efficient. It helps to view these skills as a pyramid.

Balance is the foundation because it provides the body control and mental calm essential to learning every skill that follows. Learning Balance replaces the sinking sensation with a comforting sense of feeling 'weightless'. You accomplish this by working *with*—instead of fighting—gravity.

Streamline skills come next because water is 880 times denser than air. Why waste energy trying to overpower water resistance when you can reduce it quickly and with relative ease? You accomplish this by *shaping your vessel* to slip through a smaller 'hole' in the water—and by using your limbs as much for minimizing drag as for creating propulsion.

Propulsion skills follow the others because they require a stable body, a high level of coordination and keen self-perception. Our path to mastering them will be far smoother after establishing Balance and Streamline skills. You accomplish this by channeling power and rhythm from the core to the extremities and by propelling with you whole body, not your arms and legs.

Besides offering a proven way to become efficient, this sequence of skill acquisition offers these additional advantages:

Immediate Energy Savings

As energy-wasting machines, we must consider the energy cost of every aspect of swimming—starting with our learning process.

Balance skills focus on relaxing, floating, and extending. These require virtually no energy and lead to immediate, significant energy savings. As well, balance is the key to swimming at the equivalent of a runner's easy 'conversational' pace. You could well be swimming farther after 10 to 20 hours of balance practice than following months of endurance training.

Streamlining skills—lengthening and aligning the body—require only slightly more energy than those for Balance. And, because drag—and the power needed to overcome it—in-

crease exponentially as you swim faster, minimizing drag will make your energy savings exponential.

Propulsion actions—i.e. pulling and kicking—have a greater energy cost than those we use to balance and streamline. And their effect on how far or fast we can swim is relatively minor in comparison to gains from improving Balance and Streamline. Make it a habit to devote more attention to improving balance and reducing drag, than to increasing propulsion.

Put the Odds in Your Favor

The Balance-Streamline-Propulsion pyramid progression increases your odds of success in two ways:

1. **Avoid Failure Points.** One of Tim Ferriss's key strategies for meta-learning, is to avoid common 'failure points' at the start. For newer swimmers, the two aspects of swimming most likely to defeat you before you've barely begun are kicking and breathing. TI technique is explicitly designed to minimize reliance on kicking. And we introduce breathing only when you have the body control and comfort in the water to handle it with aplomb.

2. **A Glimpse of Success** In The Power of Habit, Charles Duhigg writes that, to replace an undesired habit with an improved one, experiencing a 'small win' early provides motivation to persist through challenges you encounter later. In the TI learning sequence that occurs in the first Balance drill, when you learn how it feels to glide weightlessly and effortlessly. For adult novices, that experience is liberating— even thrilling—and comes as a ray of hope for those who had felt hopeless before.

In the next chapters, I'll cover the three essential aspects of TI Swimming: Balance, Streamlining, and Core Powered Propulsion.

How Marilyn Bell Discovered the Joy of Swimming

In January 2014, Paul Lurie called to alert me that “swimming legend” Marilyn Bell also lived at Woodland Pond, his senior residence. In September 1954, as an unheralded 16-year old Toronto schoolgirl, Marilyn completed the historic first crossing of Lake Ontario, swimming 32 miles from Youngstown NY to Toronto in 20 hours 55 minutes. A crowd of 100,000 was waiting on shore as she finished. Afterward, the Canadian press named her “Canadian Newsmaker of the Year” and “Canadian Athlete of the Year.”


The Globe and Mail

Scattered Showers Continuing Cool

After 21 Hours, a Possible $50,000

MARILYN SWIMS LAKE

Quake Levels Algerian City, Hundreds Die

Collapses in Boat, Feels Terrific Later

Was Nearly Run Down

Wireless Bulletins Flashed Details Of Marilyn's Grim Ordeal in Lake

Canadian Marilyn Bell was the first woman to cross Lake Ontario in 1954.

Besides her pioneering swim across Lake Ontario, Marilyn also became the youngest swimmer to conquer the English Channel and to cross the Strait of Juan de Fuca. Babies, public parks, and a ferry were named after Marilyn. Canadian children were raised on stories of her bravery and determination.

Paul told me that Marilyn shared the Woodland Pond pool with him each morning but did water exercise as he swam. Pain from a degenerative spinal condition had kept her from swimming for 16 years, since age 60. He wondered if I might be able to help her. Thrilled to learn that such a famed swimmer was living quietly in my own neighborhood, I eagerly agreed.

Two days later, I met Paul and Marilyn at the Woodland Pond pool. She had misgivings, but graciously agreed, when I asked if she’d swim a lap. She showed classic 1950s form—head high, hips locked, legs churning. I felt there was a good chance that, with a change in form, she could regain the ability to swim comfortably. Here I’ll turn the narrative over to Marilyn.

To be honest, I really doubted that I could swim again after so many years. But when Paul called on a Monday evening and said: "Would you be willing to meet with my friend Terry?" I couldn't say no. Paul wasn't only a dear friend; I'd been inspired by the beauty of his swimming and how much he enjoyed it.

Terry arrived in the middle of a snowstorm at 6:45 the next morning. I thanked him for coming in such awful weather and he answered, "It's an honor to meet you." I thought, "Oh goodness, now I really have to go through with this."

Terry recorded me on his ipad. Viewing it, even I could recognize how bad that way of swimming was for my back. Terry started me with a balance and alignment drill. As I glided, I recalled how wonderful it felt when I first learned to float—something I hadn't thought about in 70 years!

I practiced with Terry making several adjustments to my position, then tried a length of freestyle with my head in line and my legs relaxed. After only 10 minutes, I already felt more comfortable than I had in decades.

Marilyn Bell 'in sync' with Total Immersion Founder Terry Laughlin in 2014.

Terry returned every couple of weeks to teach me something new. Between his visits, I practiced with Paul as my mentor. He has a good eye for TI technique, so he watched closely and gave helpful feedback. We also filmed each other with my ipad, so I could compare my form to his.

Two aspects of learning TI were especially rewarding. The first was feeling such harmony with the water after years of discomfort. The second was finally learning how swimming should feel. After learning the 'Mail Slot' entry, I would search for that feeling on every stroke. I still get goose bumps recalling how sensual the water felt as I slipped my arm in.

Best of all, swimming is now a joyful experience. I always felt elated after completing a marathon, but swimming for pure joy is an unexpected gift and I understand why Paul was so anxious for me to share this.

I'm excited and grateful that I might once again provide inspiration for other swimmers—not about how far or fast you swim, but about learning something new at any age—as Paul did at 93!

Swimming the TI way seems like an anti-aging prescription—not only for physical health, but to keep your mind and senses sharp and your outlook fresh. You can literally learn something new each day.

Postscript: On August 18, 2014—close to the 60th Anniversary of her Lake Ontario crossing—Marilyn swam in open water for the first time in 27 years, completing 400 meters in Lake Minnewaska, in New Paltz. Upon finishing, she exclaimed, "I feel born again!"

August 18, 2014—Lake Minnewaska, New Paltz NY

Click here to see the video of her 2014 swim.

5

Balance: The Essential Foundation of Efficiency

Photo credit: Steve Jordan, Mohonk Images

To swim efficiently, you *must* master Balance first. But the effect of learning Balance can be much more far-reaching. It certainly was for me.

In September 1988, when I met Bill Boomer at a coaching clinic and learned that ‘the shape of the vessel matters more than the size of the engine,’ Boomer also said that Balance is the foundation of vessel-shaping. Though I’d been swimming for nearly 25 years,

I'd never before heard a single mention of Balance as a swimming skill—much less the most important one.

Soon after, I visited Boomer in Rochester NY to learn more about vessel-shaping and watch him coach his University of Rochester swimmers. While there, I asked Boomer to show me how to balance. He had me perform a drill while kicking lightly in a prone position with my arms back. *(Photo 5a).* When I aligned my head and hips, as instructed, pressed down lightly on my chest, my hips instantly rose to the surface and my legs felt light. I was moving just as fast, but with a noticeably easier kick.

I repeated the drill several times, memorizing these new sensations, then swam a length of whole-stroke. My stroke felt stunningly different. For 25 years my legs had felt 'heavy.' But after just a few minutes of practicing a simple drill, they felt light.

While the new ease I felt was exciting, the effect of the experience of *swimming in balance* would be much more far reaching. It changed my whole sense of what was possible, for me and all swimmers, in multiple ways:

1. I had swum only sporadically for nearly 20 years since college, and with no purpose other than to get exercise, but without real enthusiasm. Ever since I've been a *passionate swimmer*, and swimming has become essential to my quality of life.

Photo 5a: **Balance means being *effortlessly* horizontal from head to toe.**

2. Prior to that day the only change I had experienced in my swimming was marginal and temporary. After months of training, I could swim longer and faster—but that effect disappeared as soon as I stopped training. The change I experienced through Balance was more dramatic than anything I'd ever known, and has become permanent. Not only do I feel positively brilliant every time I swim, but even after missing practice for several weeks, I recapture that feeling *immediately* upon my return.

3. Experiencing such a fundamental and striking change made me realize that, though I'd swum for almost 25 years, I still had much to learn. And in fact, I've continued to learn new skills and discover new insights (kaizen!) for over 25 years since.

4. At age 37 (when I was introduced to Balance), I had thought my best swimming was 20 years behind me. In reality, it was still far in the future! As a result of learning Balance, and many other discoveries that followed, I've improved continuously through my 40s, 50s, and 60s.

No More Struggle

The most limiting aspect of swimming is the sinking sensation. When your legs hang far below the surface, it's impossible to feel comfort or ease, your endurance and speed are sapped by drag, and your arms and legs are so preoccupied with trying to stay afloat, they can do little to aid propulsion.

Poor balance is why only 30 percent of us can swim 25 meters. Besides the fact that 'survival swimming' is exhausting, the sinking sensation also creates a constant, verge-of-panic feeling, with adrenaline flooding your bloodstream and muscles. This makes it impossible to enjoy swimming—or to anticipate eventual success.That constant sense of lacking control also blocks the calm focus needed to learn new skills.

However, if you can solve such profound problems, you should also gain a sense of confidence in dealing with future challenges along the way.

When you eliminate the sinking sensation and feel a sense of control over your body you immediately feel much more ‘at home’ in the water. You also achieve the foundation for every skill that follows. This feeling of comfort and control has two aspects:

1. Head-to-Toe Balance: Achieving a stable horizontal position from head to toe: (i) reduces frontal drag; (ii) calms churning legs; and (iii) frees you to fully extend your body-line in each stroke. *(Photo 5b)*

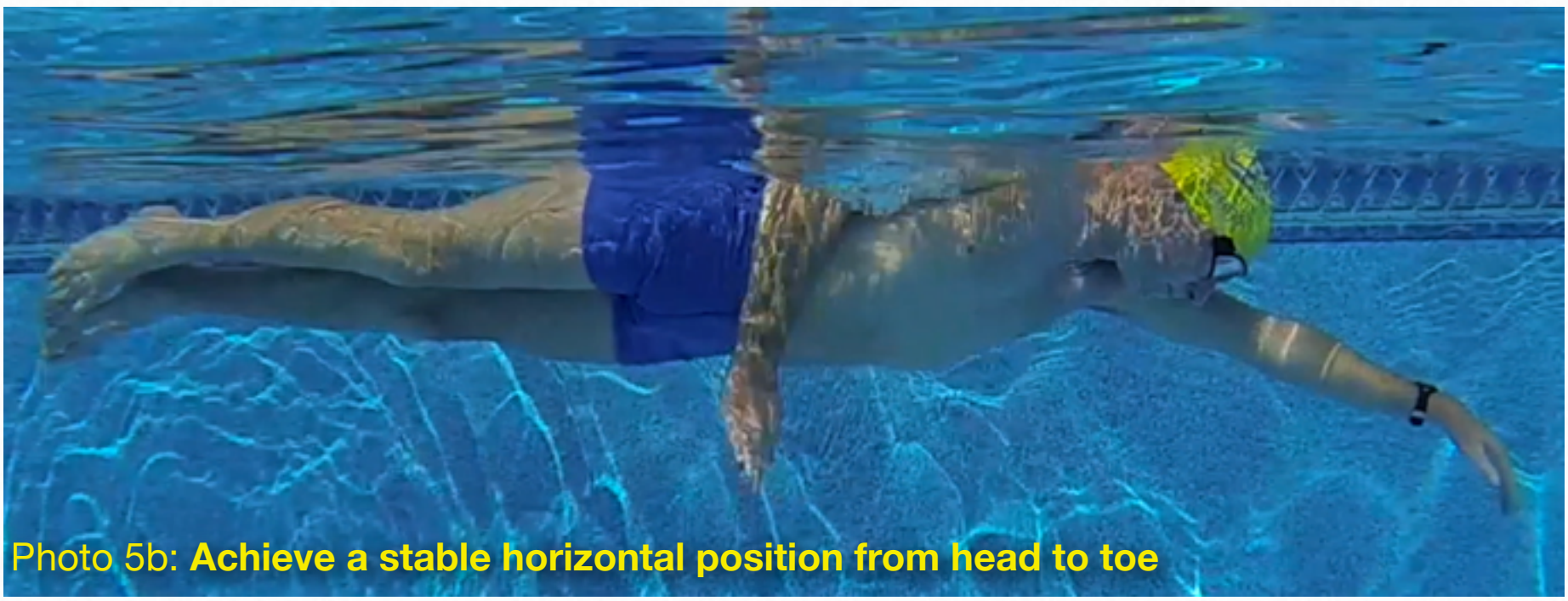


Photo 5b: **Achieve a stable horizontal position from head to toe**

2. *Core* Stability: You already know this is good for posture on land, but it’s also essential to efficiency in water. If your core body wobbles, wiggles or rotates excessively as you stroke and breathe, your legs will bend, swing, or splay in reaction. When your core is stable, your arms and legs are free to propel effectively, and you have access to all your available power.

Five Steps to Balance and Core Stability

As you’ll see none of these ‘mini-skills’ are instinctive. To learn them , patiently give your full attention to only one at a time.

Step 1: Release and Align Your Head.

Keep your head aligned with your spine and completely still. You can achieve this via a series of three complementary Focal Points:

- **Release** To bring your head into alignment with your spine, don't push it down. *Let it go!* Relax your neck and upper back until you feel its weight is supported entirely by the water—and not by your muscles. While this action seems fairly simple, our head-lifting instinct is so deep-rooted that it may take months to overcome. Keeping your head aligned and weightless *while* breathing is even more challenging, because it feels 'risky' to have your nose and mouth, so close to the water. The instinct to lift the head to breathe is even more primal.

- **Connect** Feel a connection between your head and hips via the spine. When head, spine, and hips are aligned, the head's 10-lb weight helps counter the downward pull of gravity on your dense lower body.

- **Stabilize** Once your head is aligned, focus on keeping it perfectly stable. When your head moves up or down, so does your core body. When it moves side-to-side, so does your torso. When your head is stable, it's much easier to maintain a stable streamlined core body.

- **Visualize** Reinforce alignment by visualizing your head-spine line projecting forward like a laser. (Photo 5c). Always aim your laser in the direction you wish to move—especially when breathing—and notice when it points in any other direction. A stable, laser-

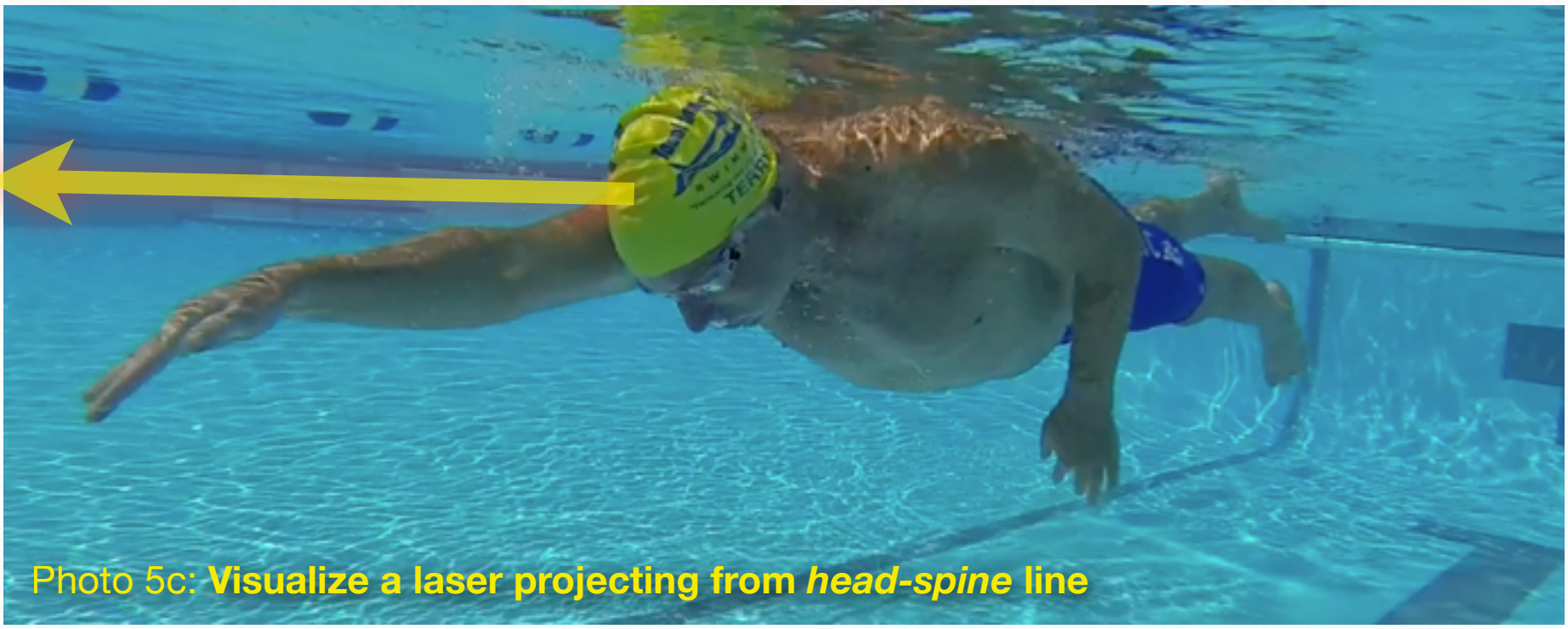


Photo 5c: **Visualize a laser projecting from *head-spine* line**

aligned head helps channel the flow of your energy and momentum in a forward direction.

- These skills are so important you should make them your first 'efficiency checkpoint' for the rest of your swimming life. More than 25 years after I first focus on aligning my head and spine, I still recheck it regularly and often find room for improvement. Particularly when I breathe—or when swimming in open water swells and chop.

Step 2: Be Conscious of Your Core.

A strong and stable core is essential to: (i) maintaining a long sleekly-shaped vessel while stroking and breathing; and (ii) connecting the propelling actions of pull and kick to core power. Activating them is a focal point in TI balance drills. While swimming, try to check in with your abdominals occasionally. Pull your navel slightly toward your spine, and lightly tuck your tailbone—actions familiar to anyone who practices Pilates or yoga. This should slightly flatten your lower back—which normally curves in while standing on land. Avoid tension; activate these muscles at the 20 percent level.

[**Note:** While I regularly do core exercises, such as the plank, these muscles are already strong from keeping you erect and stable on land. Swimming in a 'core-conscious' way helps train them for a markedly different task—maintaining a sleek stable bodyline in a *horizontal* position in the highly unstable medium of water.]

Step 3: Extend Your Body.

A primary focus of TI Technique—in all strokes—is to lengthen your body. You *complete* each stroke by extending your body fully from fingertips to toes. This aids balance in two ways:

1. It maximizes the water surface covered by your body, using Archimedes Principle of water displacement to maintain optimal body position.

2. It activates postural muscles, aiding stability.

Photo 5d: **A longer bodyline reduces wave drag**

In addition—because a longer bodyline reduces wave drag—this focus introduces the first Streamlining skill—even as you work on Balance. *(Photo 5f)*

Step 4: Position your Arms.

Proper arm position also contributes in a major way to both balance and stability. Focus on the following:

Reach slightly downward . . . This turns your arms into the swimming equivalent of *trim tabs*—small surfaces attached to a boat's rudder or airplane's wing to maintain an even pitch with the help of aerodynamic forces. Extending your arms at a slight downward angle helps raise your legs closer to the surface, reducing drag and freeing up leg muscles to help with propulsion. *(Photo 5e)*

Photo 5e: **Reaching *below your body line* will raise legs toward the surface.**

. . . And 'hang' your hands Relax hands and wrists so your fingers separate and point down. To increase the trim tab effect, reach below *your bodyline*. *(Photo 5f).*

. . . on Wide Tracks. Visualize parallel tracks, as wide as your shoulders, stretching ahead of you. Follow this Track as you extend your arm forward—taking care not to cross your hand toward the center.

Wide Tracks contribute to efficiency in two ways

1. They act as do outriggers on a canoe, helping to stabilize your body against excessive rotation.

2. They guide your arms to avoid crossover movement, helping channel your energy and motion directly forward. *(Photo 5g).*

Step 5: Calm Your Legs.

Because our legs are 'built to sink,' we all begin in swimming with an overwhelming instinct to churn them in a futile effort to keep them afloat. While working on your balance,

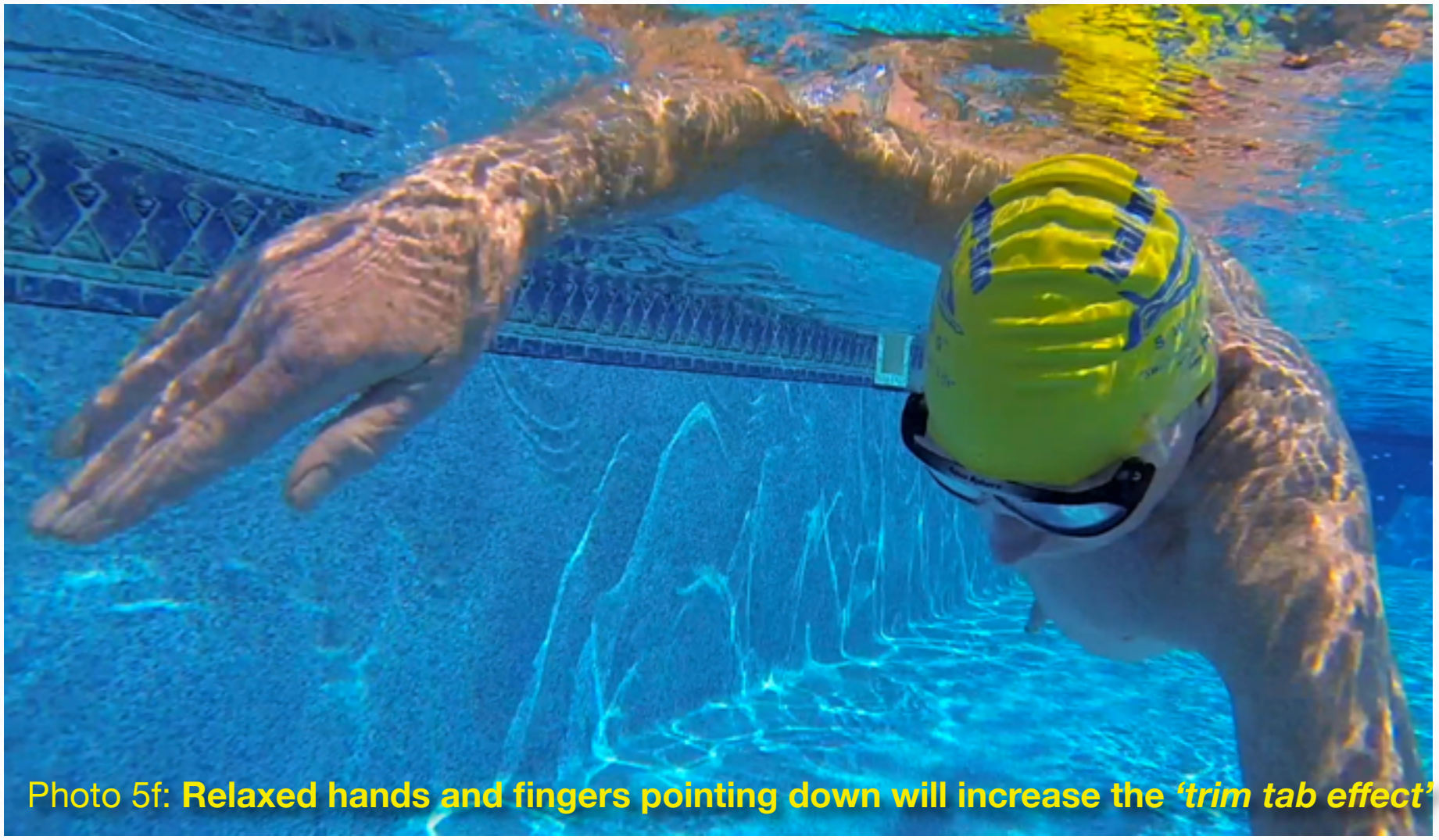


Photo 5f: **Relaxed hands and fingers pointing down will increase the *'trim tab effect'***

you should make a conscious effort become conscious of and turn off the leg-churning impulse. Releasing your head to a neutral position, and extending your arm at a slightly downward angle will reduce gravity's downward pull on your legs and bring them closer to the surface. Complement this by letting your legs simply follow your body more passively and feel more relaxed overall. *(Photo 5h).* This will also help prepare you for the highly efficient 2-Beat Kick (2BK) which we explain in Chapter 10.

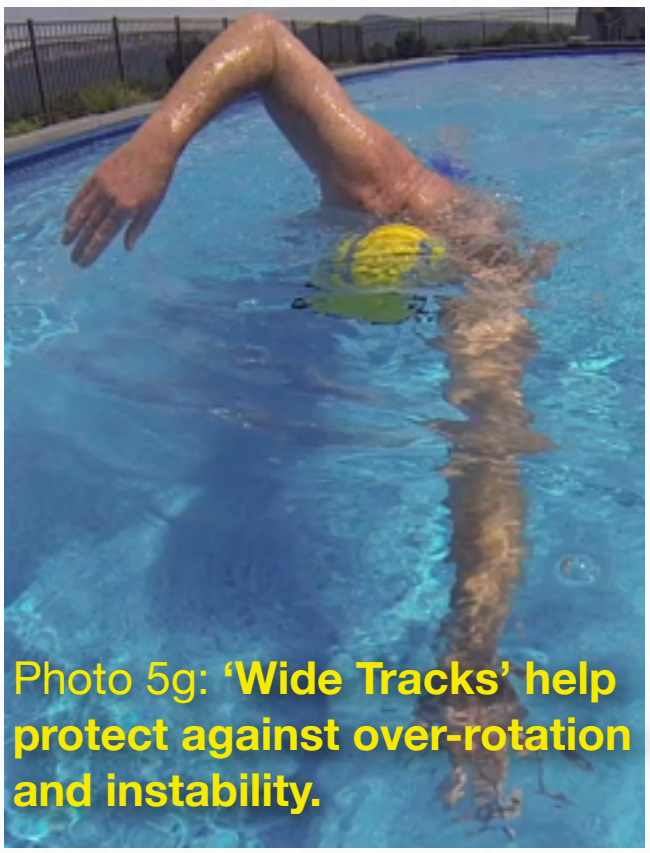


Photo 5g: **'Wide Tracks' help protect against over-rotation and instability.**

Balanced Body, Focused Mind

The effects of balance practice on your mind and psyche are as profound as those on your body. The balance learning sequence—in combination with structured use of the various Focal Points referenced above—has been designed and thoroughly tested to prepare you cognitively as well as physically for a successful learning experience.

Photo 5h: **Reduce drag by calming legs and letting them 'follow' your body.**

A combination of targeted mental focus with slow movements and moderate heart and respiration rate puts the brain into a state of relaxed alertness known as the Alpha brainwave pattern (8 to 12 cycles per second.) Researchers call this the Superlearning zone.

The five steps above encompass 10 distinct focal points, all with the potential to improve balance. Initially, pick one—and only one—for every rep you do. After each rep, assess the quality of your movement and the quality of your focus. The combination of balanced body and alert mind is the ideal preparation for all the learning that will follow.

6

How Streamlining Works

In 1936, British zoologist, Sir James Gray observed dolphins keeping pace with a boat traveling at 20 knots (24 mph). At this speed, a dolphin should experience drag 700% greater than its muscular power could overcome. So how did they manage to swim this fast? Sir James called this the Delphine Mystery and theorized that *an inexplicable ability to avoid drag* was the explanation. Nearly 80 years later, scientists still cannot fully explain that ability.

In 1992, USA Swimming researcher Jane Cappaert measured the stroking power of swimmers attending the Olympics in Barcelona. To her surprise, she found that finalists gener-

ated an average of 16% less power than also-rans. Ms. Cappaert hypothesized that the world's fastest swimmers owed their success mainly to *a superior ability to avoid drag*.

In 2005, DARPA engineers found that dolphins were nearly 30 times more effective than humans at converting energy into propulsion. They concluded that the dolphins' incredible efficiency reflected a *natural ability* for *'active streamlining.'*

Each of these studies confirms Bill Boomer's observation that "The shape of the vessel matters more than the size of the engine." Yet despite overwhelming evidence of the great advantages of streamlining skills, the training methods of competitive swimmers remain highly power-centric, while ignoring the effects of drag. But—having seen unmistakable evidence of the importance of 'vessel-shaping' 10 years earlier—I needed no persuasion.

Underwater Revelations

In September 1978, I began coaching at a pool with an underwater viewing window. The first time I descended the ladder to watch my athletes from underwater, I saw something startling that I'd never noticed while coaching from the pool deck the previous six years.

Swimmers who held a tight streamline while pushing off the wall seemed to *streak* through the water. Those whose 'vessel' was only slightly less sleek slowed so dramatically it looked as if they'd run into a wall. *And every one of them slowed noticeably as soon as they began to pull and kick.*

I instantly realized that if I could teach my swimmers to somehow avoid drag *as they stroked*—not only while underwater the first 5 meters—it would do more to boost their performance than anything else I could do as a coach. At that moment, I wasn't quite sure how to teach 'active' streamlining—i.e. minimizing drag while pulling and kicking.

A decade later, I would finally have the ideal opportunity to test that thesis, as hundreds of inexperienced adults began streaming in to TI workshops. Informed by insights into vessel-shaping from Boomer, those workshops would become a 'laboratory' for refining techniques for ultra-efficient swimming.

‘Separating’ Molecules

In old-school technique, you focus primarily on pushing back on the water molecules *behind* you. In TI technique you give far more attention to ‘separating’ the molecules in front of you.

Bodies designed to travel at high speed through air or water all share a similar shape—a smooth shaft, tapered at the ends. This is true of engineered objects—bullet trains, supersonic planes, jet-powered cars—and bodies shaped by evolution—fish and aquatic mammals. *(photo 6a).*

In all of these examples, the tapered leading edge separates molecules, to minimize high-pressure resistance in front. The smooth body slips through the low-resistance space created by the tip, to minimize turbulence in the air or water around it. A tapered trailing edge minimizes the creation of a low-pressure *vacuum* in the rear.

To develop Streamlining skills, swimmers must try to mimic those effects. Our inbred instincts, terrestrial bodies—and urgent directives from some coaches to pull and kick faster and harder—make that a real challenge.

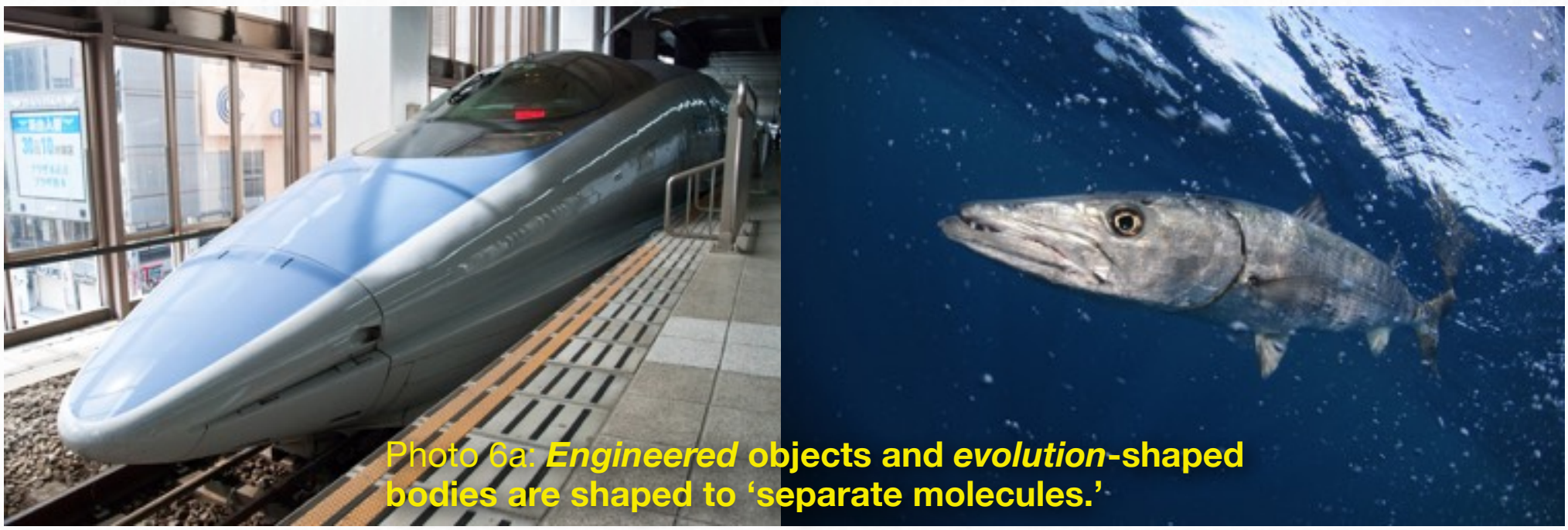


Photo 6a: ***Engineered*** **objects and** ***evolution*****-shaped bodies are shaped to ‘separate molecules.’**

But the benefits are almost limitless: *Our potential for reducing drag far exceeds our potential to increase propulsion.* To take full advantage of all this drag-reducing potential, it will help enormously to understand how drag occurs.

A Primer on Drag

To move forward through water, you must *push aside* the water in front of you. Drag is the energy cost of doing so. The more water you must move aside, and the farther you must move it, the more energy you expend. And the more energy you spend moving water aside, the less remains for forward motion. Considering that—as a *human* swimmer—you convert as little as 3 percent of your energy into forward motion, this ought to be your highest priority.

Drag comes in three forms: Friction, Pressure, and Wave. You can affect the last two by improvements in technique. Fortunately, they're the two that matter most.

Friction Drag is caused by water molecules adhering to your body as you move along. It results in far less resistance than Pressure or Wave Drag and can be addressed only by shaving body hair, or wearing specially-designed water-shedding swim apparel.

Between 2004 and 2008, manufacturers of competitive swim wear engaged in an 'arms race'—designing suits with high-tech rubberized materials. While this increased the cost of racing suits almost tenfold, it also re-

Photo 6b: **Human bodies can be *consciously shaped* the same way!**

Photo 6c: **Complete each stroke with head, torso, and legs aligned.**

sulted in an unprecedented spree of record breaking, before those materials were banned for providing an artificial boost to speed.

I competed regularly in Masters and open water events during the height of high-tech fever. Despite swimming in 'low-tech' suits, I had the greatest racing successes of my life, winning my first national titles and breaking national age group records. I did this by relying on cost-free and natural Active Streamlining techniques that minimized Pressure and Wave drag.

Photo 6d: **Keep head aligned while breathing.**

Pressure Drag is caused by the water's resistance to the volume and shape of your body. Because your body is land-adapted, has many moving parts and changes shape constantly as you stroke, your transformation into an ultra-efficient swimmer should begin by developing 'baseline' low-drag positions. You can do this in three

ways:

1. Complete each stroke with head, torso, and legs aligned as shown *(Photo 6c)*. In fact, the primary purpose of your stroking movements should be to put you into the lowest drag position.

2. Become especially aware of maintaining that sleek shape by keeping your head aligned as you breathe *(Photo 6d)*.

3. Reduce the distance the water must travel to evade you by rotating each shoulder just out of the water in crawl—and backstroke. (In butterfly and breaststroke, you accomplish this by submerging between strokes.)

Wave Drag is the largest resistive force limiting your speed and sapping your energy. Wave drag diverts energy in two ways:

1. It takes energy—all of it generated by you—to make waves or throw splash into the air. Energy diverted into wavemaking is unavailable for moving you forward.

Photo 6e: **Reduce drag by keeping bodyline long between strokes.**

2. Rough or rushed movements stir up the molecules surrounding you, causing eddies and vortices. These impede forward motion. They also make it harder to ‘grip’ the water with your hands as you stroke.

Less Drag, Less Work . . . More Speed

You minimize Wave Drag mainly by *thinking in radically new ways* about your stroke. Old-school thinking about freestyle treats the body as if it was divided at the waist: The upper body pulls. The lower body kicks. In new-wave thinking, mentally divide the body down the center: Form a long, sleek line with the right side of your body, then with the left side.

Photo 6f: **Form a long sleek line with each side of your body.**

During your next swim try this experiment: Swim one length with old-school thinking, then the next with new-wave thinking. Count strokes and rate your effort from 1 (easy) to 5 (hard) on each. When you focus on forming long, sleek lines with each side of your body, both stroke count and effort should be lower than when you focus on pulling and kicking.

Streamline *as you Stroke*. If that experiment works, take your streamlining exercise with these *Active* Streamlining techniques. These teach you to put your primary focus—while stroking—into avoiding drag. Creating propulsion still gets attention (as explained in Chapters 7 through 10) but becomes a secondary focus. You can actively minimize drag with these Focal Points:

Focal Point #1: Swim Taller.

The simplest thing you can do to reduce Wave Drag in freestyle is to lengthen your bodyline—and keep it long for more of each stroke cycle. Do this in two ways:

I. **Use Arms to *Lengthen Body*.** The most important thing your arms do is to *lengthen your bodyline*. In other words, give most of your focus to the arm that's extending. The other arm will be pushing back at the same time. Let it do its thing while you focus more on the one extending forward.

II. **Be Patient.** Begin each stroke just as the other hand is about to enter the water. The slight 'overlap' timing shown *(Photo 6g)* ensures you always have one hand forward of your head. By keeping your *vessel* longer than your actual height, you reduce drag—and maintain greater momentum—during the brief interval between strokes.

2. **Align on Tracks.** As you lengthen your body with your right arm along the Track, roll *slightly* to align the entire right side of your body to follow your arm down the Track. Your left shoulder should barely clear the water to let the water flow around it. These actions reduce both Wave and Pressure Drag.

3. **Slip Through a Sleeve.** Focusing again on the arm that's lengthening your bodyline, use your hand and arm to 'separate molecules' as you enter and extend. (This transforms your arm into the equivalent of the pointy nose of a bullet train or barracuda.) Then slip your head and body through the 'sleeve' cut by your extending arm. This minimizes Pressure Drag.

4. **Don't Make Waves.** As you swim, strive to minimize wave-making and eliminate bubbles, splash, or noise. Intensify this focus whenever

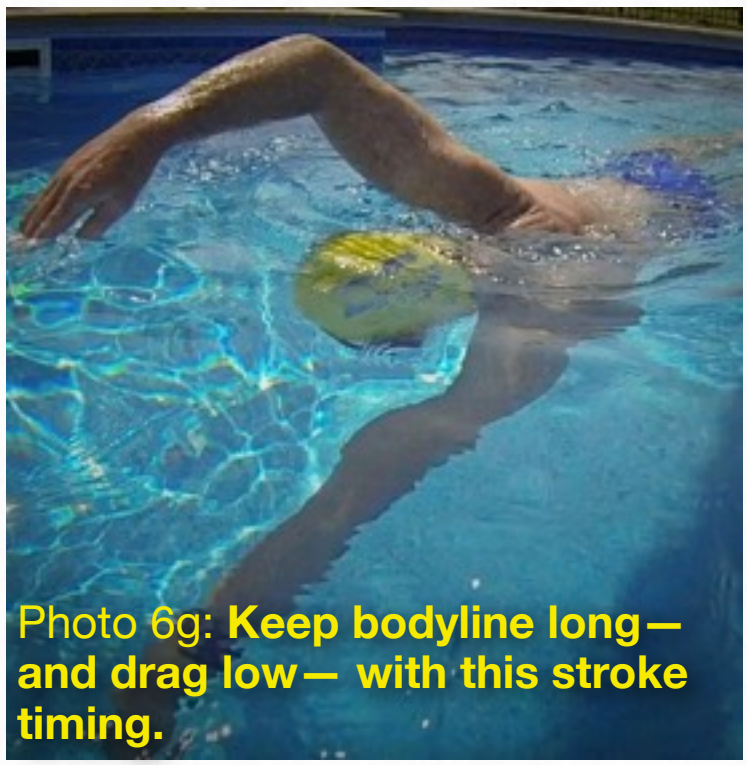


Photo 6g: **Keep bodyline long—and drag low— with this stroke timing.**

Photo 6h: **Minimize waves to swim faster . . . *easier.***

you increase speed or tempo, do a timed swim, or swim in a race. By minimizing Wave Drag, you'll swim faster . . . easier *(Photo 6h)*.

These focal points—along with those introduced in Torpedo, Superman and Skate drills — will not only improve your efficiency; they will also put you into the *Ultra*-Learning Zone.

Sleek Vessel or Powerful Engine?

In the next chapter, we turn our focus to Propulsion. Before moving on, I want to restate the highest-value takeaway of this chapter. It's very easy to be 'seduced' by thoughts of powerful propulsion and forget the importance of streamlining.

Remember this: ***Actions that minimize drag are far more valuable than those that maximize propulsion.*** Which is just another way of saying "The shape of the vessel is more important than the size of the engine.

The choice is yours: If you find yourself working too hard for too little speed . . . or your improvement stalls . . . or your stroke count is higher than usual . . . or any sign that your swimming isn't where it should be . . . recheck Balance and Streamline. You can never go wrong by doing so.

7

Ultra-Efficient Propulsion:
Swim From Your Core

The next four chapters describe Total Immersion techniques for Propulsion. This chapter explains why your pull and kick should be driven by core power and core rhythms. Two chapters are devoted to the armstroke, and one to the kick. But making optimal use of core power is essential to an effective pull and kick, so we start with that.

In 1988, like most former high school or college swimmers, I was sure my best swimming was behind me. Learning Balance made me realize I was far from a ‘finished project’ as a swimmer. There was no instruction manual, at the time, for teaching ‘fishlike’ swimming to

humans. Thus, for most of my 40s, I devoted my own practice mainly to refining the new *ultra*-efficient techniques we were teaching.

For 10 years I focused mainly on Balance and Streamline skills. Through this unusually long period—longer than the time I'd spent swimming in high school and college—I never felt limited by 'neglecting' Propulsion. I made steady progress in relatively basic skills, producing measurable improvements in overall efficiency.

I'm not suggesting that you wait 10 years, as I did, before working on Propulsion skills. For one thing, because of refinement in the TI learning process, I believe I could now learn in less than a year what originally took 10 years of discovery through experimentation. For another, many Focal Points for Balance and Streamline also help you propel more efficiently.

But please take away two insights:

1. Be mindful of how easily habit and instinct can pull you back toward the energy-wasting ways that come so naturally to human swimmers.

2. You can continue improving Balance, Stability and Streamlining indefinitely—and that will improve Propulsion as well.

Propel *Ultra*-Efficiently

One reason we introduce Balance and Streamlining skills first is because we're 'energy-wasting machines.' Those skills improve performance while *saving* energy and power. But Propulsion always incurs an energy cost because it requires you to apply muscular pressure to the water.

Apply propulsive efforts *ultra*-efficiently by:

1. Direct natural forces—like gravity and buoyancy—before generating muscular force.

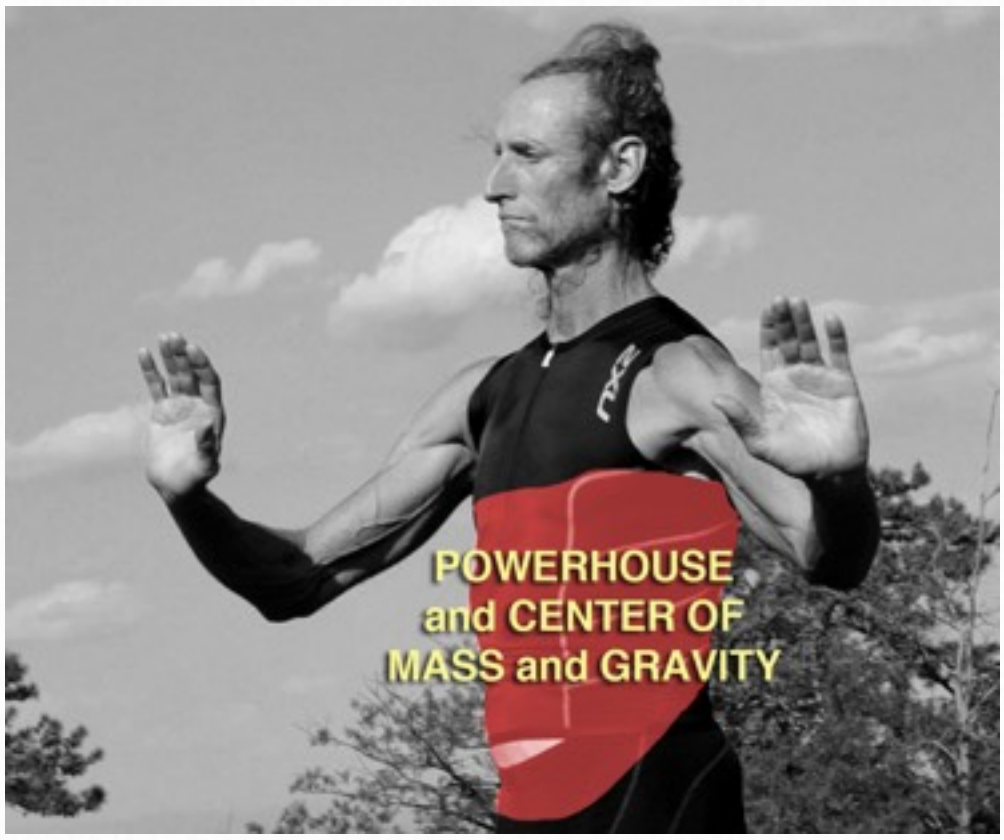
2. When you do generate force, maximize use of the largest, and most fatigue-resistant muscles—and minimize reliance on smaller muscles that fatigue easily.

How Core Power Works

According to experts in human movement, the *center of mass*—a point just below the navel—is where all movement should originate. This is also the point around which the body balances and rotates. Balance is essential to *skilled* movement. Rotation is essential to *powerful* movement.

In Pilates, the area from the bottom of the rib cage to the hips—including the gluteal muscles is called the *Powerhouse*. The center of mass is also the central point in the powerhouse.

In martial arts, the center of mass is referred to as the *dan tien*, which translates as “energy center.” Every martial artist learns not only to move from the *dan tien* but also to always *direct attention* there before focusing on other parts of the body.



TI *ultra*-efficient propulsion techniques are based on the same principles:

1. Focus attention on your core.

2. Initiate movement, power, and rhythm in your core.

Old-school technique puts your focus on the pull and kick. When you think first of pulling and kicking, the arms and legs must generate their own power—and that power is dissipated into the water. When you think first of using your core, you convert your midsection into a *force-coupler*—feeding power from lower to upper body and back again. Power flows to where it can be applied most effectively, and all body parts work as a synergistic system—rather than a collection of disconnected parts.

To propel ultra-efficiently, swim with your *whole body*, rather than your arms and legs.

The advantage of *whole body* swimming

Between ages 18 and 20, I was fitter than at any time in my life. Yet each time I raced—even at distances as short as 100 yards, taking less than a minute —my legs would get so tired that they were of little use on the final lap or two. In my longest race, the 1650 yards/1500 meters, which lasted less than 20 minutes, my *latissimus* and *triceps* muscles would ache for up to an hour after finishing.

In contrast, I'm now in my 60s, training less than half as much as in college, while regularly swimming open water races that last from 30 minutes to an hour or longer. Yet my legs always feel strong at the finish, and I never experience post-race muscle soreness.

Here's the difference: In college I *pulled and kicked.* Now I swim with my whole body—spreading the workload across many more muscles, most of it borne by 'powerhouse' muscles that are much stronger than arm or leg muscles and virtually immune to fatigue.

Our ultra-efficient propulsion skills will conserve energy and banish aching muscles in three ways:

1. Reduce the work your muscles must do by accessing 'free' power from the interaction of your body mass with gravity and buoyancy.

2. Transfer most of the muscles' workload from fatigue-prone arm and leg muscles to fatigue-resistant core muscle.

3. Apply power with *precision*.

Bring the Core to the Fore

Every key skill of TI Technique requires us to resist primal instincts—e.g. Using your arms and legs to minimize drag before maximizing propulsion. Core-powered Propulsion is no exception. Two focal points will help you direct attention to your core first—before focusing on how you use the arms and legs:

Focal Point 1: Use Energy from the 'High' Side

If you propel yourself by pushing water back with your hand, your arm and shoulder muscles bear the full load of overcoming drag and moving you forward.

Instead, *hold your place* with your stroking hand while driving the high hip to move past your grip. When you do, your whole body—*aided by gravity*—propels you forward. *(figure 7d)*

Photo 7d: **Use the high hip—*and gravity*—to move past your extended hand.**

When you add just a little of your own energy, the combined power output is far greater than what you can muster with just the muscles in your arm—but the work is far less.

Focal Point #2: Swim from the *Inside* Out.

Trying to propel with arm-and-leg churn creates two problems:

1. The arm muscles are not very powerful and they tire easily. Leg muscles, are quite powerful, but they're woefully ineffective at creating propulsion *and* they fatigue quickly.

2. When you move your arms faster, your core—having far more mass—often can't keep up. It then becomes useless and cumbersome baggage.

The solution to both problems is to swim faster from the *inside* by doing the following:

- To increase power, move your core more *energetically*.
- To increase tempo or rhythm, move your core more *briskly*.
- *Resist* the instinct to move arms and legs harder or faster.
- Let power and rhythm *flow to them* from your core.

Core Awareness Exercises

Swimming *from your center* feels dramatically different than swimming from the outside. These exercises will familiarize you with those new sensations.

Do each of the following as a series of 8 or more 25y/m freestyle repeats. Note how your awareness changes in each exercise.

1. **Count strokes.** On odd lengths, count hand entries. On even lengths, count hip rotations. Do you feel different when counting hip rotations? Use new awareness on the following exercises.

2. **Vary energy.** On odd lengths, ‘nudge’ your high hip lightly. On even lengths, add a bit more energy to hip drive—don’t overdo it. Use your high hip to push your extending hand *forward* (i.e. Don’t focus on pulling the other hand back.) How does adding energy at your hip affect hand extension? Do these changes affect your stroke count?

3. **Vary tempo.** On odd lengths, rotate your hips at a deliberate tempo. On even lengths, move them at a slightly brisker tempo. *Make no conscious effort to change arm tempo.* Can you feel your arms (and legs as well—if you already use a 2-Beat Kick) respond naturally to the change in hip tempo? Does this bring a greater sense of integration to your stroke?

4. **Watch and listen.** When varying hip energy or tempo, watch for bubbles in your stroke and listen to the sounds you make. Can you add energy or tempo at your hips while keeping your stroke free of splash, noise and bubbles?

Final Thoughts

1. **Body Control is Required.** If you feel your legs sinking or your torso is unstable, your arms and legs will be too busy trying to fix those errors to perform the skills described in this chapter. Recovery and breathing have particular potential to undermine your propulsive efforts by destabilizing your core, because both involve raising large body parts above the surface. Chapter 8 explains how to recover in a way that contributes to ultra-efficient propulsion. Chapter 11 does the same for breathing.

2. **Propulsion is Kaizen.** More than any other category of skills, you can improve propulsion steadily over many years. I began to give keen focus to a more propulsive armstroke 12 years ago and to making my kick more effective 10 years ago. I’ve come a long way in both, but still don’t feel as if my learning curve has flattened. I seem to gain some exciting new insight or awareness each year.

3. **Connect with established skills and habits.** You learn fastest by using an established skill as the foundation for a new one. In the chapters on the armstroke and kick, I list mini-skills from Balance, Stability, and Skate that prepare you for improved propulsion. The stronger those skills are the more easily you'll master more advanced skills; if they're not well-developed, you'll have a harder time.

The Choice is Yours . . .

If you find yourself working too hard for too little speed . . . or your improvement stalls . . . or your stroke count is higher than usual . . . or any sign that your swimming isn't where it should be, recheck Balance, Stability, and Streamline. You can never go wrong by doing so.

8

Ultra-Efficient Armstroke, Part 1: *Recovery, Entry and Extension*

Each armstroke has two phases:

1. You push back against the water to move the body forward—usually called the ‘pull’ or ‘stroke.’

2. You bring the arm forward to push back again—usually called the ‘recovery.’

In traditional freestyle, the armstroke is generally treated as one action, in which pushing back commands 95% of attention—because it's related to propulsion. The recovery is mostly overlooked—except for examples of questionable advice, like recovering with a straight arm.

In TI Freestyle the recovery phase becomes a distinct and essential skill. Because the arm moves *through the air,* it's subject to complex biomechanical and hydrodynamic forces, which have vast potential to disrupt balance, stability, and streamline. In addition, poor recovery technique is to blame for the majority of swimmers' shoulder problems.

We give such keen focus to recovery techniques because of the principle that *the shape of the vessel matters more than the size of the engine.* Any heedless action during this part of the stroke is likely to significantly undermine efficiency.

Good recovery skills will *also* improve your propulsion. It's impossible to apply firm, steady pressure *toward the rear,* if your hands are busy sculling and sweeping in other directions, trying to correct body position.

We guarantee: When you achieve a good baseline in three critical recovery skills, your efficiency at propelling will improve *automatically.* And when you move on to giving specific attention to how you hold and press the water (covered in the next chapter), your stable core will enable much faster progress in those skills, as well.

The "10X" Arm

As you finish each stroke, you lift your arm from the water and carry it forward over the surface. When your arm loses the buoyancy of water and becomes subject to the full force of gravity, its weight is effectively multiplied by a factor of 10. This gives even the *smallest incorrect movement* great potential to hurt balance and stability, increase drag, and disrupt propulsion.

To ensure a stable core body, you must establish three elements in your recovery:

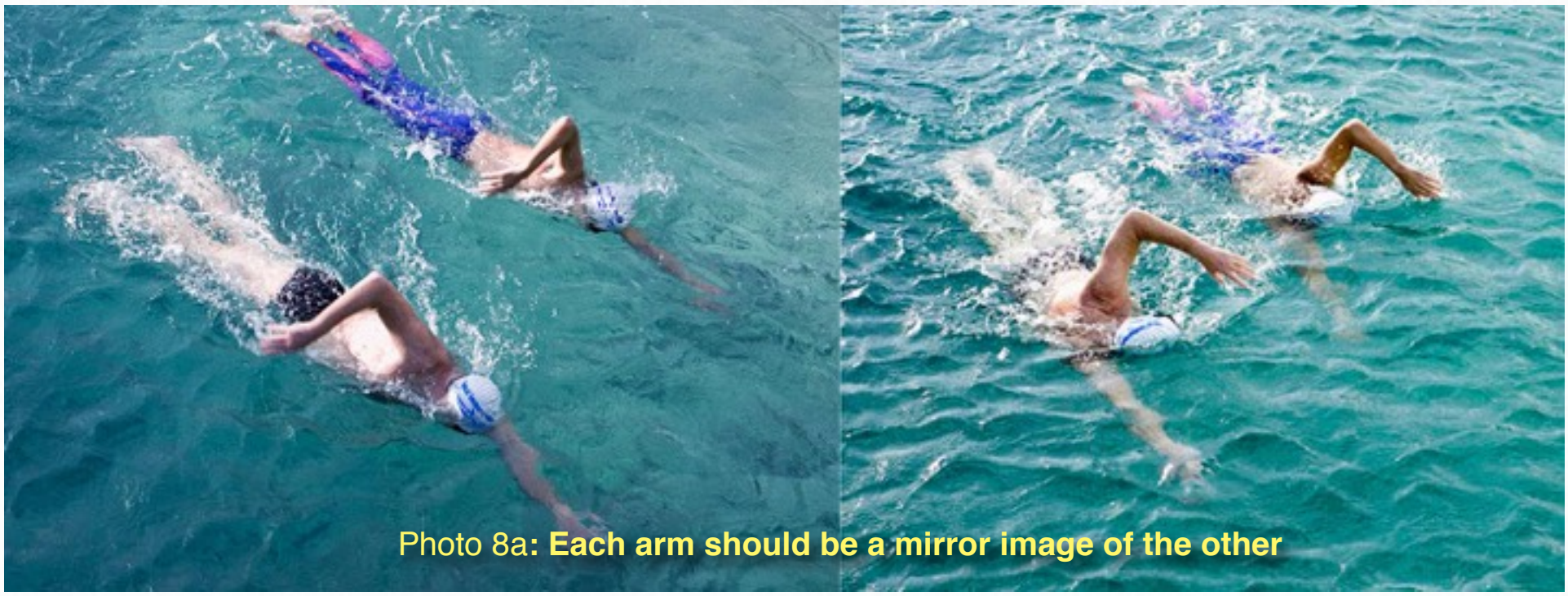


Photo 8a: **Each arm should be a mirror image of the other**

1. Symmetry

Each arm should be a mirror image of the other. *(Photo 8a)*

If one arm swings just a little wider or higher, it will direct uneven forces to your core body—causing your legs to bend excessively or splay far apart. Or an asymmetrical recovery may cause you to veer continuously to one side.

In the pool, you'll make constant small corrections—wasting energy every time. In open water, the effect of these overlooked errors becomes far more noticeable, sending you far off course. A symmetrical recovery will cure the worst of these problems.

Three Steps to Improve Symmetry

1. Carefully replicate the three skill steps below with each arm.
2. Learn to breathe bilaterally. Read more in Chapter 11 The ultra-Efficient Way to Breathe.
3. Record video of your recovery—both front and side—to reveal errors too subtle to feel.

2. Relaxation

‘Hang’ your forearm and hand from your elbow—like a rag doll. **Turn off every muscle below the elbow** while your arm is in the air. This matters because:

1. A tense forearm creates *ballistic* forces, which can divert your momentum sideways. Relaxing the forearm minimizes ballistic forces during recovery.

2. As you press back, you’ll activate hand and arm muscles to hold the water. To keep those muscles fresh, give them a rest when they’re not needed. The farther you swim, the more this matters.

3. [Note: A ‘Rag Doll’ Arm is also best in rougher water. When a wave hits a relaxed arm, it yields to—and dissipates—that force. If the arm is tense, it transmits that force to the core body, hurting stability.]

Photo 8b: **The ‘Rag Doll’ arm improves stability and channels energy forward**

3. **Direct Energy Forward**

While above the surface, it's essential that your arms move *in the same direction you are*. Lifting your hand—more than the absolute minimum required to clear the surface—will hurt balance and waste energy. Swinging them to the side will send you off course.

Imprint those three qualities in your recovery by developing three essential skills.

The 3-Part Recovery

While the recovery takes only a split-second, it has three distinct phases—each taking an even smaller fraction of a second. Even so, because your arm is above the surface, there are many opportunities for costly errors. Learning these skills will transform your swimming!

1. Swing your Elbow

Nearly all swimmers instinctively *lift* the elbow as it exits the water—or, worse yet, pull it inward toward the spine. Lifting hurts balance. Pulling it back causes the hips to roll too far, hurting stability. *(Photo 8c).*

Photo 8c: **Pulling elbow into 'red zone' causes injury and instability.**

Recovering in the *red zone* (outlined in Photo 8c) increases stress on your shoulder, by pulling the arm behind the 'scapular plane'. Maintaining the flatter angle between upper arm and shoulder, illustrated in Photo 8c, relieves tension and stress in the shoulder.

To maintain Balance, Stability—and achieve a comfortable and *orthopedically-healthy* range of motion—swing your elbow away as your hand exits the water, with your upper arm at the angle shown in Photo 8d.

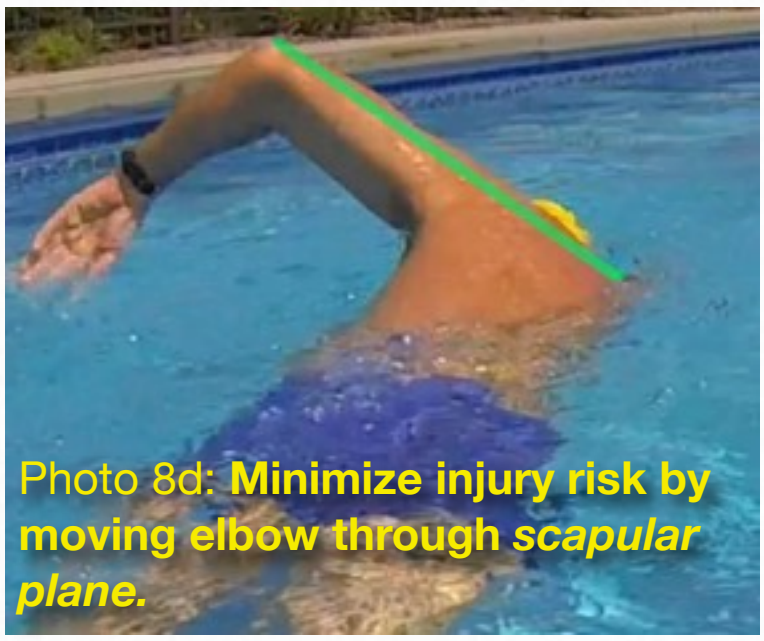


Photo 8d: **Minimize injury risk by moving elbow through *scapular plane.***

clearing the surface. [To enhance awareness, 'paint' that line with fingertips, or even knuckles dragging on the surface, as shown *(Photo 8e)*.]

2. To remove ballistic forces, and give arm muscles a rest, *hang* forearm and hand from your elbow like a rag doll. Strive to feel that *every muscle below your elbow* is turned off.

2. Paint a Line.

This skill eliminates ballistic forces from recovery, and moves your arm in the direction you're traveling. Learn this via two Focal Points:

1.Visualize a straight wide line between the hand's exit and entry points. Mindfully follow that line on recovery—with fingertips barely

Photo 8e: **'Paint' a *straight line* from exit to entry**

3. Mail Slot

Learn the Mail Slot entry via these Focal Points:

1. Visualize cutting a 'slot' in the surface with your fingertips as they enter. *(Photo 8f).*

2. Slide your hand and forearm through this slot. The hand is easy; your forearm takes care.

3. Enter the Slot without noise or splash. *(Photo 8g).*

Photo 8f: **Visualize a Mail Slot while 'rehearsing' the entry.**

Arm Extension

You complete this phase of the armstroke by reaching to full extension through—not over—the water, following the Slot entry. This is ultra-efficient because:

1. Your arm regains the support of buoyancy (i.e. reduces its weight by 90%) much sooner. This improves Balance.

Photo 8g: **Enter the Slot without noise or splash.**

Photo 8h: **Extend relaxed hand below bodyline with no bubbles.**

2. It gives you a longer bodyline in the water. A longer ‘vessel’ reduces drag.

3. Your extending arm ‘separates molecules like the tapered head of the dolphin. Your body encounters less resistance when it follows your arm through this ‘sleeve.’ *(Photo 8h).*

We’re often asked: *Doesn’t your arm encounter less drag moving through air?* The answer is: Yes . . . if that’s all it did. But your arm’s drag is trivial compared to the drag created by your body. And by using your arm to slice through the water *ahead of your body*, total resistance is far lower.

The Slot entry also protects you from shoulder pain and injury. Reaching far forward before entry is the most common cause of shoulder injury. A fully extended arm impacts the surface at the moment when your shoulder joint is least stable and the stress created by your arm pressing against the water is greatest. Doing this while wearing paddles creates a *perfect storm* of injury potential!

This part of the stroke should be fairly familiar already, as we introduced Focal Points related to arm extension as elements of Balance and Streamlining. Review these Focal Points from Chapter 5:

1. **Reach to full extension.** Don’t strain. Do open your *axilla*, or underarm. Lengthening your bodyline reduces resistance.

2. **Reach slightly downhill.** Your *relaxed* hand should be below your bodyline when you reach full extension.

3. **Extend on Wide Tracks.** Extending on shoulder-wide Tracks gives you the equivalent of 'outriggers' for a more stable vessel.

4. **Minimize bubbles** . . . as you do each of the these three actions.

Last Thoughts

If you find yourself working too hard for too little speed . . . or your stroke count is higher than usual . . . or your improvement stagnates . . . or any sign that your swimming isn't where it should be . . . recheck how your recovery, entry and extension are affecting Balance, Stability, and Streamline. You can't go wrong by doing so.

9

Ultra-Efficient Armstroke, Part 2:
Creating Propulsion

The propulsive phase of the armstroke goes by various names—the pull, the stroke, catch-and-press. Whatever you call it, remain mindful that using scarce energy ultra-efficiently should always be your conscious priority. When you press your arm back, there are two possible outcomes:

1.**You 'spin your wheels.'** You move the water too much . . . your body not so much. This occurs 99% of the time—and is virtually *guaranteed* whenever you try to stroke faster or harder.

2.**You keep the water still . . .** while moving your *body* forward. This is exceptionally rare. It requires a *stable vessel*; acutely sensitive *feel for the water*; and *precise* application of

pressure. Though it may be challenging, *any* swimmer can learn this. Read on to learn how.

What 'Doc' Saw

In 1968, Indiana University coach Dr. James 'Doc' Counsilman attached lights to legendary swimmer Mark Spitz's fingers to highlight his hands' movement and filmed underwater as Spitz swam crawl against a grid background. When Counsilman reviewed the film he saw something that overturned traditional notions about 'moving forward by pushing water back.' The film showed very clearly that Spitz's hands exited the water *forward* of where they'd entered.

In other words, his hands *held their place*, and his body moved past them.

One of the most important things that elites do exceptionally well is hold the water. The rest of us *move it around*. Coaches call this 'feel of the water' but there's much more to it than feel. This essential skill is so rare in part because few people have that kind of innate feel. It's also rare because so few people have mastered the even more fundamental skills of balance and stability. If your hands are busy steadying your body, they simply *can't* hold water.

Five Fundamentals for an *Ultra*-Efficient Stroke

When you stroke, you should move forward about as far as your arm pushes back—while placing minimum demand on fatigue-prone muscles. Five skills make it happen:

1. 'Trap' the Water. To travel forward as far as possible, you must trap the *largest volume of water* behind your hand and forearm. From the *Mail Slot,* reach to this catch position.

2. Hold your place. Resist the instinct to pull back. Instead, try to keep your hand still while your body moves past it. *(Photo 9c).* Not only will this eliminate wheel-spinning, it also keeps arm muscles fresh:

- When you *pull*, arm muscles do most of the work.

- When you hold, core muscles take over.

3. Press straight back. Pressing straight back maximizes forward propulsion. Pressing *in any other direction* is wasteful—and often hurts body position. You need a balanced, stable vessel to maintain steady rearward pressure. *(Photo 9d).*

4. Stroke with *precision*. Stroking forcefully is more likely to create bubbles and turbulence than propulsion. It also puts your shoulder at risk. Instead stroke firmly, not forcefully. Rotator cuff muscles *direct* the pressure you apply. They work best (and stay healthy) when not overloaded.

5. Minimize drag. To create locomotion, your muscles must generate more force than the resistive force of the water. Generating muscular force is costly. Reducing drag is *free*. *(Photo 9e).*

Photo 9b: **Trap as much water as possible behind hand and forearm.**

A Transformative Sensation

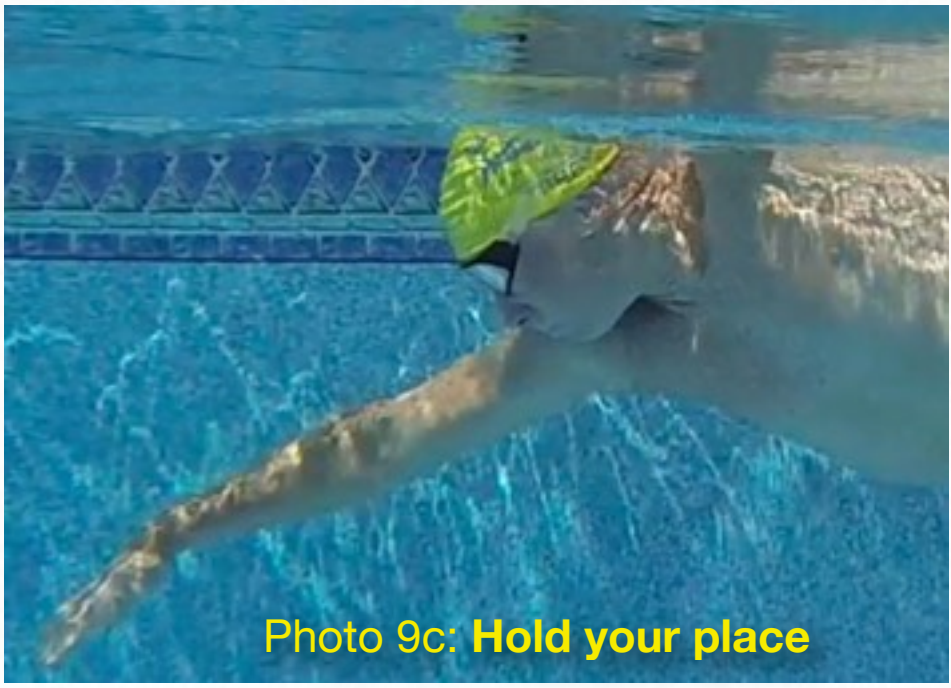


Photo 9c: **Hold your place**

From age 14 to 54, I had no understanding of how the water should feel when I pressed on it with my hand. Even with this 'sensory blind spot,' my *low-drag vessel* had allowed me to place 2nd in Masters National Championships in open water at age 53, for 5 kilometers, and for 2 miles at age 54.

But months before my 55th birthday, I ruptured the biceps tendon in my right shoulder while lifting weights—normally a crippling injury for a swimmer. My post-surgery rehab orders prohibited whole-stroke swimming for nearly four months. However I cheated a bit, resuming swimming after six weeks. To protect myself from re-injury, I swam with *featherlight* strokes for about 10 weeks—something I'd never attempted (or frankly dreamed of doing) in 40 years.


Photo 9d: **Press straight back**

A remarkable thing happened: Minimizing stroke pressure strikingly enhanced *feel for the water*. The water began to feel 'thicker' (like pudding or syrup) and I could feel it return pressure to my hand and arm. As my shoulder felt stronger and I pressed more firmly, I felt myself *move forward like never* before with each stroke.

In the following year, I made a

Photo 9e: **A *sleek bodyline* reduces need for power in the pull.**

breakthrough I'd never imagined possible, winning several national championships and breaking national 55-59 age group records—though the injury and rehab had considerably reduced my training volume and intensity over the previous year.

How to *Hold* the Water

Fundamental 2 in the sequence above is the most challenging because it requires a rare degree of sensory awareness and precision control. To acquire the kind of sensitivity I did, it's not necessary to be injured and go through rehab. Practice five Focal Points with short non-breathing repeats—five to six strokes. Stay with each Focal Point as long as needed to achieve consistency. Practicing with a snorkel can accelerate learning. *(Photo 9f).*

Focal Point #1: Watch and Feel. Watch your hand extend to verify that your palm faces back as you reach full extension. Memorize what you feel when you see your hand in this position. Repeat until you do this consistently. *(Photo 9g)*

Focal Point #2: Remain still. Next, watch and feel that your hand is *still for a moment* after completing extension. Pausing for just a nanosecond is enough. Repeat until you achieve consistency.

Photo 9f: **Practicing with a snorkel can accelerate learning.**

Focal Point #3: But keep moving. As your lead hand pauses, your other hand should keep moving through exit and recovery. This skill (it's called asynchronous timing) can be challenging. Give it time.

Focal Point #4: Hold your place. Shift focus from a still hand to actively holding your place with that hand. Even as you think about holding, you'll feel your hand pulling. It's normal to feel that: Stay focused on holding a little more, and pushing back less. (Photo 9h).[Note: This action should make you feel core muscle become more active—and arm muscle a bit less. Do you feel it?]

Focal Point #5: Propel past your grip. Use your *high hip* to move your body past your hand. If holding with left hand, your right hip moves you past it. This should create a sense of *hips*—instead of arms—doing most of the work of propulsion. This is the feeling of core-powered propulsion. *(Photo 9i).*

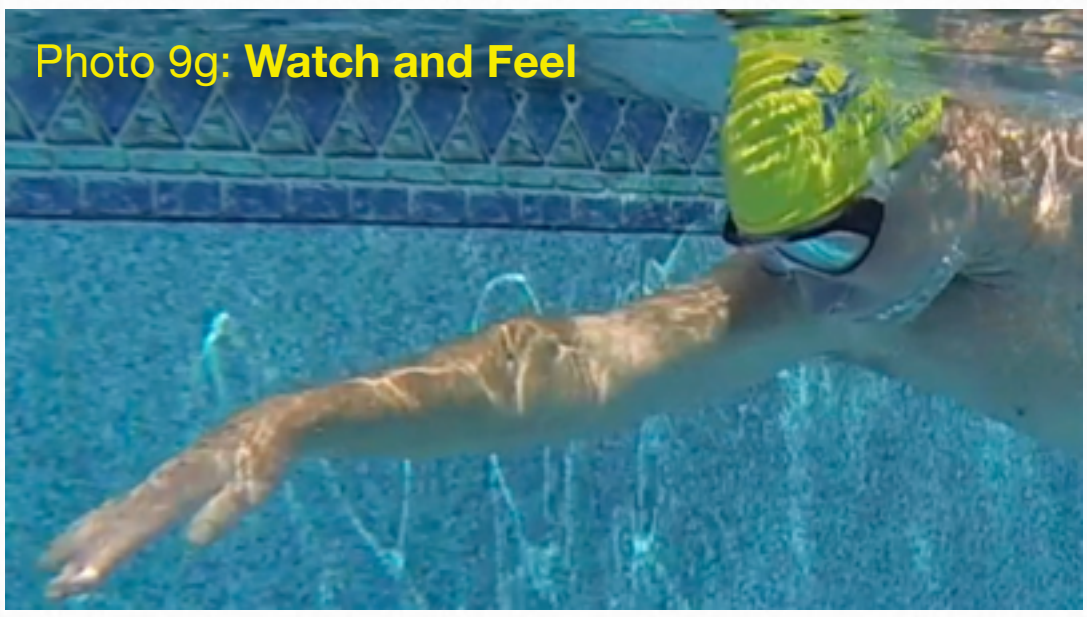


Photo 9g: **Watch and Feel**

Feel of the Water.

To enhance sensory awareness, try any of these exercises with a closed fist, or with just your index finger extended. Either will make you more aware of the importance of holding

Photo 9h: **Hold your place**

water with your forearm as well as hand. Then repeat with your full hand and note how sensory awareness has changed.

When stroking with a fist, flex your wrist to face more of your hand to the rear. When stroking with one finger focus on two things:

1. Your finger should always point down.

2. Try to hold a single water molecule on the tip of that finger for as long as possible. (This is an intensive visualization exercise.)

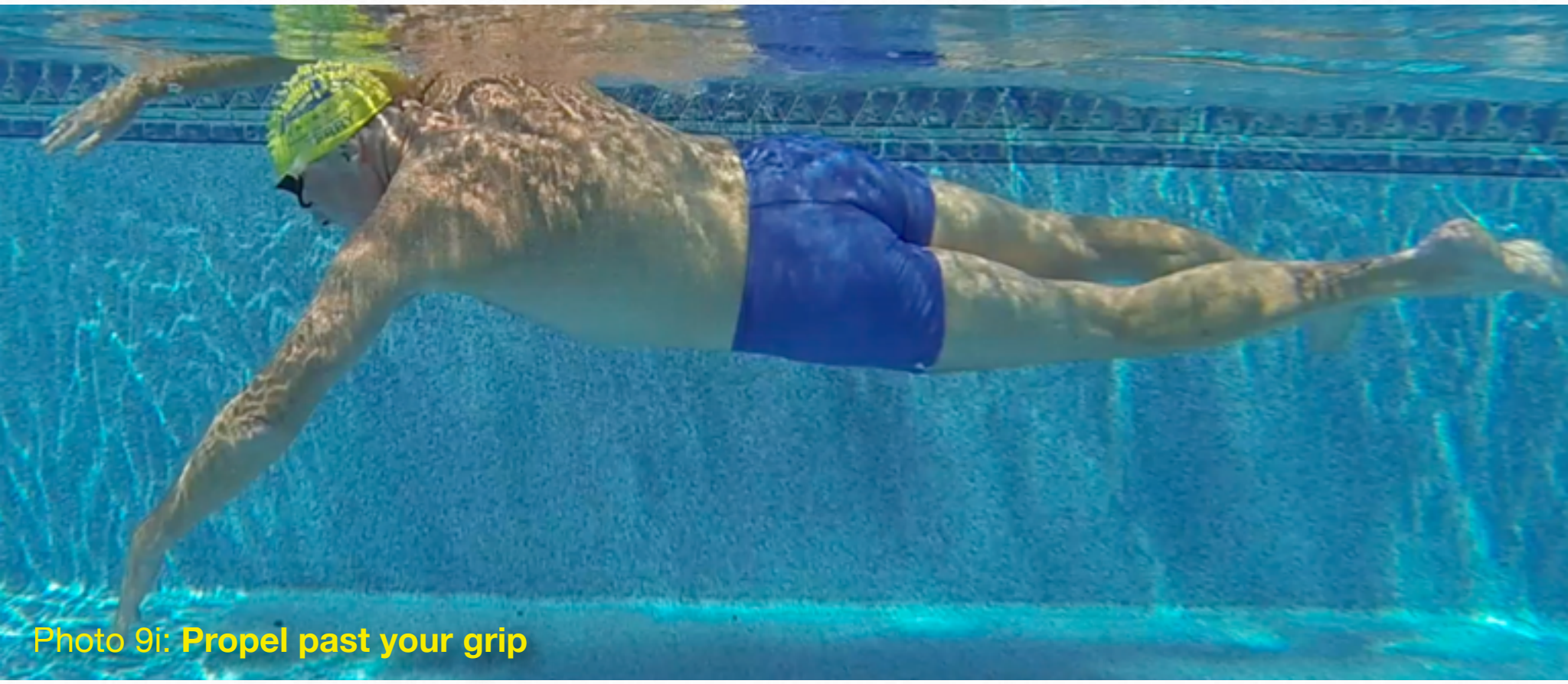


Photo 9i: **Propel past your grip**

Bad Advice: *Ignore* These Stroke Tips

One swimmer said he'd heard over 100 stroke tips over the years—all given equal emphasis—but none had made a lasting difference in his swimming. There is more bad advice related to the armstroke than any other part of the stroke. You can safely ignore all the following:

Photo SB1: **Fingers should be slightly separated**

Make your hand a paddle. You've probably heard you should stiffen the hand into a sort of paddle while stroking. This *will* fatigue your forearm; it won't improve propulsion. A stiff hand is highly likely to scoop up as you reach, causing legs to drop and increasing drag. A relaxed hand (firm but not stiff) minimizes fatigue, holds water better, and increases sensitivity to water pressure. Your fingers should be slightly separated, both stroking and recovering. *(Photo SB1)*

[**Note:** We strongly discourage using the other kind of paddle as well. It increases risk of shoulder injury, puts emphasis on using arm and shoulder muscles, and hurts your feel of the water.]

Stroke in an 'S.' Films of elite freestylers show them stroking in a curving pattern—wide at the start, sweeping inward slightly, then back outside the hips. Consequently, some advise you to consciously do an 'S-stroke.' But when asked what they feel as they swim, these elites say they stroke straight back! You should feel the same. If you try to stroke in an S, you'll exaggerate the natural curve, hurting efficiency.

Push beyond your hip. Most propulsion occurs at the moment shown in *Photo SB2a*. When your hand reaches the position in *Photo SB2b* the water behind it is already moving. Pushing further will only wear out your *triceps* muscle (which should never ache or feel

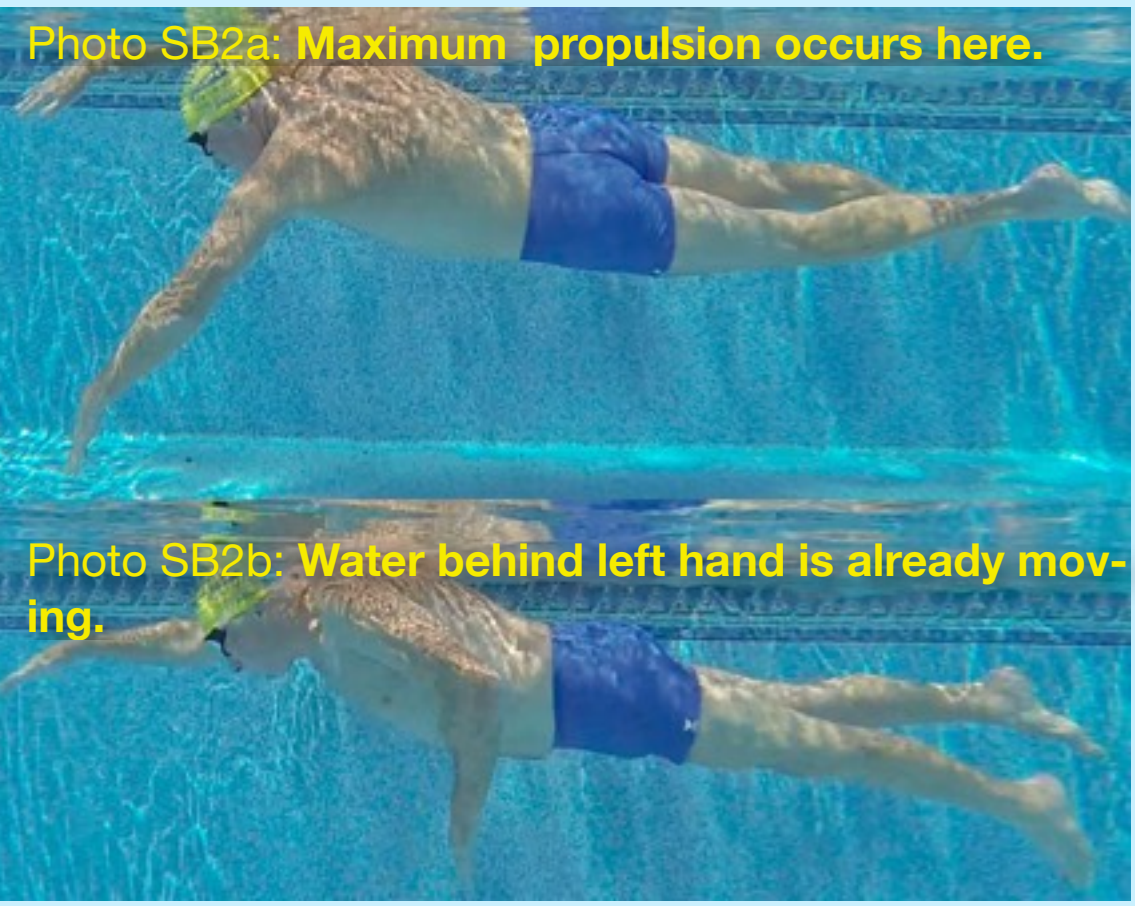


Photo SB2a: **Maximum propulsion occurs here.**

Photo SB2b: **Water behind left hand is already moving.**

tired) and may hurt core stability. Start the stroke effectively, then let it take its natural course.

Accelerate your hand. I was told to push harder in the last third of the stroke as early as 1968. It was bad advice then and remains so today. This stroke tip came from old movies of elites showing the hand seeming to accelerate. Like the S-stroke, they weren't *trying* to accelerate. In reality, the hand doesn't move back faster. The body moves *forward* faster—because of the weight shift, (*Photo SB3*) and because drag is far less when the body reaches the position shown below. If you try to accelerate: (1) the water moves; and (2) your triceps ache.

Photo SB3:**The body moves forward because of weight shift**

10

How To Kick *Ultra*-Efficiently

We referred earlier to the kick as a common ‘failure point’ for beginners. For most everyone else, it’s the greatest cause of wasted energy—a problem extending even to elite swimmers. Most of us feel that we kick too hard, with too little effect.

I’m no exception. For almost 40 years, I believed I needed to kick harder to swim faster, but doing so exhausted me. It also disrupted my stroke rhythm. When I raced, my legs almost invariably ‘died’ each time I raced—while adding precious little speed. I faithfully did kicking sets for over 20 years, yet my kick never became more effective . . . and my legs still ‘died’ in races.

That finally began to change in 2004, when I learned a coordinated and effortlessly powerful '2-Beat Kick' that provided a significant boost toward breaking National Masters records for the 1- and 2-mile open water cable swims soon after. I'd been doing an ineffectual version of that kick for many years before. Learning to connect it to power and rotation in my core body made all the difference.

Though I haven't done a kicking set (i.e. a set that works the legs in isolation to strengthen and condition them) in 20 years, my legs *never* tire. They still felt fresh after swimming over 28 miles in the Manhattan Island Marathon.

The TI ethos of *kaizen*—no skill is static or fixed, but can be improved continuously—applies strongly to kicking. Ten years after I transformed the efficiency of my kick, I continue to experience breakthroughs in balance, control, and precision—and in understanding how the kick works.

How Inefficient is the Kick?

The most comprehensive attempt ever to assess how much propulsion the kick produces, and at what energy cost was conducted nearly 50 years ago by Doc Counsilman, the same coach who revealed that Mark Spitz kept his hands in place while his body moved forward.

Doc Counsilman

In one study, Doc had swimmers towed at a range of speeds. At each speed, he measured tension on the line—sometimes with the swimmer kicking, at others with the legs streamlined—to assess whether the kick added propulsion.

Kicking added propulsion *only* at slow speeds, with the swimmer kicking at maximum effort. At speeds greater than 5 feet per second (a plodding pace for the swimmers Doc tested), hard kicking added no propulsion, In fact, it *increased* drag most of the time

Doc also measured the oxygen cost of pulling only, kicking only, and whole-stroke. In every instance, kicking consumed far more energy. For example, at a pace of 60 seconds for 50 yards, (ultra-slow for elite swimmers) kicking required 400 percent more oxygen than pulling at that pace.

Doc's studies made strikingly clear the high cost and minimal benefit of kicking—even among swimmers as highly skilled as those on Doc's NCAA championship teams. For the rest of us, inefficient kicking exacts far greater costs. Indeed, one of the easiest ways to significantly increase your efficiency is to simply kick *less*. As a second step, those with higher ambitions in skill and/or performance, can gain a significant payoff from doing as I did and develop the 2-Beat Kick to a high level of skill.

One Stroke: Two Ways to Kick

Freestyle is the only stroke that offers two different kicking options. One is the 6-Beat Kick (6BK) with six leg beats per stroke cycle. This is the kick most favored by competitive swimmers. Doc Counsilman's study looked at the effects of the 6BK.

The second option—the one I worked to master, and recommend to most swimmers—is the 2-Beat Kick (2BK), with two beats per stroke cycle. (While some claim the 4-Beat Kick is another variation, in most cases, the 4BK is actually a 2BK with extra 'steadying' beats, due to poor stability in the core body. It's better to stabilize your core, eliminate the extra beats, and learn an effective 2BK.)

The only circumstance in which I recommend using a 6BK is if your goal is to swim a short distance (50 to 100 meters) as fast as possible. For *all other swimming goals*, it's better to choose a kicking option that requires far less effort and energy. You'll swim better, enjoy it more and progress faster. And if you're a triathlete, you'll have fresher legs for running and biking.

A highly effective 2BK is not a simple case of kicking *less*. It's a sophisticated action that seamlessly coordinates the legs with the whole body. An effective 2BK generates impressive propulsive power, while keeping leg muscles fresh.

Nor is the 2BK *slow*. When he broke the 1500-meter world record in the 2012 Olympics, Sun Yang used a thoroughly relaxed 2BK for 90 percent of the race, changing to a 6BK only for the final 150 meters. (To see video of Sun Yang during a world record swim, click here.)

Six Beats or Two?

In the 6BK:

1. Only two beats contribute to propulsion; four are preoccupied with body position; and
2. Oxygen-hungry thigh muscles work continuously and you rely entirely on muscular force for the little propulsion your kick generates.

In the 2BK:

1. *Every beat* helps propel you forward; and
2. Thigh muscles fire for only a fraction of a second in each stroke, and highly efficient core muscle does most of the work—supplemented by 'free' energy sources of gravity and buoyancy.

How to Learn 2BK

The 2BK is an essential element in the ultra-efficient form we call Freestyle. A 6BK will also adapt easily to Total Immersion technique, though we don't cover that in this book. However—because four of six beats deal with body position—if you learn to stabilize and

streamline your ‘vessel’, far more of your energy in a 6BK will be channeled into propulsion.

The first step toward learning a high-skilled 2BK is to simply calm any existing tendency of your legs to churn or scissor. As a supplemental step, learn to integrate your kick closely with the actions of arms and torso.

Step One: Calm and Streamline

If you feel your kick is too tiring or accomplishes little, it’s because your legs are churning, flexing, or scissoring—habits that developed due to poor balance or an unstable core. If you’ve improved balance and stability but still feel as if your legs are overactive, relax your legs as much as possible, without dragging them.

This should bring immediate energy savings—plus the additional benefit of becoming aware: Can you sense the difference between a ‘no-kick’ stroke that supports a straight bodyline and a more active kick that breaks it? Work patiently to have more of the former. Swim short repeats—starting with a brief no-kicking glide in Superman position. *(figure 10b).* Stop for a reset when you feel your legs over-working.

Step Two: Streamline Your Kick

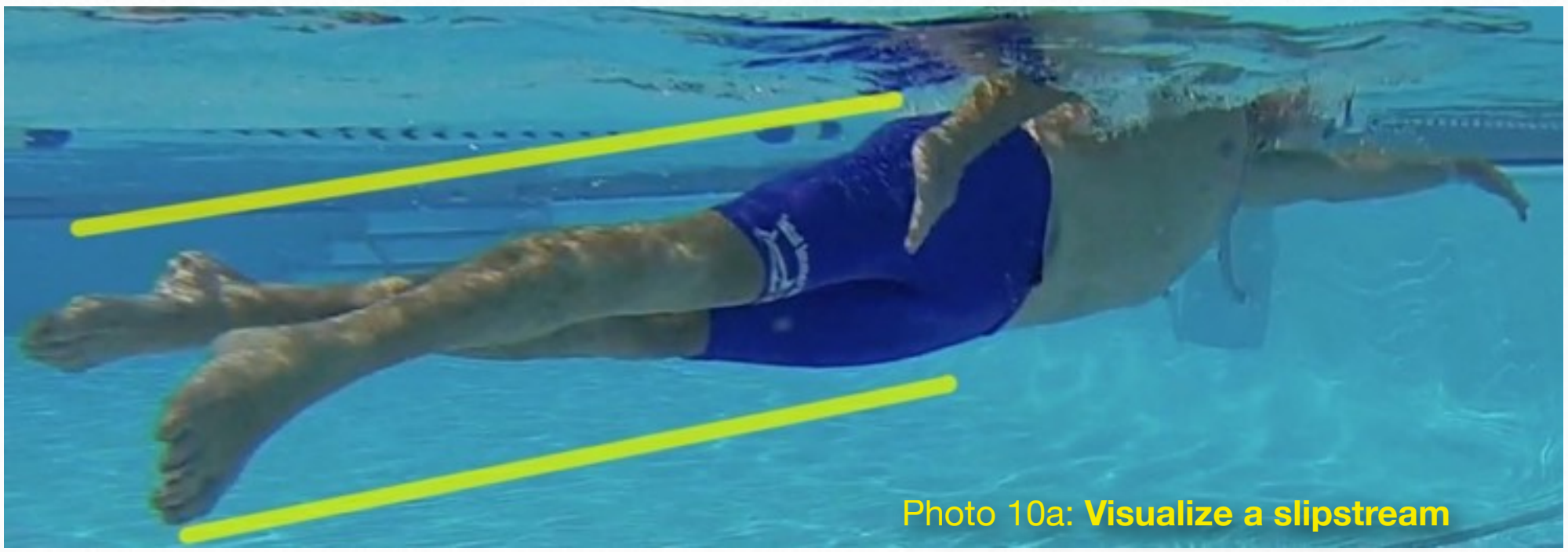


Photo 10a: **Visualize a slipstream**

You learned earlier that (because a sleek vessel is better than a big engine) Job One for your arms is to *lengthen your bodyline*. The highest value activity for your legs is to *draft behind your upper torso*.

Visualize a *slipstream*—spreading slightly like a boat's wake—behind your upper body. *(Photo 10a).* If you feel your legs drift outside the slipstream, check for:

- Does your hand scoop up or curve inward as you extend it?
- Do you pull your elbow back or swing your arm wide on recovery?
- Are you rotating too far onto your side—rather than *off your stomach*?

Correct those and you'll gain better control of your legs.

Also, focus on your core: Pull navel toward spine and tighten glutes slightly, creating a sense of a 'toned' (not tense) core. Extend that sense of *tone* to your feet. Better-toned legs will be critical in the next step.

Step 3: Connect Your Kick

Your kick will acquire effortless power when it's driven mainly by core-body rotation, with leg muscles adding a small assist. You can master this via a series of mini-skills, which progress gradually from easier to more challenging. It took me a few weeks to learn the first. I've been improving the others for over a decade.

Mini-Skill #1: Drive the *opposite* hand forward. *Right foot drives left hand forward, and right foot drives left hand.* We call this 'diagonal power.' This adds leverage to a dynamic we described earlier— using your hip to drive your hand through the Mail Slot toward the position shown in *Photo 10b*.

When you make the diagonal connection with consistency, combine it with a focus introduced in Chapter 10. Use left foot to drive right hand past your left hand—which is *holding your place* in front. The moment when this occurs is shown in *Photo 10d*.

Photo 10b: **Drive the *opposite* hand forward.**

Also notice that, each time you kick, your leg is naturally re-positioned for the next kick—with no more effort than swinging your arms while walking.

Mini Skill #2: Stable Pivot. Using my foot to drive the opposite hand forward was my sole 2BK focal point for several years. I became aware much later that the 'inactive' leg—the one not driving—also has an important role to play. (*Photo 10c*).

After your foot drives your hand forward, that leg should hold its place, to act as a 'pivot point' off which the other leg drives.

After flicking your toes, keep that leg long and stable, as you press the other down. The stable leg should feel *strong-and-supple*, not rigid.


Photo 10c: **Right leg is stable pivot as left leg drives.**

Mini-Skill #3: Steady Pressure. As with your armstroke, you can create either turbulence or propulsion when you press on the water with your leg. Your kick will add more to propulsion, while minimizing muscle fatigue, if you press firmly and steadily—rather than a sharp, snapping motion. It should feel more like using your foot to roll a heavy medicine ball forward—and less like kicking a soccer ball.

The Power of Leverage

Archimedes, the Greek mathematician, physicist, and engineer said: "Give me a lever long enough . . . and I shall move the world." The ultra-efficiency of the 2-Beat Kick derives from using your lower leg and foot as a *Class 1* Lever. *(Photo 10d).* Their combined surface area can apply considerable pressure to the water.

Also, the distance from your extended hand to opposite foot is the longest span on your body—a valuable force-multiplier in the principles of leverage. *(Photo 10e).* When you use your leg to drive your hand forward (and extend and rotate your upper torso) *every muscle* between your foot and hand cooperates in this action. Combining this with gravity generates impressive power—while each individual muscle bears very little load. When you swim with a 2BK, you truly kick—and swim—with your whole body!

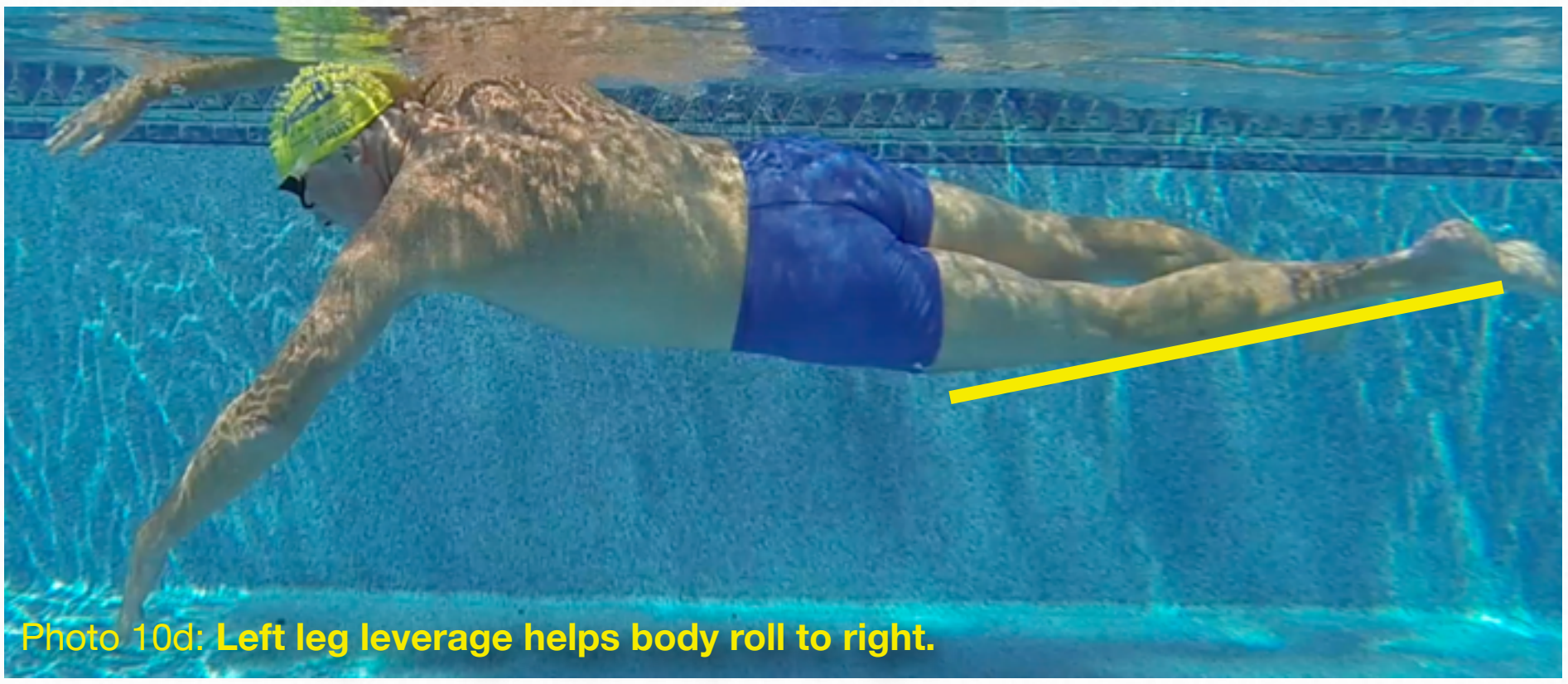


Photo 10d: **Left leg leverage helps body roll to right.**

Photo 10e: **Distance from extended hand to opposite foot is the longest span on your body.**

11

Seamless Breathing:
The Final Piece in an Ultra-Efficient Stroke

Breathing is the most complex and challenging skill in freestyle. But it's much more than a skill. Breathing has panic-inducing potential for many beginners and is the main reason why fewer than 30% of American adults can swim 25 meters. Even after dozens of lessons, Tim Ferriss and Vik Malhotra could not swim more than 20 meters, because they were unable to get the air needed to swim farther.

But significant breathing errors persist even among elite swimmers. In 1997 I analyzed stroke videos for the US National Team at training camp prior to the World Championships. While reviewing underwater video with one swimmer, I pointed out that her lead

hand scooped upward on each freestyle breath. This hurt her balance—requiring her to kick more strongly for an instant—and put her hand in a less effective catch position.

This screen shot—from Sun Yang's world record 1500 meters at the 2011 was World Championships—shows an even more 'breath-taking' example. His bodyline twists noticeably as he breathes—a consequence of moving his head out of alignment while breathing. In that brief moment he can't help but lose a tiny bit of forward momentum.


Sun Yang breaks his bodyline

If he kept his spine aligned and laser aimed forward while breathing could he have swum even faster? Let's do the math: Sun breathed about 450 times during that race. If better alignment allowed him to travel just an inch farther during each breath (a difference of only 1 percent in his Stroke Length), he'd have saved himself over 11 meters of swimming—shaving an additional 7 seconds from the world record he set that day of 14:34.14!

How is it possible that some of the world's fastest swimmers still display such a fundamental weakness? Very likely they developed poor habits as young and unskilled swimmers—lifting the head because of poor balance. And because they were probably faster than peers at every stage, their coaches overlooked errors that only become apparent when studying underwater video, one frame at a time.


Terry keeps his bodyline straight.

Small improvements in breathing technique can add up quickly. And it's likely your improvement opportunities are greater than Sun's. By learning the techniques described

below, you could even maintain a sleeker bodyline than Sun Yang's—as I do at age 63.

Two Universal Breathing Challenges

1. Breathing has *Panic Potential*

Running is often referred to as *primal*—something for which evolution has prepared us well. The only thing primal about swimming is a *healthy respect for water's perils*—a respect that rises to the level of phobia, or even panic, in some.

Those perils—choking and sinking—are mutually reinforcing. Fear of choking causes us to lift or lunge as we breathe . . . which makes us more vulnerable to sinking . . . and thus more likely to choke. No wonder beginners have such a hard time of it.

The TI learning sequence begins with Superman. Not only to teach balance—but also to break the grip of these primal anxieties. While gliding, you experience a sense of weightlessness, while exhaling quietly and consciously. These combine to create a calming and

'centered' feeling. The Focal Point of *release your head to feel the water's support* quiets lift-and-lunge instincts.

These focal points are present in all subsequent skill steps, and occupy the center of your focus, when you work specifically on breathing.

2. Breathing is a *Skill*

The primary reason that many people who hardly break a sweat while running a 10k can become exhausted in as little as 25 meters of swimming is the difference in the seemingly simple act of getting air. On land, air is *there for the taking*. But while swimming the air is *up above and off to the side*.

To get a breath we must move the head (10% of body mass) to the air. The moment we start lifting and turning the head toward the air, every other skill we've worked hard to learn breaks down. Drag increases and arms and legs get diverted from propulsion into sinking-avoidance.

In experienced swimmers, this moment passes in a fraction of a second—but is repeated 30 times a minute. In a newer swimmer—such as an aspiring triathlete—it is often the main barrier to progressing from short repeats to a continuous—and easy—mile. Solving these problems will allow you to swim almost any distance with the ease of 'conversational' running.

Here's the good news: As with the other essential skills of efficient swimming, a series of proven steps will teach you the skill of *seamless* breathing. These skills fall into two categories—how to exchange fresh for stale air, and how to keep stroking efficiently as you do.

Skill #1 Get Fresh Air In

It may surprise you as that simply getting air into and out of your lungs is a skill. But, in the water, we encounter two unique complications:

- You face resistance from water pressure while exhaling.

- You exhale for much longer than you inhale—a bit like a singer holding a note, then taking a ‘bite’ of air between phrases.

Improve your air exchange with four Focal Points:

1. **Push air out.** Exhaling should be an intentional and energetic action. When you emphasize the exhale, the inhale *happens* as air rushes to ‘fill a vacuum’ in your lungs.

2. **Keep it moving.** Never hold your breath or interrupt your air exchange—not even for a nanosecond. Breath-holding causes tension—and does nothing for buoyancy. Begin exhaling as soon as you finish inhaling.

3. **Finish strong.** Exhale *forcefully* as your mouth reaches the surface—as if you’re trying to blow the water away from your mouth.

4. **Get just enough.** There’s no need to completely fill—nor empty—your lungs. Get ‘just enough’ air. Inhaling and exhaling in swimming should feel much the same as singing.

Skill #2 Maintain Stroke Efficiency

Having spent countless hours ‘shaping your vessel,’ learning to hold water as you stroke, and connecting your kick to body rotation, you’ve now come to a challenge with the potential to undermine everything you’ve done thus far to improve stroke efficiency.

Rhythmic breathing in freestyle is the most exacting of all skills because:

1. You must fit the breath into an alternating-arm rhythm; and

2. Nearly 10% of your body mass (your head) is moving to the side, while the rest of you is moving forward.

Cut these challenges down to size by imprinting three habits:

1. Breathe with head and spine aligned: Don’t *lift* your head.

2. Breathe with body roll: Don't *turn* your head.

3. Maintain the shape of your vessel. Keep bodyline long and balanced—and lead arm positioned to *hold* the water—as you breathe.

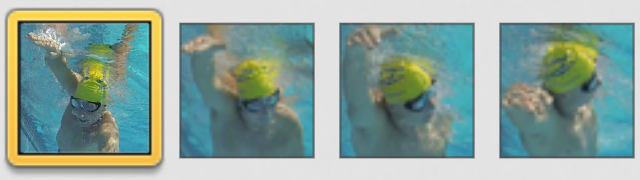
Focal Point #1: Keep Head Aligned.

Note: You can heighten awareness of these sensations by doing several short repeats of Superman and non-breathing strokes.

1. **Weightless:** Does your head feel as weightless during the breath as it does on non-breathing strokes?

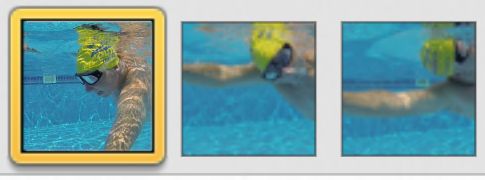
Review 11.1 Breathing with body roll (front) [tap thumbnails to see entire sequence]

1. Head is neutral as right hand enters



Review 11.2 Breathing with body roll (side) [tap thumbnails to see entire sequence]

1. Neutral *weightless* head as right hand enters



2. **Cushioned:** Do you feel the water ‘cushion’ the side of your head as you breathe—just as it cushions your face before breathing?

3. **Laser:** Your ‘laser’ points forward between breaths. Where does it point as you breathe?

Focal Point #2: Follow Your Shoulder.

Your pull and kick are most efficient when they’re part of a *whole-body* action. This is true for breathing as well. Never move your head on its own. Always fit breathing seamlessly with the action of the body. Here’s how to do this when breathing to the left:

As your right arm spears forward, your left shoulder rotates out of the water. To breathe, simply let your chin follow your shoulder . This integrates the breath with body movement and minimizes the chance of your head moving by itself.

Focal Point #3 Synchronize Breath Timing and Stroke Timing

The key to seamlessly integrating breath and body action is to synchronize breath timing with stroke timing. A simple way to do that is by coordinating four key moments in your breath with what your hands are doing at that moment. For a left side breath, focus on the following:

1. Your right hand entering the Mail Slot initiates rotation to the air.
2. Your face clears the water as your right hand reaches full extension (touching the VW Bumper).
3. Your right hand holds the water—and your place—as you inhale.
4. Your face submerges again as your left hand enters the Mail Slot

Both Sides Now

Immediately following, you'll read about a critical decision I made on the first day of my coaching career. Watching my new team for the first time, I noticed that all had asymmetrical strokes. Those who breathed to the left torqued noticeably in that direction; right breathers did the same to the other side.

While I had no formal knowledge of stroke mechanics at the time, instinct told me that swinging one arm wider or higher than the other, or bending the torso sideways probably hurt efficiency. I also noticed that the excessive sideways motions were always toward the side on which the swimmer breathed. When I instructed the team to breathe to the ‘wrong’ side the next day, their lack of symmetry disappeared. Before long I made it a standard requirement for the swimmers I coached to breathe bilaterally during practice.

Just above I wrote that a primary reason breathing in freestyle is such a frequent occasion for stroke errors is the difficulty of keeping the body aligned, stable and traveling forward when 8 percent of body mass repeatedly moves to the side.

When we move that 8% only to one side, it's inevitable that, over time, the body accommodates these uneven forces in various ways—none of which promote efficiency.

Though I required my swimmers to breathe bilaterally as early as the 1970s, when I got serious about improving my own efficiency in the early 1990s, I was still a unilateral breather—breathing almost exclusively to the left, as I'd done since 1964.

One day I decided to breathe to the right for an entire 800-meter swim. I was swimming in Los Banos del Mar, a 50-meter pool in Santa Barbara, that day. I'd recently made it a habit to count my strokes. It really got my attention that my stroke count improved from 41 SPL (strokes per length) to 39 when I switched breathing sides. Though breathing to the right felt awkward, that motivated me to continue. For several months, I breathed far more to the right than to the left, which helped me adapt more quickly. I've been a bilateral breather ever since.

If you've always breathed to one side, it will feel awkward for a time. There will be a learning curve. But if you commit to learning the breathing fundamentals described herein, you may as well practice them on both sides, right from the start. Your primary goal is to make your left and right sides identical in every regard, as shown here. I guarantee that the effort to do so will make you a far more efficient swimmer.

What I Saw on Day One

I began coaching at the U.S. Merchant Marine Academy (aka Kings Point) on Long Island in the last week of August 1972, just six months after my final meet as a college swimmer.

Terry Laughlin (Coach of the Year), and Kurt Yost (Outstanding Swimmer) at the 1973 Metropolitan Collegiate Swimming Championships.

Taking a cue from my college coach, Dick Krempecki, I began that workout by assigning a warmup of 800 yards of freestyle. As I watched my team swim back and forth for the first time, I noticed that nearly all of them appeared ‘lopsided.’

Left-breathers torqued toward that side—swinging the left arm on recovery, crossing the right arm past the midline on extension, sometimes twisting the torso toward the left as well. Right breathers torqued the other way. (Bilateral breathing was rare at the time.)

Inexperienced though I was, I still felt instinctively that diverting movement and energy to one side couldn’t be a good thing. And the evidence in front of me suggested strongly that this asymmetry was probably a product of breathing to just one side for many years.

Testing the blank-slate principle, the following day I instructed the team to breathe on the ‘wrong' side during warmup. They responded with puzzled looks and mild grumbling, but for the next 12 minutes I had a team of strikingly more symmetrical swimmers.

Though I was still ‘wet behind the ears’ as a coach, I still felt strongly that some good must come from spending the first 10 to 15 minutes of workout practicing symmetry. From that day on, 'wrong side' breathing was a standard feature of our warmups. (In later years,

I required bilateral breathing throughout practice of all swimmers I coached—while leaving them free to breathe as they wished in races.)

The success of this little experiment encouraged me to seek more opportunities to improve form. I didn't have to look far.

In our 4-lane pool, the four fastest swimmers trained in Lane One and the slowest in Lane Four. As I scanned the pool from left to right I could see an obvious pattern. In Lane One, the swimmers looked longer and smoother. As I shifted my gaze to the right, strokes looked progressively shorter and more ragged. I concluded that smoother strokes were very likely as critical to success, as fitness or power.

Though I lacked formal knowledge of stroke mechanics (the term itself seemed intimidating) I began to regularly spend time 'tweaking' form to move the whole team to look more like the best swimmers. I knew I was doing something quite unusual, but it just felt right to me.

By the end of the season, collectively and individually—those swimmers improved far more than any I'd ever seen. In years since, I've been struck by how an instinct for technique-centered coaching, that has only grown stronger during the intervening 40 years, became apparent in the first 15 minutes I ever stood on a pool deck with the responsibility to make other swimmers faster.

12

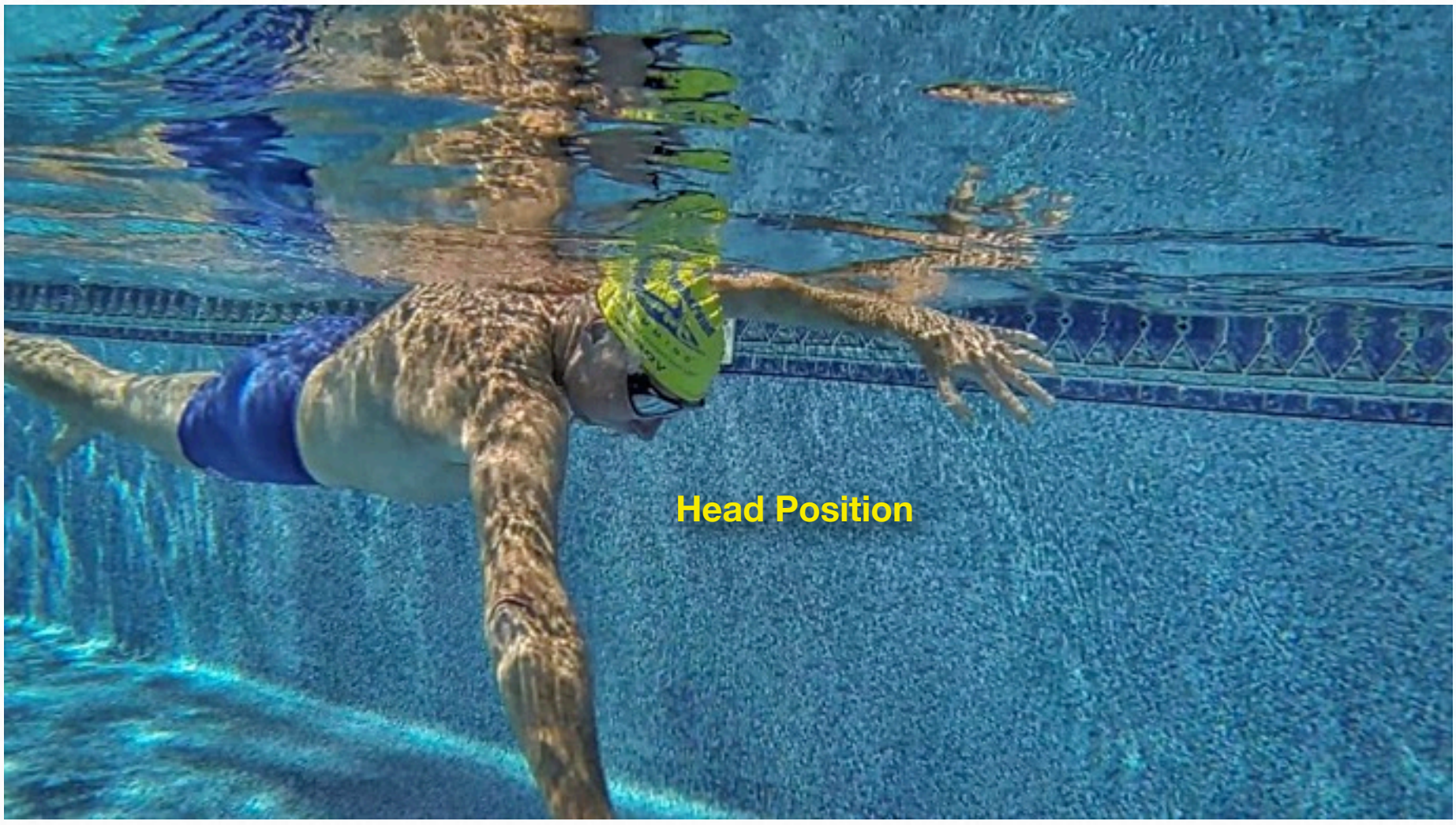
How To Become *Ultra*-Efficient:
Tips For Lifelong Learning

The preceding chapters describe an innovative technique which has been ‘human engineered’ to dramatically improve on the efficiency of traditional freestyle. While the focus of this book is primarily how to *swim* effectively (we cover effective *learning* methods in a companion ebook) this chapter provides succinct guidance on the most effective ways to learn swimming technique . . . as well as to learn most anything else. Total Immersion learning methods and swimming techniques are *both* cutting edge.

Ascend the Pyramid

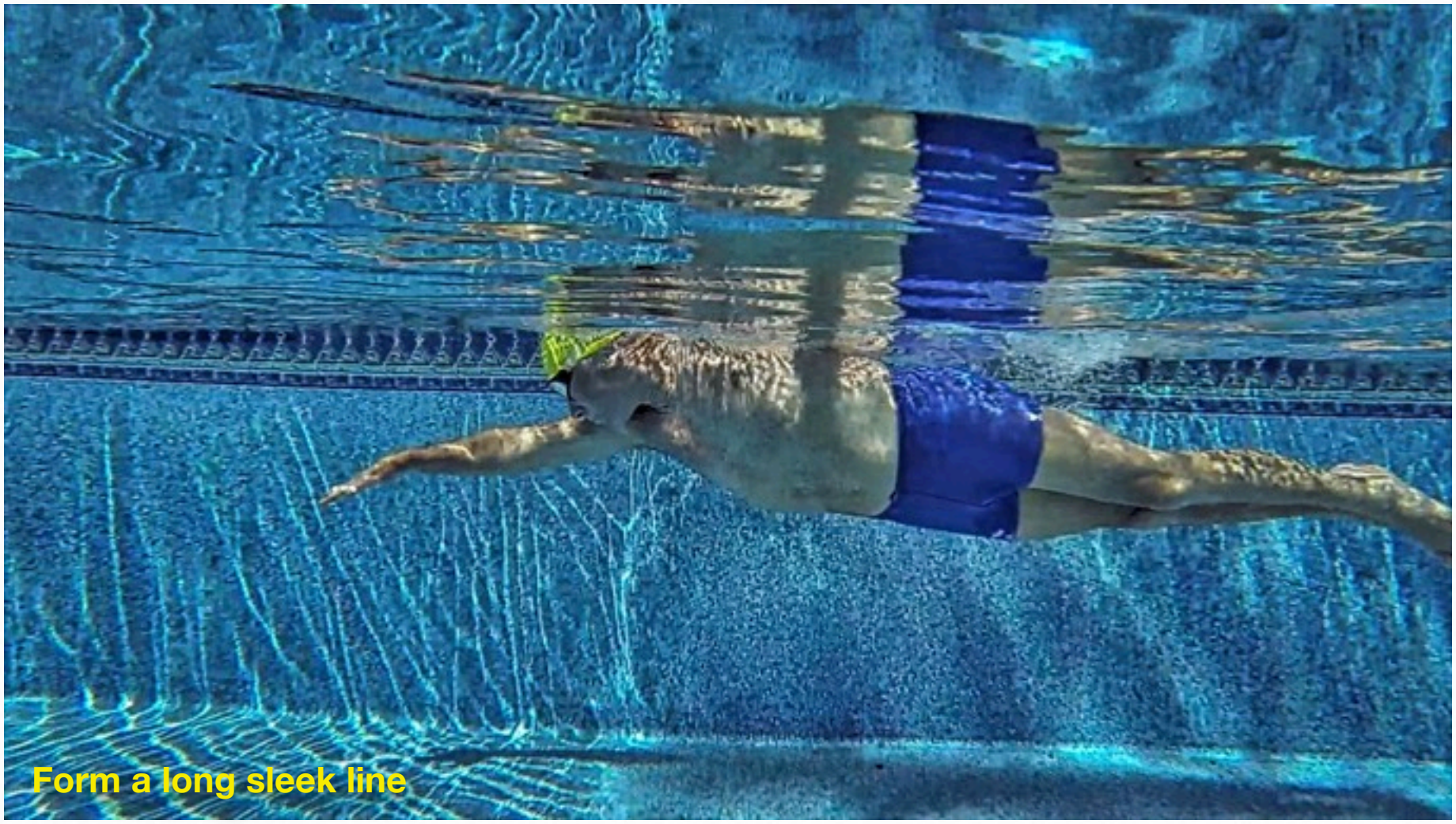
As you undertake to improve your technique, remember the TI Pyramid of Skills, with Balance as the foundation, Streamlining as the second level and Propulsion as the final step. In this pyramid, the skills that bring the most immediate and dramatic gains in comfort and efficiency are also easiest to learn!

Another effective way to organize your learning process is to focus on one part of the body at a time—and one aspect of technique or efficiency for each body part, using the checklists below for guidance. Skill development should *always* start with head position.



Head Position Checklist

1. Relax neck muscles and release your head's weight to be supported by the water.
2. Consciously align head and spine. *Stay* aligned while stroking and breathing.
3. Keep head perfectly still while the rest of your body is in motion.



Body Position and Vessel-Shaping Checklist

1. Balance your bodyline so hips and legs ride close to the surface. Do this through weight distribution, not by kicking.

2. Form lines. i.e. Lengthen and align yourself, from fingers to toes, to move through the water *like an arrow through the air*.

3. Stabilize your core. A stable head, engaged core, symmetrical recovery, and controlled rotation all play a role.

Arms-and-Legs Checklist

1. Use them first to help maintain a long, stable, and *slippery* bodyline.

2. Connect them to power and rhythm originating in the core. Use your body as a *system*, seamlessly coordinating the action of head, torso and limbs.

3. Work *with* the water in propulsion. Keep the water still while moving your *body* forward.

Breathing Checklist

Breathing skills generally need special attention, separate from positioning and propelling the body. If you already breathe with some comfort and skill, blend a breathing focus with other skills at any time. If not, use a snorkel, or stop for a breather as needed while developing other skills. Tackle breathing skills 2 and 3 after establishing good control over head, body, and limbs.

1. Keep air flowing continuously—never hold your breath—and emphasize exhale more than inhale.

2. Keep head aligned with spine and connected to core-body movement while breathing.

3. Integrate breathing seamlessly with propelling motions.

Five Stages for Learning A Skill

While learning the skills described in Chapters 5 through 11 (or any other exacting skill), it's common to experience four stages of skill competence:

1. Unconscious Incompetence In this stage you don't know how to perform the skill and often don't recognize that you don't know it—or fail to understand its value. I was *unconsciously incompetent* in Balance for 25 years—until introduced to it by Bill Boomer—and in the 2-Beat Kick for nearly 40 years!

2. Conscious Incompetence In this stage, while you still don't know how to perform the skill, you *do* recognize your skill deficit—and the value of correcting it. During your first attempts at the skill, errors are frequent, but are essential to your learning process.

3. Conscious Competence You've learned to perform the new skill but doing so requires your full concentration. At this stage, you should practice whole stroke more than drills—but focus on one mini-skill at a time. For relatively simple skills, it takes 3000 to 7000 *cor-*

rect strokes to progress to the next stage. For more complicated skills, it may take 20,000 correct strokes.

4. Unconscious Competence At this stage, the skill has become "second nature" and errors are far less frequent. You can now perform the skill well even when not focused on it—allowing you to bring a *new* skill to the Competent Competence level. You also understand the skill well enough to teach it to others. This further improves your own grasp of the skill.

How to Create a ‘Muscle Memory’

Any skill results from an electrochemical signal traveling along a neural circuit from your brain to the muscles that perform the skill—like the circuit carrying an electrical current from a wall switch to a light fixture. Progressing from conscious to autonomic control of any skill reflects a physical ‘rewiring’ of your brain.

When a skill requires intensive concentration, the mental processing occurs in the cerebral cortex. As the skill becomes more natural and effortless— popularly known as having *muscle memory*— processing shifts to the cerebellum.

The advantage of achieving Unconscious Competence is twofold:

1. You save energy because your stroke is *unvaryingly* efficient.

2. You also save energy by *thinking* more efficiently.

Your brain runs on the same ‘fuel’ as your muscles—oxygen and glycogen. Because circuitry is far simpler in the cerebellum, your brain also *consumes far less fuel*—leaving more fuel for your muscles.

This is the process in the Conscious Competence stage to create a Muscle Memory:

1. **Create a *Mental Blueprint*:** Prior to beginning a repeat, choose a small specific skill to improve. Choose the Stroke Thought (aka Focal Point) that will help you perform the movement correctly—and the *sensations* you'll use for feedback. To do this effectively you need two kinds of information:

    - Visual—how it looks when done correctly (Watch video or a skilled TI swimmer or coach.)

    - Kinesthetic—how it should *feel.* Chapters 5 through 11 include *kinesthetic cues* for every essential mini-skill.

2. **Do a *mindful* repeat (and probably miss the mark):** Mistakes are essential to course correction. With each additional repetition, you should be able to make more accurate and subtler distinctions between sensations that are just-right and not-quite.

3. **Adjust your *Intention* (Stroke Thought) and try again.** Each correct repetition strengthens the connection between intention, sensation and action; improves the circuit from brain to muscle; and brings you one rep closer to Unconscious Competence.

A 'Recipe' for Faster Learning

For any new skill—particularly when you must *unlearn* an energy-wasting habit—you'll progress more rapidly to the highest stage of competence by following this proven *recipe for accelerated change.* (It works for both drills and whole stroke.)

1. **Ultra-Short Repeats.** Let go of the idea that when you leave one end of the pool, you *must continue* until you reach the other. Any time your movement quality degrades, stop for a breather and mental reset. We've found that the most effective way to learn a new skill is with ultra-short repeats (as few as 3 to 5 strokes) when first attempting it. This maximizes focus, and minimizes potential for 'practicing struggle.' Your primary goal on these repeats is to *heighten awareness of a particular sensation*—like the feeling of a weightless head.

2. **Minimize Breathing.** When a skill is new, breathing adds both a mental distraction and a physical complication. Either stand for a breather between repeats, or use a snorkel. Introduce breathing gradually—one or two breathing cycles at a time. As you do, assess how breathing affects your performance of the new skill. Performing the new movement *during a breath*—remaining balanced, stable and with control in arms and legs—is much more challenging than performing it without breathing.

3. ***One* Thought.** For every skill listed in Chapters 5 through 11, we also described several mini-skills or listed several Focal Points. Choose a single focus for any repeat. Maintain that focus for several minutes to become familiar before progressing to a new focus.

4. **Swim With Feeling.** Never be satisfied with a stroke that just feels 'okay,' when you know you're capable of better. At the end of each repeat, assess the quality of your movements and compare with the best sensations you've experienced—whether in a drill or whole stroke. Lengthen your repeats based on your ability to *repeat quality strokes*. After each repeat, you should also assess the quality of your attention. This will be the largest factor in how rapidly you attain Unconscious Competence.

A Sample Mini-Lesson

During the period in which you must concentrate intensively to ensure *correct* repetitions, a proven way to heighten sensory awareness and minimize error is via a series of mini-lessons. Each mini-lesson should focus on a single Focal Point or mini-skill, and have a duration of just 10 to 12 minutes. This allows you to complete several mini-lessons—on related skills—in a single practice; ideal during an intensive skill-improvement phase. This sample mini-lesson uses the Wide Tracks and Relaxed Hands focal points.

- Rehearse: Stand with arms extended (on Wide Tracks) and hands relaxed. Revisit rehearsal as needed between drill repeats.

- Drill: Push into Superman. Compare whether arms and hands feel as they did during rehearsal. Repeat 4 to 8x.
- Swim: Take five to six *non-breathing* strokes. Compare whether arms and hands feel as they did during Superman. Repeat 4x.
- Swim 25 yards/meters. Assess how hands and arms feel as you swim farther—and when breathing. Repeat 4x.

* * *

How to Measure Efficiency: Swim in your 'Green Zone.'

The central objective of this book is to help you become an ultra-efficient freestyler (though the core principles apply to all strokes.) Naturally, you'll want to have a way to measure efficiency. Your initial measure will be subjective—how your stroke feels, or the ease with which you can swim any distance or speed.

You should also use a completely *objective* and concrete measure. The simplest and most reliable is the number of strokes it takes you to swim the length of the pool. Shorthand for this is Strokes Per Length or SPL, counting each hand entry.

In an efficient stroke, you should travel *approximately the length of your arm* each time you take a stroke. In other words, your hand should exit the water, at the completion of a stroke, about where it went in.

When you travel this distance, you know that your strokes are *moving your body forward*, rather than moving the water back. These height-indexed charts provide a personalized guide to efficiency for both 25-yard and 25-meter pools.

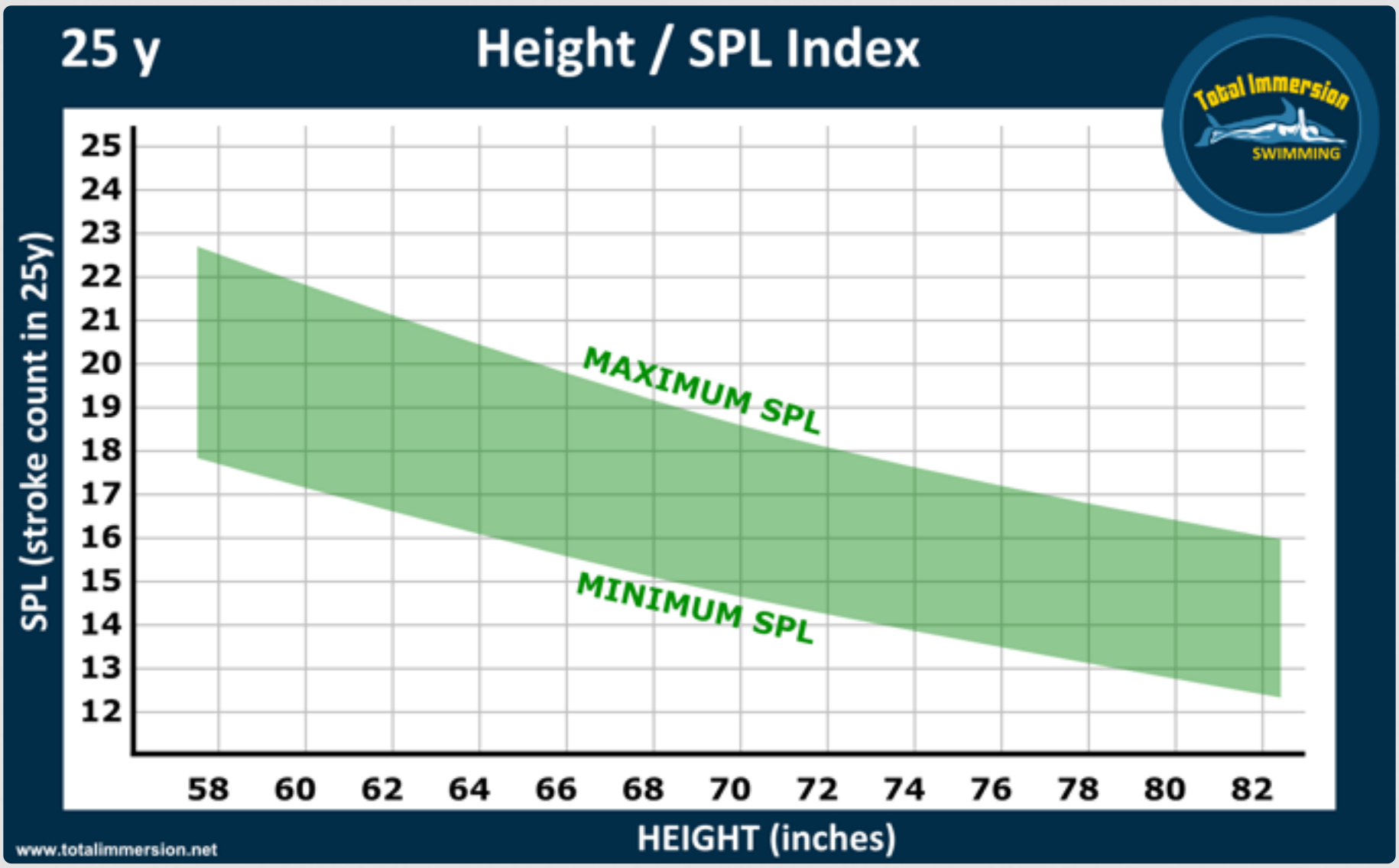
The world's best freestylers travel 65% to 70% of height on each armstroke. (Sun Yang averaged 73% while breaking the 1500-meter world record.) On this chart, the highest count

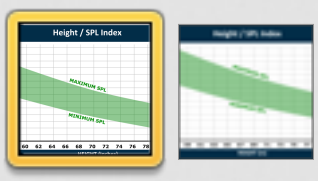
in the Green Zone for your height (I.E. 19 SPL if you're 5'8" inches tall and swimming in a 25-yard pool) is equivalent to traveling 55% of height. This gives you an *efficiency baseline* that is realistically attainable for any swimmer—even those with little experience.

Once you've achieved conscious competence in balance and vessel-shaping, you can set a goal of consistently keeping your stroke count in the middle to upper end of your Green Zone, and take care to avoid exceeding the highest count. When you keep your count in your Green Zone, you **make every stroke count.**

If your SPL is higher than Green Zone, you're diverting energy into *moving the water,* instead of propelling you forward. To reduce SPL, try the following:

Review 12.1 SPL index for meters and yards [Click thumbnails to change from yard to meters.]





1. Review Chapters 5 and 6. Your focus should be on a balanced, stable, sleek ‘vessel.’ Align head with spine and get your legs to draft behind your torso. Eliminate bubbles, noise, and splash from your stroke.

2. Swim shorter repeats. Start with 25y/m repeats. Progress to 50 y/m repeats when you can consistently and easily swim 25s in the mid to lower part of your Green Zone range. Progress to 75s or 100s when the same is true of 50 y/m repeats. Always emphasize ease. Never strain to reach a lower count.

3. Slow Tempo. Begin practicing with a Finis Tempo Trainer. Push the right button on your Tempo Trainer, slowing tempo by .05 sec/stroke at a time until you can swim 25y/m repeats within your range. Slow Tempo by another .05 and try 50m repeats. As you gain the ability to maintain a Green Zone stroke count for longer distances, you can increase tempo for shorter repeats. E.G. If your tempo is 1.3 seconds/stroke for 100y/m repeats, you may be able to swim efficient counts at 1.25 on 50y/m repeats and 1.2 on 25y/m repeats. The Tempo Trainer is available from the TI web site.

Finis Tempo Trainer

If your SPL is already in your Green Zone, you have a solid *efficiency foundation*. Patiently and systematically expand the combinations of Tempo and Distance (make small changes in one or the other) at which you can swim within Green Zone.

When you find a combination that you can just maintain with keen focus (another example of Conscious Competence), but avoiding physical strain, stay with that combination until it feels easier and more natural (Unconscious Competence) to swim that way.

Swimming *Faster*: Smarter Choices, not Harder Effort

As the title says, this book is about swimming more efficiently. But I anticipate that many readers hope that greater efficiency will translate into swimming faster as well. I’ve already begun writing another book about how to swim faster--through smarter choices as the

heading says. I'll briefly explain how to base those smarter choices on skills and knowledge presented in this book.

Most people instinctively choose the *harder effort* way to swim faster: They stroke faster and kick harder. These are *guaranteed* to increase the two limits we must overcome to swim faster--energy cost and resistance. **Energy cost** (as measured by oxygen consumption) increases by 30 percent to 40 percent when you swim just 5 percent faster (i.e. completing 100 yards or meters in 1:35, instead of 1:40). **Drag** increases exponentially as you go faster (i.e. you encounter 25 percent more drag at a pace of 1:35 than at a pace of 1:40 per 100 yards or meters . . . if you do it by stroking faster and kicking harder.)

This explains two phenomena I reported in Chapter 6. Dolphins swim 700% faster than should be possible given their muscular power. In the Olympics, finalists generate strikingly less power than also-rans. For both, the 'secret' to speed is a superior ability to avoid resistance.

Think about it this way: To move forward in the water, the force of muscular power you apply must exceed the resistive force of water. To move forward *faster*, you must increase the gap between resistive force and muscular force. Reducing drag has little or no oxygen cost, while increasing muscle force incurs a large cost. So efficiency is your most valuable 'trading chip' for gains in speed.

To swim faster . . . *easier* . . . follow this 3-part prescription:

1. Focus on technique and efficiency in every practice, on every lap, and even on every stroke you take. You can always improve both.

2. Check your efficiency by counting strokes. Swim every practice length within your Green Zone range of stroke counts.

3. Patiently and gradually increase the rate or tempo at which you can swim your Green Zone counts. And make those adjustments with precision, using a Tempo Trainer, rather than by guesswork.

The Navy SEALs and Total Immersion:
"It really works!"

U.S. Navy SEALs are trained in Total Immersion swimming techniques which has increased the number of BUDS trainees able to pass the swim course. (Photo courtesy US Department of Defense)

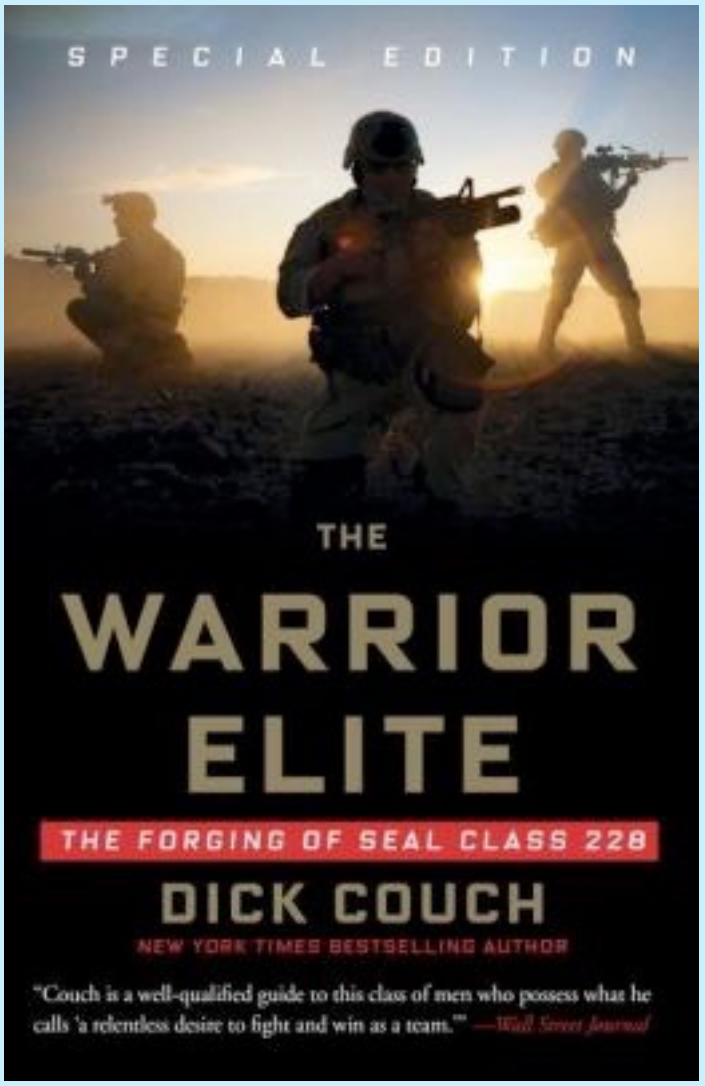
In 1996, several U.S. Navy Seals attended a TI workshop I led in San Diego. While all were triathletes, it turned out they had a professional interest as well. They wanted to assess whether TI techniques might be of value in training at BUD/S (Basic Underwater Demolition/Seals) school, the famed training ground for new Seals.

Several months later, I was invited to Naval Special Warfare Training Center in Coronado CA to formally train BUD/S instructors in the principles of efficient swimming—and effective teaching. I returned each year through 1999. While working with them, I adapted Com-

bat Swimmer Stroke—a hybrid of crawl and sidestroke—to emphasize balance, alignment, and core-powered propulsion.

In 2001, Vietnam-era SEAL Dick Couch published The Warrior Elite: The Forging of SEAL Class 228, the definitive account of how our most elite special forces are trained. He devoted several pages to the impact of Total Immersion on SEAL training. Here is that portion of the book:

> The teaching begins in the pool. "You have to be good in the water," Instructor Tim King tells Class 228. "This is what separates us from all other special operations forces. For them water is an obstacle. For us it's sanctuary."
>
> I noted many changes in the curriculum at BUD/S since I'd completed the training, but the most dramatic are in the swimming curriculum. In the past, it was simply a matter of showing trainees a basic stroke, and then have them swim laps.
>
> Now it's all about technique. The instructors begin by teaching them balance and body position in the water. The basic stroke is a modified sidestroke that the trainees will later adapt to the use of fins. Much of what is taught is based on the work of Terry Laughlin and his Total Immersion techniques.



Laughlin is a noted civilian instructor who developed innovative long-distance swimming techniques for recreational and competitive swimmers. A few in Class 228 were competitive swimmers before coming to BUD/S but most are not. All will learn the Laughlin method.

According to Laughlin, it's all about swimming more like a fish, and less like a human. The instructors say it's like swimming downhill. It focuses on making one's body physically longer in the water and reducing drag.

"Before Terry Laughlin," King says, "it was just a matter of getting in the water and getting it done. Now that's all changed, technique is everything."

The trainees do lengths in the pool, working on the kick. Then they learn a new breathing technique, rolling for air rather than lifting the head. The arms are used to aid balance and to lengthen the swimmers' bodies in the water. As the trainees practice, the instructors are right there, coaching and teaching.

"There's not a lot we can do to make them run faster," explains Instructor King. "But if they can master these techniques, we can dramatically improve their swim times. The staff here at BUD/S can be a very skeptical bunch. We tend to resist anything from the outside. But when our own swim times came down using Laughlin's methods, we knew this was good information."

"We try to do as much teaching as possible here in Indoc. First Phase instructors just put them in the water and expect them to perform. If they can't make the minimum swim times, they'll be dropped from the class. For some, these techniques will make the difference between graduating or washing out.

"Total Immersion has helped us cut swimming washouts by twenty-five percent. This stuff really works!"

13

From Efficiency to Mastery

This book is available as a standalone item, and as part of a closely integrated set of *Ultra-Efficient Freestyle Mastery* self-coaching tools. If you ordered the book separately, we would like to offer you a *risk-free trial* of the complete set of tools for becoming your own best teacher and coach.

The additional modules in this set include:

- **14 Video Lessons**—Together, these total over 40 minutes of the highest quality skill-improvement video available. Each lesson teaches an essential mini-skill and each builds seamlessly upon the others. Every critical element of each step is presented with precise detail, via multiple angles; slow-and-stop-motion; and graphic highlighting of finer points.

- **The Freestyle Mastery Workbook.** The workbook provides in-depth guidance on how to accelerate learning and avoid common mistakes, and detailed step-by-step instructions for each video lesson.

- **An Image Gallery.** We've captured the critical moments and positions in each drill and skill in a series of photos, grouped by lesson. Print these out and laminate or put in a sealable plastic bag to serve as memory aids and visual cues at the pool.

Our Promise

We guarantee this will be the most workable, understandable, and effective swim instruction you have ever experienced. If you don't agree, we'll cheerfully refund your purchase price. We're highly confident you'll learn at least five times faster and swim with 30 to 50 percent greater efficiency than with any non-TI swim program. Indeed, as Tim Ferriss discovered, you'll even learn dramatically faster and with a far more satisfying outcome than via 'live' coaching in traditional techniques.

Become An Expert Learner

While we've provided much guidance on how to learn effectively in these chapters, the additional modules show that we've given as much thought and care to the art of teaching and science of learning as to the best way to move through the water. Indeed we often say, Total Immersion uses swimming as *a vehicle for teaching people how to learn*. After teaching yourself ultra-efficient swimming skills, apply your learning expertise to any other valued skill.

Simple and Streamlined Skill Steps

Total Immersion is known worldwide as the most effective way to improve your swimming. Our belief in *kaizen* has inspired us not only to tirelessly pursue more efficient ways to swim, but also to constantly refine how we teach—and you learn—those skills. This program represents a significant advance on previous generations of TI learning methods, in part because it was inspired by my experiences teaching 94-year old Paul Lurie.

The challenges of teaching a student of such advanced age pushed me to rigorously simplify and streamline what was already the world's best stroke-improvement methodology. We spent two years refining these innovations and testing them with hundreds of students, of all ages and skill levels, before publishing them here. They have consistently improved learning speed and retention and reduced the most common challenges people face in understanding and executing counter-instinctive skills.

The key to learning with ease, accuracy and speed is a synergistic combination of three learning activities, developed by and exclusive to Total Immersion—Rehearsals, Drills, and Whole Stroke. When sequenced, with a unifying Focal Point—they are the most powerful *accelerator* yet devised for skill improvement.

Rehearsals bring a pinpoint focus to a small and specific position or movement. Rehearsing a tiny piece of a complex movement while standing allows you to explore and calmly memorize new sensations with unmatched control and awareness.

Drills highlight a single critical position or movement and simplify the intricate coordination of multiple mini-skills that are essential to an ultra-efficient stroke. Total Immersion drills have a precision and clarity of purpose unmatched in swimming.

Whole Stroke practice is essential for integrating a group of mini-skills into a flawlessly coordinated *whole skill*. This process is made nearly foolproof at the highest level by following our guidance in practice-planning your practice to systematically refine every aspect of the stroke via this process. The Freestyle Mastery set will guide you through every step.

Learn with a Partner

Another TI learning innovation introduced in the *Ultra-Efficient Freestyle* program is partnered learning. The absolute fastest way to progress in skill and form is by learning the correct position, direction and timing of key movements with a partner both observing and manually guiding you—as shown in the companion videos.

During partnered-learning, both the partner performing the skill and the one observing and assisting gain valuable understanding. The partner performing the skill receives the most accurate guidance on for instance, reaching forward to the 'VW Bumper." This minimizes both error and mental overload. The partner assisting learns nearly as much, simply by observing—and *feeling*—common errors.

The video series shows (and the workbook describes) exactly how I and other TI coaches give hands-on guidance while teaching. Try them with a partner and watch your rate of learning soar.

From Efficiency to Mastery

In Chapter 12, I described four stages of skill competence, culminating in Unconscious Competence. Beyond that, there's a fifth stage, sometimes referred to as *Enlightened* Competence. We call this Mastery. Attaining Mastery makes the following possible:

- To perform the skill in the most challenging circumstances—to swim with as much ease and efficiency after eight or 10 hours of a marathon as in the first hour; to remain relaxed and efficient at top speed swim; to swim smoothly in rough water . . . or amidst a churning pack of triathletes in rough water.
- Your skill becomes ever more instinctive and reflexive. Your self-perception gets stronger and deeper.
- You have a deep understanding of the principles underlying the skill, external factors affecting it, and its relation to other skills.
- You know how to acquire and improve the skill with more assurance, ease, and speed than it required initially.
- You can *articulate* and teach the skill to others in an effective and expeditious manner. Doing so deepens your own mastery.

This book, and the complete self-coaching package, is the first swim improvement tool consciously designed to guide the learner not only to an ultra-efficient stroke—but also to lead toward Mastery.

Visit our online store (click here) to download the Ultra-Efficient Freestyle Mastery Video series. As a special BONUS we're offering those who have purchased this e-book a $10 savings. Use COUPON CODE: **IMMERSION2984** at checkout to take advantage of the discount.

Join a Worldwide TI Learning Community: The TI Discussion Forum is a remarkable resource for improvement-minded swimmers. Browse for topics of interest, or start a discussion on a new topic of interest to you. The Forum connects you to a network of fellow TI swimmers around the world, who share insights in a generous and supportive spirit.