Triathlon Swimming Made Easy: How ANYONE Can Succeed in Open Water Swimming with Total Immersion
(Text-only version prepared for electronic transmission. The book, as published, is heavily illustrated.)

Special Intro by Terry Laughlin
TSME will give every reader a simple, clear, practical guide to swimming better than you ever thought possible and to experience the sheer joy of being Fishlike. Not only to swim well enough to breeze through a triathlon swim leg with ease and confidence; but to reach a Nirvana where the swim is your favorite part.

If you’re already a triathlete, this book will give you all the knowledge and guidance to become a complete and knowledgeable swimmer. If you are just thinking of tackling a triathlon, it will make the most challenging part of a triathlon, the open-water swim, an experience that is both enjoyable and remarkably easy.

If you’re not aiming to do a triathlon, but would simply like to swim with ease, efficiency and confidence, don’t be fooled by the title. This book will guide you through the swimming-improvement process with complete assurance and turn you into a beautiful freestyler.

Triathlon Swimming Made Easy is guaranteed to improve your swimming or your money back. If you’re not completely satisfied, we’ll give you an unconditional full refund AND the book is yours to keep.

"Terry Laughlin has written the Cliff Notes for triathlon swimming. He gets to the point and you get the picture -- right away!"
Celeste Callahan
TI grad, Age Group Triathlete, USAT Level II Coach

“This book will be priceless for anyone wanting to swim freestyle better. It has helped me to convey, to those I coach, things I did instinctively as an elite swimmer, but could never before put into words.”
Shane Gould
11-time World Record holder, Triple Olympic Champion, Total Immersion Coach

“As a beginner, swimming is by far the most challenging aspect of triathlon. During my first race, I swam hard just trying to finish. Terry’s book made an immediate difference. This book will truly help you swim more efficiently and effortlessly than ever before.
Gregg A. Wheeler
Age group triathlete

“With this book, in twelve weeks I went from struggling through a few laps to finishing an Olympic distance triathlon with astonishing ease. I have never been so excited by any book before and I thank Terry for helping me reach my goals faster than I ever thought possible.”
Tim Rooney
Age group triathlete

"Triathlon Swimming Made Easy is a priceless primer on how to do it the right way. I always finished the swim leg in the lead, but working so hard made the bike and run an ordeal. These days, I finish my open water swims at the front of the pack and I'm not even breathing hard!"
Beth O'Connor Baker
Masters Swimming World Record Holder, National Triathlon Sprint Champion & USAT World Team Member

“Triathlon Swimming Made Easy provides a practical, do it yourself guide for transforming the swim from a gruesome struggle against the water into a relaxed, pleasurable experience. This will be a great
confidence builder for triathletes.”

*Ivar Brinkman*
Certified Triathlon Coach
The Netherlands

“Whether you race sprint or ironman distance, this book will help you become a graceful, balanced and faster swimmer. If you are serious about reaching your highest athletic potential, *Triathlon Swimming Made Easy* is the triathlete's self-mastery guide for swimming.”

*Mark Wilson*
USAT Certified Coach, Total Immersion Certified Coach

“Terry Laughlin understands triathlon racing! *Triathlon Swimming Made Easy* is the complete package for improving the swim leg of a triathlon while conserving energy for improved performance in cycling and running as well. It offers powerful, immediately-effective improvement techniques for the novice and the experienced triathlete.

*John Fisher*
T.I. Alum, Age group triathlete

*Triathlon Swimming Made Easy* can turn ANYONE into a beautiful, Fishlike freestyler. It helped me to my best season of open-water swimming in 30 years. Swimming the TI way has become a source of endless pleasure for me and it will for you too.

*Don Walsh*
TI-certified coach, Champion Marathon Swimmer

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Introduction

In 1989, I began teaching adult swimmers at Total Immersion summer camps and was soon teaching hundreds of improvement-minded swimmers each year. In 1991 I began writing for Triathlon Today magazine (now Inside Triathlon) and began to see so many triathletes at my swim camps that, in 1993, we began offering freestyle workshops. Triathletes flocked to these and I recognized their powerful hunger for instruction in swimming technique.

In 1995 I published a book called Total Immersion: The Revolutionary Way to Swim Better, Faster, and Easier, which quickly became the best-selling book on swimming. Though I didn’t write this book specifically for triathletes, thousands of multi-sporters made it their swimming bible and the number of triathletes attending TI workshops exploded.

Teaching thousands of triathletes has convinced me that swimming for triathlon (and swimming in open water) is a significantly different sport than competitive swimming (as in age-group, high-school, college, and Masters meets). While most triathletes copy the training programs of competitive swimmers, they shouldn't. Here’s why:

• Competitive swimming is done mostly in pools; triathlon swimming is done mainly in open water.

• Competitive swimmers have spent years gaining specialized skill and experience; more than 90 percent of triathlon swimmers are relatively unskilled and inexperienced in swimming, but still need to swim well now.

• Competitive swimming events are primarily 200 meters or less; triathlon swimming – and all open water swimming -- happens mainly at distances greater than 400 meters, often much greater.

• Competitive swimmers need to swim with intensity; triathlon swimmers need to swim effortlessly.

• Competitive swimmers can be specialists; triathlon swimmers have to train seriously in two other sports.

Triathlon swimming truly is a unique sport with unique challenges. This book focuses precisely on how to meet them, whether you are a first-timer seeking the confidence to tackle a long swim in open water, or an experienced competitor wanting to turn swimming into the best part of your triathlon. Open-water swimming is also quite different from competitive swimming, and has far more in common with triathlon swimming than with competitive swimming. This book will also be a complete resource for those who want to enjoy success in open water, whether or not they cycle and run after finishing the swim.

The good news is that success at this kind of swimming is far less dependent on “swimming talent” than you might imagine, and is actually within reach of every athlete. By mastering a finite set of easily learned skills, any smart and diligent athlete can swim dramatically better. I’ll guide you through that process in the pages to follow. By following this special Total Immersion triathlon/open-water swimming program, you'll learn to coach yourself so effectively that, within a short time, you will:

• Stand on shore at the beginning of any race and KNOW you can make the swim distance -- and make it with ease.

• Know that you don’t have to train as long or as hard in the pool as you thought.
• Know you really CAN master this sport that makes so many otherwise successful athletes feel unfit and uncoordinated.

Happy laps,
Terry Laughlin
New Paltz NY
June, 2001

Part 1
Why Swimming Frustrates You and How You Can Achieve Fulfillment

Our first three chapters will give you a succinct explanation of
• Why you’re not swimming as well as you’d like
• Why no amount of fitness, strength, or training will make any real difference
• Why swimming easier will improve your total tri-race time far more than swimming faster

We’ll outline a foolproof series of steps for making swimming an asset, rather than a liability. By the time you move on to Chapter 4, you’ll understand what constitutes good swimming and how you can embark on the path to mastery just by changing the shape of your “vessel.”

Chapter 1
True Confessions: If I’m So Fit, Why Is Swimming So Hard?

Every Saturday morning, somewhere in the USA (or Canada, the UK, Europe or Australia) 30 hopeful and somewhat apprehensive athletes, mostly triathletes and tri-wannabe’s, gather in a classroom and talk about why they’d like to swim much better. It may sound like group therapy; but it’s actually the orientation session of any Total Immersion weekend workshop. Some athletes confess that they can ride 60 miles or run 10 before breakfast yet gasp for breath after two laps in the pool. Others say they are tired of finding their bike standing alone when they finally stagger into the first transition – despite hour after hour of training laps in the pool.

Their frustration is simple and incredibly widespread. What is it about swimming that reduces otherwise fit and accomplished athletes to the point of needing TI “group therapy?” Why do all those tedious hours of repeats, laborious laps with kickboards, and wearying sessions with paddles and pull buoys never seem to produce improvement or yield results that are far too modest for the time and energy invested? Time on your feet and time in the seat work for running and biking. Why not for swimming?

The answer is that water is a completely different medium from air, and swimming is a completely unnatural activity for most land-based humans. In water, the rules are different. If you try to improve by swimming more and harder (an approach that comes naturally for cyclists or runners), you’ll mainly make your “struggling skills” more permanent. If you seek instruction, you’ll find that few coaches or teachers know how to teach you the skills and awareness that really make a difference. If you join a Masters swim team, your training program will be more organized than if you swim on your own, but unless you have the great fortune to be training with a coach who is just as good at teaching as training, you’ll be a fitter flailer, but still not a good swimmer. Until you become a good swimmer, you’ll always limit your potential as a triathlete. That’s because you need to have a certain level of efficiency to get results from all your hours of training.

The solution is not elusive, costly, or time consuming. You can become a good enough swimmer to hugely improve your performance, potential, and fulfillment in triathlon. What it takes is a little knowledge and a willingness to practice swimming in a completely different way from how you train for the other two disciplines. Running and cycling are sports. Swimming -- at least as you need to do it to be the best triathlon swimmer you can be -- is an art. It’s a movement art just as rigorous and exacting as gymnastics or martial arts. In order to succeed in it you need to do two things:
1. Become your own swimming coach.
2. Practice mindfully, patiently, and intelligently.
This book will give you the information and guidance to do both well.
Why Inefficient Swimming Is Limiting Your Triathlon Success

Success in triathlon obviously depends greatly on sheer fitness. Thus, 95 percent of your energy as a triathlete is usually devoted to maximizing your aerobic potential. Because you have to squeeze in three sports around work and family, you can’t waste time on unproductive efforts. Yet until you become an efficient swimmer, you cannot realize the hard-won aerobic potential your training has earned you. Poor swimming not only puts you far back in the pack before you get to your strengths but also prevents you from spending your aerobic resources wisely and optimally. If you’re a poor swimmer, you lack control over how hard you work in the water.

It’s fairly simple to ration energy wisely while cycling and running. On the bike, you even have gears to help you maximize speed while minimizing effort. For a poor swimmer, there is no choice. For a large percentage of triathletes, simply making it through the swim is a survival test. If that's you, you have to flail and churn the whole time -- an effort that doesn’t earn you anything approximating a good swim time. It just allows you to finish wearily and far back in the pack.

Considering how little of the overall race distance and time swimming takes up, it consumes an extravagant amount of the energy available for the entire race. If you’re like the great majority of triathletes, you aren't concerned solely about how slowly you swim. You probably worry more about how hard you work to swim that slowly. The most important message I give triathletes at Total Immersion workshops is this: Your primary goal is not to swim faster. Focus first on swimming easier, and let more speed be a natural product of your increased efficiency. You will improve your overall performance far more by saving energy for the bike and run than you will by swimming faster. But, better yet, as you become an efficient swimmer, you will also swim faster.

What It Takes to Be a Good Triathlon Swimmer

Unless you are an elite athlete, your smartest goal on the swim leg is to exit the water with a low heart rate. The swimming leg is too short for a speedier swim, by itself, to make a significant difference in a race that usually lasts for hours. If you do work hard enough to pick up a few minutes in the swim, that effort can easily cost you many minutes back on land. Conversely, many triathletes who have taken the TI workshop have found that their newfound efficiency, while it may have shaved just a few minutes off their swim time, resulted in substantial time drops for the rest of the race, simply because they were much fresher entering the first transition.

So your first goal as a triathlon swimmer is to gain the freedom to swim as easily as you wish -- to be able to virtually float through a mile of swimming if you choose. To be able to choose how long or fast you stroke. And to be able to adjust both with the same ease with which you shift gears on your bike.

Your starting point for accomplishing these goals is to develop four foundation skills: balance, body alignment, body rotation, and coordinated propelling movements. The key is to have a relaxed, low-drag, fluent stroke at low speeds and to maintain all of those qualities as you move through your “swimming gears” to go faster. For most triathletes, swimming speed will probably never be essential (I’ll explain the exceptions in a later chapter). Swimming ease, however, is a non-negotiable skill for every triathlete. Ease means efficiency, and efficiency leads to speed. And for those of you approaching the elite level, you must learn to swim fairly fast, without exerting yourself so much that you blow up on the run. And the same fundamentals that let the beginner acquire ease also let the more advanced athlete develop efficient “gearing” for swimming faster when necessary.

Your essential goal as a triathlete is to have more control when swimming -- more ability to decide how hard to work, how much stroke length and stroke rate to use at any moment, and the skill to find the most efficient way to go faster when needed. Let’s begin learning how to gain that control and why, as a triathlete, you have plenty of company in figuring out The Swim Thing.
Chapter 2
Two-Dollar Gas: The Secret of Economy

Whenever the price of gasoline nears $2.00 per gallon, SUVs and other gas-guzzlers lose a bit of their popularity, while car pooling and public transportation gain ground. I drive a more economical car, but my response is to drive with a lighter foot, avoid nonessential trips, and combine errands. As a triathlete, your training time and energy are two-dollar gasoline and there’s no way to create more of either. Triathlon is a demanding discipline. Most triathletes cannot make a full-time job of training; thus, economy is the smartest success strategy of all.

By economy I mean: (1) efficient use of your limited training time and (2) efficient use of your body so that your available energy goes into forward motion and not struggle. If you take to heart the lessons of this book, you’ll need to spend less time in the pool…and will accomplish more than in your current program. If you get excited about shaving minutes off your bike time with an expensive set of wheels, think how you’ll feel if you could spend a modest amount to learn how to swim with such ease that you might cut an hour or more from your total Ironman time…and gain a priceless lifetime skill.

Your constant goal as a multi-sport athlete is to develop the capacity to go further and faster and, more important (because most triathletes are in their 30s or older), the capability to do both without breaking down. Faster race times are the motivation for training. Therefore you need to be rigorous in spending your precious training time wisely so that it brings clear benefits to race time. Training simply to prove that you can endure prodigious workloads would make sense if places were awarded to those with the most impressive logbook. But most triathletes have job and family responsibilities, and the best training program is one that produces the fastest race times with the least time and effort. And, as you’ll learn, training intelligently is even more critical in swimming than in the other two disciplines.

Economy

In the physiology lab, economy is measured by how much oxygen you use while exercising, because oxygen consumption is the best indicator of how much muscle fuel you burn to go a given distance at a given speed. In the pool or on the road, heart rate is the most practical marker for economy because trained athletes develop an acute sense of how hard they are working at any given moment. If a competitive swimmer spends fewer heartbeats (i.e., consumes less oxygen or fuel) to do the same work -- let’s say, to swim 100 meters in 1 minute, 20 seconds -- she has two choices for how to use the energy surplus she’s created. Sprinters can swim the distance faster, perhaps improving their 100-meter time to 1 minute and 15 seconds. Longer-distance swimmers can choose to maintain the same speed for longer, swimming 200 meters in 2 minutes, 40 seconds, or 400 meters in 5 minutes, 20 seconds. And perhaps ultimately 1500 meters in 20 minutes. Tri-swimmers have a third option -- for most the smartest one -- to save much of that surplus for cycling and/or running.

The longer the race, the more important economy becomes. When swimming a short distance -- 50 to 100 meters -- you could conceivably muscle your way through it. But there is no sprint distance in tri-swimming. Even a “sprint” triathlon starts with a 400-meter swim, which is a long way to be wasting energy. And the 2.4-mile Ironman swim is 250 percent farther than any Olympic swimming event. The opportunity to waste energy -- to misspend heartbeats you badly need to bike 112 miles and run a marathon -- is astronomical. And as we have heard countless times from TI workshop alumni -- those who have chosen to apply most of what they learned from us to swimming easier, rather than faster -- while their times for the swim leg have indeed improved markedly, their race splits in cycling and running have also improved dramatically, because they “save heartbeats” in the water for use on land.

From a tri-swimming perspective, in this book I’ll show you how to

1. Drive with a lighter foot (swim with a lower HR and energy cost).
2. Avoid unnecessary trips (get more benefit from fewer and easier swim-training laps.
3. Acquire a “smart” car (retool your stroke for efficiency).

The effect of all three will be to turn the “cost of gas” -- your time and energy -- back to those halcyon days of 30-cent-gas.
Chapter 3
How to Start Swimming Better Immediately

Perhaps you didn’t start out thinking “I’d like to be a swimmer,” but as soon as you mailed your first triathlon entry, swimming became a necessary evil. Or as most triathletes perceive it: “something I have to endure in order to do the two other sports I find much easier and more satisfying.” And you probably began by applying what you had learned from cycling or running: mileage equals improvement. You may even have seen some modest progress in the beginning. But if you’re like 98 percent of triathletes I’ve met, you soon reached a state one described as “Terminal mediocrity: no matter how much I swim, I never get any better.” There’s a logical reason for that. Unlike running or cycling, which you probably did reasonably well from age 7, with little instruction or “practice,” swimming well requires lots of both. Thousands of athletes who can run or bike long distances with ease, find themselves exhausted after a few laps of swimming. They know they’re in shape, but swimming seems to require its own special kind of fitness. So they do yet more laps, hoping it will come. But if you're an unskilled swimmer, all those laps do is make your “struggling skills” more enduring. No matter how many laps you do, you’ll never have enough fitness to compensate for the energy you waste.

This is why triathletes have responded enthusiastically to the simple logic of Total Immersion. We explain your difficulties in a way that makes sense. We suggest simple approaches that even inexperienced swimmers can confidently practice in a way that they know will make a difference. And, finally, we’ve replaced boring workouts with purposeful and interesting practice. The result is a style of swimming that, among its many virtues, always feels good. It looks good, too. TI swimmers are instantly recognizable to other swimmers by their unusual flow and ease.

The Water Is Your Swimming Problem

The reason you're not swimming as well as you'd like is because you’re a land animal in water. Humans are “hard-wired” to fight the water rather than work with it. There are literally only a few dozen people on the planet who have almost totally solved this. Swimmers such as Ian Thorpe (and former Olympic medallists such as Sheila Taormina) have learned to overcome the "human-swimming problem" because: a) they’re gifted with a rare sense of how to be one with the water (coaches call this “feel of the water”) and b) they’ve spent millions of yards (typically guided more by that intuition than by their coaches) developing a preternatural grace and economy.

You, on the other hand -- along with virtually everyone else on the planet – probably swim more like “Eric the Eel,” the athlete from Equatorial Guinea who won our hearts and admiration at the Sydney games for finishing the 100-meter freestyle, despite the fact that every stroke seemed like agonizing struggle for him. Human swimming looks like this mainly because water is an unnatural, even threatening, environment. Our bodies were not designed to travel easily through it, and our basic instincts as land-based animals cause us to fight it, not work with it. Our discomfort creates tension; we respond with turbulent churning. Both keep us from moving freely and fluently. Since water is a fluid, flowing freely through it is essential to efficiency. Any swimmer can learn how to do this. The first step is to understand what's holding you back.

Three Mistakes Every "Human Swimmer" Makes

Chances are, you've thought there was something wrong with you because:

1. **You think you'll sink.** Fighting "that sinking feeling" is something all humans do from their very first stroke. After a very few additional strokes, the struggle to stay afloat becomes a habit. The result? Most of your energy and too much of what you hope are propelling actions (i.e., your pull and kick) are spent keeping you from sinking, instead of acting to move you forward.
2. **You try to overpower the water.** Water is 800 times denser than air. In essence, it’s a wall. If air can feel so resistant at 20 miles an hour on a bicycle, then imagine how much resistance the water throws at you at even the slowest speeds. As you get a little faster -- particularly if your legs tend to sink as you swim, drag goes up to almost inconceivable levels. Want to better understand how that wall of water reacts to your body? Next time you go to the pool, try walking half a lap. What you feel is drag. Next, try running the same distance. Ouch! And how do we instinctively respond to resistance? Mainly by pushing harder. But all that does is increase drag still more.

3. **You churn your arms.** The medium that was too solid when you tried to walk through it suddenly becomes very elusive when you look for a handhold to support or propel yourself. When you try to push on it, it just swirls away. Compared with running, in which we move through thin air and propel by pushing off solid ground, swimming is like running through a Jello swamp. And because the water offers neither support nor traction, our natural response is turbulent churning, like wheels spinning on ice. This increases energy cost and the extra turbulence increases drag. A double whammy.

**The 4-Step Swimming Solution**

The reason TI methods create such fast transformation is simple: They've had to. By teaching hundreds of workshops that last just a weekend -- rather than lessons that go on for weeks -- by having **hours** to teach fluency, not months or years as most coaches do, we've learned to eliminate wasted steps. And since many of our students are inexperienced, we've done away with all of the technical mumbo-jumbo. Our instruction is simple and clear. And virtually everyone who follows four basic, but non-negotiable, steps learns to swim better with almost ridiculous ease.

1. **Learn balance.** Balance -- the feeling that you are effortlessly supported by the water and free to devote all of your efforts to efficient propulsion -- is what makes Ian Thorpe and other Olympians swim as beautifully as they do. Lack of balance -- the sense that you must constantly fight that sinking feeling -- is what made Eric the Eel swim as he did. In the TI program, mastery of balance is the non-negotiable first step: You do nothing more difficult until you have learned to be effortlessly horizontal and completely supported in a few basic positions. And you continue practicing these positions until balance feels completely natural. When you learn balance first, you not only stop fighting the water and wasting energy, you also learn comfort and ease, which allows you to master every other swimming skill much faster...and ultimately will let you virtually glide through a triathlon swim of any distance.

2. **Unlearn struggle; learn harmony.** Being able to relax and enjoy the support of the water is just the starting point of a series of sequenced movement skills. At every step, it’s critical to remember that your human DNA, combined with your history of “practicing struggle,” makes you incredibly vulnerable to regressing. The great advantage of the TI process is that it starts with simple movements and positions and progresses in small steps. At every step, you have the opportunity to eliminate struggle and let fluency replace it as a habit. When you master basic balance, and move on to active balance and beyond, remember that the **qualities** of fluent movement you will be practicing are just as important as the **mechanics** of drills and skills.
3. Learn to roll effortlessly. Human swimming propulsion instinctively comes from arm-and-leg-churning. What that does best is make waves and create turbulence. Fish propel by undulating their bodies. Scientists have yet to puzzle out how, with little “horsepower” and resisted by drag, fish can reach speeds of 50 mph and beyond, without ever seeming to try. That effortless power is produced by core-based propulsion. You’ll learn to tap effortless power when your rhythms and movements originate in your core body, not in your arms and legs. Those core-rhythms release the energy and power that subsequently become a strong, economical swimming stroke. You learn them by advancing from static to active (rolling) balance drills.

4. Learn to pierce the water. Torpedoes, submarines, and racing boats are sleekly shaped for the same reason fish are: to avoid drag. Because drag increases exponentially as speed goes up (twice the speed equals four times the drag), drag reduction pays off exponentially as you swim faster. That’s why humans who learn to slip through the smallest possible hole in the water see such rapid and dramatic improvement. Slippery swimmers need far less power or effort to swim at any speed. Awareness of slipping through the smallest possible hole in the water is maintained at every step of our skill-building sequence.

5. Learn fluent, coordinated propelling movements. To most coaches, technique means “how you use your hands to push water toward your feet.” That’s the starting point and remains the primary focus of conventional instruction and stroke drills. In the TI approach, arm stroking is among the last things we teach: First, you acquire a long, balanced, needle-shaped, and effortlessly rotating core body. Then you link your pull and kick to the body’s movements and rhythms. As your propelling actions, practiced first in “switch” drills, gradually grow into “strokes,” we maintain a focus on keeping them coordinated and integrated with core-body rhythm. Our slogan is “swim with your body, not your arms and legs.” And the moment your speed, effort, or fatigue causes you to feel “disconnected,” it’s time to slow down and regain your flow. Never, ever “practice struggle.”

But remember: None of these positions or skills is natural or instinctive. You must apply yourself to learning them. The clear and logical course of instruction in the chapters that follow should put you on the path to better swimming immediately. But first I’ll ask you to forget everything you “know” about swimming so you can learn a completely fresh way to move through the water, a way I guarantee will make more sense, feel better and make improvement easier than anything you’ve tried before.
Part 2

The Smart Swimming Solution

In the next six chapters, we’ll explain the smartest way to become a more effective swimmer. The information we’ll present is simple, readily available, and logical…but widely ignored by swimmers (triathletes, too) and coaches, who choose the much harder, more frustrating route of generic training. But not you. In the next few pages, you’ll learn the most clever and reliable way to improve your swimming, and you’ll gain all the tools you need to train smarter and more efficiently than virtually every swimmer on earth.

Chapter 4

Stroke Length: How You Can Swim Like Ian Thorpe

While special oxygen-analyzing equipment may be needed to measure economy in the research lab, in the pool economy is easy to recognize. The pool where I train is filled with thoroughly “average” swimmers. Their splashy, choppy, noisy strokes are the norm. The pool at Auburn University, where we did a TI team workshop for the school’s two-time NCAA Championship team, is filled with extraordinary swimmers. Wherever we looked -- even before we began teaching -- almost all of the fifty men and women swimmers were practicing long, relaxed, unhurried strokes, with little noise or splash and a marked absence of visible effort.

Good swimmers have one thing in common: They make it look easy. Genuinely great swimmers – there are only a few dozen in the entire world -- are so fishlike that they look downright elegant. The latest example is 2000 Olympic champion Ian Thorpe, who shattered world records in Sydney, while taking what The New York Times described as “strokes of languid purpose.”

Since 1992, Alexander Popov had been my favorite exemplar of swimming economy. While Popov is enormously gifted, he and his coach also made a purposeful decade-long effort to emphasize the practice of fluidity and control at all speeds. The impression I get from champions such as Thorpe and Popov is that they always seem to be of the water, not just in it. The word that best captures the quality of their swimming is flow.

And what is the secret to flow? For years I was convinced it was pure talent: great swimmers somehow knew in their bones how to remain fluid and smooth when going fast. The rest of us could just watch in envy. But ten years of intensive teaching have shown me that “Fishlike” swimming is possible for anyone who pursues it logically and patiently. At every Total Immersion workshop, we start on Saturday morning with splashy, choppy, “average” swimmers, like those that fill my pool, and yours. By Sunday afternoon, the flow pattern right across the pool is much like what we saw at Auburn.

Using simple information, you too can understand exactly how to achieve flow and then, to a surprising degree, achieve it for yourself. Once you've "broken the code" of fluid, relaxed swimming, you can consciously practice, as Alex Popov does, the movements and qualities that
produce it, and that all but guarantee you'll swim your best. I won’t promise you'll swim as fast as an Olympian, but you will swim as well as you’re capable of swimming.

The key to being the best swimmer you can be is a longer stroke or, as swim pros call it, Stroke Length. This “secret” is actually widely known, but almost perversely ignored, by coaches and swimmers, who continue to pursue success mainly through sheer sweat, even though more and harder laps actually tend to make your stroke shorter, not longer. Hard work, without sufficient care and thought, will actually slow most swimmers’ progress.

An even more powerful impediment than habit is instinct. Most every swimmer who wants to go faster automatically thinks first of churning the arms faster. And a faster stroke (i.e., higher stroke rate, or SR) results in a shorter stroke -- again, just the ticket for swimming slower, instead.

**Stroke Length: The Mark of Champions**

How do we know stroke length is so important? Since 1976, more than a dozen researchers have analyzed the results of meets at all levels, from high-school championships to the Olympics, to figure out what make the faster swimmers faster. Each study produced the same result: Winners took fewer strokes. Test it yourself at any local pool or at your next workout: Count strokes per length for slower swimmers and compare with faster swimmers. The faster swimmers will almost certainly take fewer strokes.

This simple insight has incredible potential to transform your own swimming, if you'll just use it. But as I said, most swimmers or triathletes continue to train as if the pace clock and yardage total were all that mattered. If even one study had identified aerobic power as the key to better swimming, such overwhelming focus on distance, time, and effort would make more sense. But none did. Likewise, plenty of athletes pump iron or muscle their way through endless laps with huge paddles and/or drag suits, as if sheer power was the way to swim faster. Yet when scientists study the impact of power on performance, they usually find the best swimmers in the world are less powerful than any number of mediocre swimmers. So weight-room visits and power-oriented swim sets aren't the answer either.

None of this is to suggest that fitness is unimportant. But at the Olympics, everyone has worked hard; everyone is incredibly fit. Yet certain swimmers still have an edge over all the others. And that edge, up to 90 percent of the time, is a longer stroke.

**What, Exactly, Is Stroke Length?**

You can work more effectively on your Stroke Length (for simplicity, I'll refer to it as SL, and to stroke count per length of the pool as spl), if you understand it, but SL is one of the most poorly understood terms in swimming. Even though swimmers are beginning to grasp that a long stroke is advantageous, most are still unsure of exactly what SL means or how to make a stroke longer. They mostly think of SL as "how far you reach forward and push back."

Coaches usually recognize that there's more to SL than just "the length of your stroke," but few understand how to significantly improve it. When I eavesdrop at workouts, I hear directives such as, "You've got to make your stroke longer!" which the swimmer naturally interprets as "Reach forward and push back more." This will produce a small increase in SL, but 99.9% of the time that increase will be lost the moment the swimmer tries to go faster. Nor will it bring the swimmer anywhere near his or her best possible SL. So the swimmer remains unconvinced and goes back to relying on SR (stroke rate) for speed.

For years, I struggled to increase my own SL without much success. So long as I worked on it by trying to push more water back, I managed to shave about one stroke from my average each year or two. Then my teaching experiences began showing me the importance of being
balanced and slippery, and all at once I was able to lop off a jaw-dropping three strokes/length in a few weeks -- and to help other swimmers score SL improvements of up to 50% literally overnight. Often, these were people who understood the value of SL and had been trying for years to improve it.

The reason stroke length doesn't have a lot to do with arm length, or with how you push water back, is SL is how far your body travels each time you take a stroke, and your success in minimizing drag influences it far more than how you stroke. You'll learn how to minimize drag in the next three chapters.

XXX Swimming is no different from running or in-line skating (Pic of B running or me skating) XXX

Run Like a Greyhound; Swim Like a Fish

The key to becoming a better swimmer can be found in a simple equation:

\[ V = SL \times SR \]

Velocity equals Stroke Length multiplied by Stroke Rate.

How fast you swim (V) is a product of how far you travel on each stroke (SL), multiplied by how fast you take those strokes (SR). In that way, at least, swimming is no different from running or in-line skating or cross-country skiing, where SL and SR refer to Stride Length and Stride Rate.

Throughout the animal kingdom, the really fast creatures -- race horses, greyhounds, cheetahs, Marion Jones, Michael Johnson -- use about the same stride rate at all speeds. They run faster by taking longer strides, not by taking them faster. Using real numbers, a runner doubling his speed from a 10-minute-per-mile pace to 5-minute miles, might well do it by stretching each stride from 18 to 33 inches (an 83% increase), while increasing stride rate by only 8%, from 83 to 90 per minute. But in the water, for all the reasons I explained earlier, we humans do just the opposite, resorting to churning our arms madly when we want more speed.

It seems self-evident that a longer stroke or stride would be more efficient than a shorter one, but in the water a longer stroke is much more efficient. Here's why. First, there's the energy cost of a higher SR. As you increase SR, the energy cost goes up by a cube of that increase. Double your stroke rate and you burn energy eight (2 x 2 x 2) times faster. Second, there's the effect of a higher SR on coordination. As SR (and your heart rate) increases, your ability to stay coordinated and fluent diminishes dramatically. As your form becomes increasingly ragged and inefficient, energy cost goes up even more. And, finally, you disturb the water around you far more when you're churning than when stroking smoothly. A fast turnover is like swimming in white water. Not only is drag higher in turbulent water, but also your hands can't "grip" churned-up water nearly so well as they grip still water. One of the surest ways to find still water to pull is to swim with a greater SL and lower SR.

XXX Count strokes regularly and begin improving immediately XXX

How Can I Improve My SL?

As soon as you begin counting strokes, you'll recognize that virtually every choice you make in training influences your SL in some way -- the distance of your repeats, how much you rest between them, the length of your sets, how fast you swim, your heart rate. But the single most important reason for a mediocre SL is failure to pay attention to it. If you are not consciously monitoring how your SL holds up at various speeds and distances (by counting strokes), your instincts will drag you back into too much reliance on SR. In fact, if you were to
put this book away now and do nothing more ambitious than count your strokes regularly and set some personal standards or an acceptable upper limit, you would immediately start improving. When you do monitor your count, you’ll be alerted as soon as your SL falls too steeply and can immediately take steps to fix it. And what might those steps be?

SL can be improved in two ways. The easiest way is to minimize drag, and you do this by simply repositioning your body in the water to make yourself more slippery. We’ll help you do that by showing you how to pierce the water. The more slippery your body line, the farther you will travel, with more ease and less deceleration, on a given amount of propulsion. The second way to improve SL is to maximize propulsion, and you do this by focusing on doing a better job of moving your body forward. To improve that, we’ll show you how to replace exhausting arm churning with coordinated whole-body movements.

When I began teaching TI workshops in 1989, I had recently become acquainted with an independent thinker named Bill Boomer who urged coaches to at least pay some attention to "vessel-shaping." I decided to balance my attention between showing people how to propel themselves better and teaching them how to be more slippery, which in 1989 was a highly experimental art. I was clear on one thing: I would measure my success as a teacher by how much my students improved their SL.

And, from the start, I noticed a striking phenomenon. When I was successful in teaching swimmers to stroke better, I would see a modest improvement in their SL. When I was successful in teaching them to pierce the water better, I would see dramatic improvement. Norton Davey, one of the few 70+ athletes to complete an Ironman, was a prime example. At a TI workshop in Chicago in 1994, it took him 36 strokes to swim 25 yards as we videotaped him on Saturday morning. By Sunday afternoon he had increased his SL by 100%, taking only 18 strokes, but the pushing-water part of his stroke, as shown on underwater video, was virtually unchanged. His body position, though, had changed from about a 30-degree “uphill” posture on Saturday to very nearly horizontal on Sunday. Countless experiences such as that got my attention in a hurry, and we soon began to devote more and more of our limited teaching time to "slippery swimming."

**How Many Strokes Should I Take?**

The simplest way to monitor your SL is to make a habit of counting your strokes, at all speeds, and on virtually every length. That will give you a basis for evaluating whether you're spending your precious pool time concentrating on things that will really help you swim faster or more easily. You'll find there's not a single number that represents your "best" stroke count. You’ll have a stroke count range -- fewer on shorter repeats and/or when you're swimming slower, more when you're going farther or faster.

Your primary goals should be to: 1) gradually lower that range; 2) reduce the difference between its top and bottom; and 3) do the majority of your training in the lower half of your range. If your range was 17 to 24 s/l last year and 14 to 20 this year (or if you can swim faster at each point in that 17-to-24 range), stay the course; you’re doing something right.

But at what point have you gone far enough? Now and again, we’ll see a workshop pupil proudly swim for the video camera on Saturday morning in a very low count, perhaps 12 strokes, because they’ve read my first book and taken its message to heart, working unswervingly to shave strokes. But their 12-stroke lap is anything but efficient. It’s typically lurching and non-rhythmic, and there’s a whole lot of kicking going on.

I’ll take the blame for that, having failed in that book to make clear that the goal of our instruction is to help you reach your optimal, not maximal SL. We don’t want you straining to reach the lowest count you can squeeze out. We want you to free yourself to swim at an efficient
count that you can maintain with relatively little effort, and especially with relatively little kicking. These swimmers would actually have been better off with a relaxed and rhythmic 15 strokes than the 12 they were straining to hold.

The key to that freedom, ease, and control is balance, the one skill of swimming that is non-negotiable...but also incredibly rare. Let’s get straight to it.

Chapter 5

Balance: Becoming Fishlike Starts Here

If there’s one moment at every TI workshop that can be described as an *epiphany*, it’s when our students first realize they can *float* – feel effortlessly supported by the water – just by changing their body position. For most, this is a total revelation – so accustomed are they to fighting “that sinking feeling” with *every* stroke. That sensation, created by a drill so simple that 90 percent of our students master it in 10 minutes, is so transforming that one of our alums exulted in an e-mail to me, "I've been swimming twice a day since the workshop because I'm afraid if I wait too long I'll have forgotten how it feels to be balanced. Every time I get in I pray, 'please, please, feel like it did last time.' I've never felt anything like it; I'm literally just floating along!"

That sense of ease and comfort is transforming for swimmers who have struggled for years without ever feeling good. Ten minutes, and one simple skill, have made them feel more capable than anything else in their swimming experience. That's why mastering balance is the non-negotiable foundation of "fishlike" swimming -- the skill that must be learned by every would-be swimmer before attempting anything more advanced.

Which simply means that learning to swim is no different from learning to walk or any other land-based skill. Many years ago, just learning to stand unaided, and then take a few shaky steps, took each of us weeks of utterly concentrated effort. But it was essential to every movement skill that followed, from basic play skills such as running and bicycling to advanced athletic skills such as gymnastics, dance, or downhill skiing.

In each instance the body's center of gravity (several inches below the navel) must be kept artfully aligned over the feet while the body is moving in ways likely to upset that alignment. We spend virtually every waking minute consciously or unconsciously practicing dynamic balance in that way. And our motivation to excel at it is great for, if we don't, we'll be terrible at sports -- and be much more likely to fall and fracture things.

**Part of the reason it has taken so long for swimmers and coaches to understand how essential it is to master balance is that being unbalanced doesn’t have so serious a penalty in the water as on land. Rather than a painful fall and instant lesson, we start doing laps any way we can and simply get tired from all the extra drag of a body moving towards its natural (i.e. vertical) position (and begin learning how to struggle). Our reaction to that is “I need to get in better shape.”**
Ten years of teaching have shown us that every swimmer who has not consciously worked on balance has room to improve on it. Even Olympic swimmers have told me they could feel their hips become lighter and higher after practicing simple balance drills, though we could not always see a striking difference. But with Olympic decided by the tiniest of margins, even fractional improvements in efficiency loom large.

The immediate improvement in every swimmer to whom we've taught our basic balance drills has shaped TI methods as nothing else has. It’s also shaped the thinking of hundreds of coaches who have attended a TI workshop and seen how rapidly a sense of balance can transform a struggling swimmer into a fluent one. Mastering balance is not only important in its own right, but also impacts every part of the stroke. Here's how.

1. **Balance keeps you horizontal and slippery.** Imagine kicking with a board angled slightly upward. The increased drag would make kicking a *lot* harder. Now imagine how much drag your whole body can create when positioned at a similar angle. If you're not perfectly horizontal, it's a *lot* more work to move yourself forward than if you are horizontal. After viewing underwater video of thousands of swimmers, we’ve concluded that well over 90% have room to improve their balance, including many who appear from the deck to be doing fine.

   Usually the best-hidden imbalance is that which happens only momentarily during the stroke (e.g., while breathing in freestyle). Viewed in slow-motion or stop-action from under water, it shows up glaringly. The swimmer usually has no idea this is going on at all until he or she begins regular balance practice and realizes how much better it feels to be completely supported by the water.

2. **Balance saves you from wasting energy fighting “that sinking feeling.”** Let's clear up one thing right now: Your body is *supposed* to sink. Huge amounts of energy are wasted because of the nearly universal misunderstanding that good body position means riding high in the water.

   Novice swimmers spend upwards of 90 percent of their energy just trying to keep from sinking. Their “survival stroke” leaves little energy for moving forward. More accomplished swimmers -- no longer in any danger of drowning -- waste energy, too, because they’ve heard that good swimmers ride high on the water. Coaches sagely repeat it, and swimmers grimly try to do it. The reality? A speedboat will not hydroplane until it’s reached at least 33 mph, and no human swimmer has ever exceeded 5 mph. The pointless effort to stay on top not only squanders energy, but also keeps your arms and legs so busy pressing down (to keep you *up*) that they have no opportunity to propel you forwar

   You save much more energy by *learning to sink in a horizontal position* instead of fighting to stay on top. As soon as you learn to find an effortlessly horizontal position in the water, you eliminate needless tension, you gain flow and ease, and you save energy for propulsion.

3. **Balance "liberates your limbs" to propel more efficiently.** Coaches often observe a dropped elbow or splayed-leg and order, "Keep those elbows up!" or "Keep your legs closer!" They're really asking the swimmer to correct the symptom, like a doctor ordering you to "Get that temperature down!" rather than seeking the cause of your fever.

   Swimmers have an instinctive understanding that it's better to remain horizontal and stable. When they sense imbalance, they instinctively use their arms or legs to fix it. These compensating or stabilizing actions appear to the coach as stroke errors. But when the underlying imbalance is corrected, many of the more-visible errors often disappear. The arms are freed to perform their most valuable function -- lengthening the bodyline and holding on to the water. The legs are freer to stay effortlessly in sync with core-body rotation. The stroke automatically becomes far more efficient.
4. Balance frees more of your power. A baseball slugger's power is useless if he swings from an off-balance stance. An in-line skater, cross-country skier, or speed skater's powerful quads can do little good if the rest of the body isn't stable and positioned for the push. No good athlete attempts to perform in anything other than full dynamic balance. On land, grounded by gravity and needing all of your body's power to excel, your body just knows it can't deliver if it's not balanced.

In the water, it's different. Supported by buoyancy, your body weight is only 10% of what it is on land. And because you're not on solid ground, you're similarly restricted from using all of your potential power. On top of that, without those clear dry-land signals, your body's balancing instincts can't tell you how you're limiting the power you do have.

But limiting it you are, because swimming power comes from core-body rotation, which triggers the kinetic chain, which powers the arms and legs. As we’ve seen in thousands of unbalanced swimmers on underwater video, a swimmer who lacks dynamic balance loses the ability to rotate freely. Many of these swimmers, aware that something is holding them back, spend hour after hour doing lat pulls and tricep presses. Truth is, they already have ample power and could tap it instantly by improving their balance.

5. Balance frees you to be more fluent. The unbalanced swimmer, especially in freestyle, is often trapped in a cycle of frantic movement. He responds to the feeling of sinking by churning his arms more. The faster he churns, the shorter his strokes become, and the more strokes he has to take to maintain speed. Eventually, he’s flailing his arms frantically just to keep moving.

As soon as you master balance, you escape the trap. You can move at the same speed with a far more leisurely stroke, can find a more natural and fluent body rhythm, and will swim in calmer water.

Getting Your Balance

We define balance as being "effortlessly horizontal" in the water. The key word is effortless. It’s possible to achieve a horizontal position if you do things such as kick hard, skip breaths or use your arms for support. But we’re after horizontal balance with minimal kicking, breathing at will, and with "weightless" arms. And this kind of effortless balance is achieved by creatively repositioning your body parts and redistributing your body mass. You can almost forget about pulling and kicking.

The way to do it is fairly simple. First, keep your head in a natural, neutral position -- as close as possible to the way you hold it when you're not swimming. Second, shift your body weight forward. "Press your buoy," as I call the process of pushing your normally buoyant chest cavity into the water, until you feel the water pushing you back out. Pressing in, rather than trying to stay on top, is, of course, counterintuitive. But virtually everything about water balance is non-instinctive, as TI Senior Coach Emmett Hines explains.

"For a child learning to balance while walking, a certain amount of time and repetition are needed. Moreover, that repetition needs to be pretty much just walking.

"Now for a person to maintain balance while break-dancing on a trotting horse's back (I took my kid to the circus last week), to avoid falling off and getting trampled by the elephant next in line, a great deal more time and repetition are needed. And that repetition needs to be pretty much just break-dancing on a horse's back, or pieces of that skill ordered in a progressive manner, so as to end up with something people will pay to see.

"My sense is that swimming is more like break-dancing on a horse's back than walking. Whenever we do anything in the water, the neuromuscular system is inextricably drawn to the
'wrong' conclusions about what balance is and how to achieve it. Not wrong for land-based activity -- wrong for water-based activity.

Which suggests that it takes a fairly deliberate and exacting process to master this elusive skill. Here are the elements.

XXX Ask a friend if your head position looks like this. XXX

Balancing your Freestyle
"Hide" Your Head

If you've read my first TI book, you know I stressed the importance of leaning on your chest or "buoy." That's still important, but additional years of teaching and swimmers balance have shown us that head position is actually more essential than pressing your buoy. In fact, simply getting the head in a neutral (aligned-with-the-spine) position eliminates about 70% of the balance problems for students in our workshops. So our teaching progression now starts with teaching swimmers to "hide" the head. Once that's accomplished, we show them how to "press the buoy."

From the deck, it looks like this: The coaches know your head is in the right position when we can see no more than a sliver of the back of your head or cap above the surface any time you're looking down. From your point of view, it should feel as if:

- a thin film of water could flow over the back of your head at any time
- you're looking directly at the bottom between breaths, using peripheral vision to peek just a bit forward
- you're leading with the top of your head, rather than with your nose
- your hips and legs feel much lighter and are riding noticeably higher.

Hiding your head does not mean burying it, nor pressing it down. It simply means holding your head in a neutral position, the way you hold it when you're not swimming. When I'm coaching, as I look across the pool, I want to see that tiny sliver of the back of your head showing above the surface whenever you're not breathing. Or a thin film of water flowing over it. Ask a friend to eyeball you as you swim and drill, after showing them the photo below.

Swim “Downhill”

We may no longer emphasize this as much as previously, but for many people -- and particularly triathletes who are quite lean or have weak kicks or rigid ankles (from years of running) -- consciously shifting weight forward, constantly leaning on your chest, remains very helpful. Hiding your head should make your balance much better, but if you still feel your hips and legs sinking, then lean on your chest too. How much? Press in until you feel the water pushing you back out. Press in until you feel as if your hips are light, as if the water is simply carrying you. When that happens, you’re experiencing the sensation we call “swimming downhill.” You’re not really, but the contrast with your prior ordeal swimming uphill will have you imploring "please, please feel like this every time." Continue doing it very consciously until it starts to happen naturally. If you're one of the confirmed "sinkers," this could take as much as six months of patient effort.

Reach with a "Weightless" Arm

The best indicator that you are a truly balanced freestyler is the sensation of having a “weightless” arm. With poor balance, or a high head position, you have to use your arms to try to keep from sinking. The weight of your head and body drives them down as you try to reach forward. A balanced swimmer should be able to feel as if the extending arm is weightless, just
floating effortlessly -- almost leisurely -- forward, until you choose to make your catch and begin stroking.

**Drill with Total Patience**

The most important advice I give to the 20% of workshop attendees who are particularly “balance challenged” is to do as little swimming as possible. Until you have at least the basics of balance, you will almost certainly “practice struggle” to an unacceptable degree while doing whole-stroke swimming. It is essential to take all the time necessary to patiently move through the basic balance drills until effortless support begins to feel natural. Don’t swim and don’t even do much advanced drilling. Just stay with the most basic drills -- Lesson One in the drill section that begins on page 000 -- almost to the exclusion of everything else.

**Use the fistglove® stroke trainer**

After mastering Lessons 1 through 3 (see pages 000 to 000), one of the simplest and quickest ways to further develop your basic balance skills, while doing “switch” drills and whole-stroke swimming, is to wear fistglove® stroke trainers for 50 percent or more of your pool time. These black latex “mittens” tightly wrap your hand into a fist and make it impossible to use your arm as a support lever or to muscle your way through the water. They force you to use your torso for balance and support and encourage you to use much more finesse while swimming. Soon, a weightless arm is your only option. For more information on fistgloves®, visit [www.totalimmersion.net](http://www.totalimmersion.net) and check issue #9 of Total Swim, the official online newsletter of TI.

**Should I Use a Pull Buoy?**

Ordinarily my answer would be no. Once a swimmer has learned balance, I’d say he should never use a pull buoy again; a balanced body is its own perfect buoy. But for the 10% of swimmers with the most stubborn balance challenge, there may be some benefit in doing a limited amount of pull-buoy practice. The basic problem with pull buoys is they provide artificial balance; take the buoy off and it’s lost. If, however, you wear it just long enough to sharpen your kinesthetic sense of how it feels to have your hips and legs effortlessly supported and how that can free your arms to simply glide forward (see weightless arm above), you can try to replicate the sensation without the buoy. You might spend 7 to 10 minutes alternating one length with the buoy, two without, mindfully trying to make the buoy-free laps feel progressively more like the buoy-supported laps.

If you typically swim with a frantic kick (not unusual for runners), you might also benefit from spending part of your practice time with a pull buoy. Again, use it to learn what it feels like to have your hips and legs feel effortlessly supported so that you don’t need to use them to stay afloat.

**What about My Wetsuit?**

Wetsuits are universally popular with triathletes for one primary reason. They instantly solve the balance problem. Yes, they help keep you warm in cold water but, more important, they make you comfortable and confident. In Chapter 19, I’ll give detailed guidance on how to use that freedom to maximum advantage in a race, but for now just be aware of this: The greatest advantage offered by a wetsuit is the freedom to slow down your arms, lengthen your body on each stroke, and end the frantic churning. If you happen to do some wetsuit swimming in pool or lake, focus more on slowing your arms and lengthening your body than on anything else, and recognize that you are imprinting the balanced-swimming form. Then when you swim without your wetsuit, try to keep the same feeling of leisure, control, and flow.
Just as a balanced body fights the water less, the laws of physics also say that a longer body will slip through the water more easily than a shorter one. And, happily, there are ways to make our bodies "longer" too -- at least as far as the water is concerned. So now that you've mastered balance, it's time to start "Swimming Taller."

Chapter 6

How to Swim Taller – Regardless of Your Height

As with balance, "swimming taller" is neither natural nor instinctive; in coaching thousands of triathletes, I’ve seen only a few who swam taller without having been taught. But, as with the other Fishlike skills, knowing how to lengthen your “vessel” in the water can be learned by anyone, given the right kind of practice.

The most significant advantage to swimming taller is that the extra length makes your body more slippery. According to Froude's Law, as you increase the length of a vessel at the waterline, wave drag decreases and energy cost goes down. And though it may be a stretch to compare a 60-foot steel hull making 20 knots in open seas to a six-foot triathlete trying to make one meter/second in Kona Cove (and whose "vessel" is continually shape-morphing with each stroke to boot), there is no doubt swimmers can benefit greatly from trying to be more "Froude worthy."

The payoff is clear. If you watched the finals of the 100-meter freestyle at the 2000 Olympics, you might have noticed something striking about the finalists: They look like they would make a pretty decent basketball team. In fact, the fastest men averaged about 6'5" while the fastest women were 5'10" or taller.

Common sense suggests several advantages of being taller: Longer arms to win close touch-outs. Long legs to turn a bit farther from the wall. Incremental advantages like those would help in a close race, but the more critical reason is that the maximum speed of a human swimmer is approximately one body length per second. All things being equal, this gives a 6'6" swimmer an advantage of approximately 10 yards over a 6'0" swimmer in a one-minute race. Thus, the price of admission to a final where everyone swims about two meters per second (48 to 49 seconds for 100 meters) is a body that’s about two meters tall. And where do 6-footers find success? Generally, in events where the winning time might be only 1.7 to 1.8 meters per second, such as the 400- or 1500-meter freestyle.

Most triathletes are not endowed with unusual height, nor can they expect another growth spurt, but luckily this is not really a handicap in triathlon – as it would be if you harbored a secret goal to swim the 100-meter final in the next Olympics. The point is to do all you can to maximize the speed potential of the body you do have and to take back the advantage from taller rivals who haven’t learned how to use their height to full advantage.

Here’s why this works: Drag increases exponentially as we go faster; thus it takes a HUGE increase in power to swim faster if nothing else changes. But it is in your power to change the equation: Keeping your bodyline as long as possible for as long as possible during each stroke cycle is among the simplest things you can do to reduce drag. And anything you do to reduce drag hugely reduces the power required to swim at any speed. The less power and
energy it takes you to swim, say, 28 minutes for 1500 meters, the better you’ll feel on the bike
and run.

Here’s how you do it in freestyle:

1. **Hide your head and swim “downhill.”** First things first. Keep working on your
primary balance cues until you feel a clear sense of a "weightless arm" before you actually start
*trying* to swim taller. Remember, if you haven't mastered balance and learned to make the water
support you, your arms will be so busy trying to keep you afloat that you won't be able to use
them to lengthen your body.

XXX Use your arms to lengthen your vessel XXX

2. **Lengthen your body with each stroke.** As you swim, instead of thinking
"Stroke...Stroke...Stroke," think "Reach...Reach...Reach." You'll still be stroking -- the right arm
strokes as the left arm reaches, and vice versa -- but your focus will shift to the reaching arm,
which has far more potential to increase speed and reduce drag. This will change the entire focus
of your swimming, away from pushing water toward your feet (concentrating on what's
happening *under* your body) to lengthening your body (concentrating on what's happening *in
front* of your body). And that shift in focus will reduce your level of perceived effort. If you
imagine you’re sliding your arm through the sleeve of a jacket, you'll have it about right.

XXX Slice your hand in close to your head. XXX

3. **Reach through, not over, the water.** Slice your hand into the water fairly close to your
head, then extend it just below the surface. Reaching over the water is more natural, but a hand
in the air is a weighted object that makes balance more difficult. Moreover, it does nothing to
increase the length of your vessel at the waterline (remember Froude). But extending your hand
just below the surface gives you that extra length. To get this right, practice this while doing your
TI freestyle “switch” drills, and later while swimming:

• Have your hand *barely* clear the water on recovery.
• Slide your hand back into the water almost directly in front of your nose.
• Re-enter the water as if trying to cut a hole in the water with your fingertips and slip the
rest of your arm *cleanly* through that hole.

4. **Reach with a "weightless" arm.** If all your brain cells are shouting "Reach!" as your
hand enters the water, but your hand still plunges toward the bottom as it enters, there are two
possible reasons: either you haven't solved your balance problem (in which case, see #1 or
review Chapter 5), or the force of habit is still too powerful. If it's the latter, you can correct it by
a little creative self-deception: Pretend each stroke is your last of the lap, and reach forward as if
for the wall before you begin the stroke. This will help you form a new habit of extending your
hand weightlessly, effortlessly, and unhurriedly before stroking, as if it was just floating out in
front of you.

5. **Use shoulder roll to extend your hand.** Though you may feel as if your arm is
weightless, don’t feel as if it's disembodied. Use your arm as an extension of your torso. Work
on this by extending each arm until you feel that shoulder touch your jaw; men with a bit of chin
stubble should finish each practice with a small red spot inside each shoulder. An added
dividend: More body roll will add an inch or two to your reach -- and to the length of your
vessel.

6. **Learn the "Switch," and practice "FQS."** Swimming taller means you should always
have one hand in front of your head -- particularly at slower speeds -- which also means that for
a brief moment in each stroke cycle *both* hands should be in front of your head. This is known as
Front-Quadrant Swimming (FQS), though many people confuse it with catch-up swimming (a
non-TI drill in which the recovering hand touches the extended hand before each stroke).

As the photos show, our object is to learn to time strokes precisely so that one hand
remains extended for slightly longer in each stroke, until the other hand is just about to enter the
water. The quickest and easiest way to learn this is with our series of "Switch" drills, found on the video Freestyle and Backstroke: The Total Immersion Way and in Chapter 10.

7. Master one skill at a time. Swimming taller in freestyle involves more coordination than in other strokes. Avoid mental overload by learning the six stroke modifications just one at a time, in the order listed. Mastery of one will lead naturally to the next. Spend 10 to 20 minutes of each practice on one skill, and focus on only one or two skills in each session. Allow yourself at least two to three weeks to incorporate each skill. Most important, don’t rush to practice them in whole-stroke. Start with drills, then a mix of drill-and-swim. When you do begin whole-stroke practice, focus on only one point a time. Whenever you swim, never push off a wall without knowing what skill you are really trying to do well.

A Note on Front-Quadrant Swimming

Among the many non-traditional recommendations in the first Total Immersion book, the most-debated was for Front-Quadrant Swimming -- mainly with regard to sprint swimming. Some critics have pointed out that, at top speed, sprinters usually don't race with both hands in front of their head (though most of the fastest middle-distance and distance swimmers do). And it’s true that swimmers who practice FQS too rigidly can find themselves restricted from reaching the stroke rates necessary to swim fast in 50- and 100-meter races. So let's clarify how you can find out if it's really advantageous for your swimming and, if so, how to apply it properly.

Because this book is written for triathletes, it’s important to point out that freestyle sprinters race at a stroke rate (SR) of up to 100 armstrokes per minute, while the best SR for most triathletes is just 50 to 60 strokes (25 to 30 stroke cycles) per minute. At that SR, it should be quite easy to maintain FQS (or semi-catch-up) timing with no sense of restricting your ability to swim freely and rhythmically. But even so, we always encourage swimmers to experiment with a range of stroke timing at a variety of speeds and stroke counts to find the timing that feels best to you. Here’s how to do that.

Finding Your Best Stroke Timing

At TI workshops, we describe FQS as the most "negotiable" of the skills we teach. Practicing the Switch drills that teach FQS timing will allow you to discover for yourself whether you can make FQS feel comfortable and natural. A small percentage (less than 10%) of all the students I've worked with have found that FQS timing inhibited their natural sense of rhythm. We advised them to use the Switch drills to add just a bit more awareness of length to their strokes without disrupting their natural rhythms in whole-stroke swimming.

For the great majority -- and particularly the slower-stroking triathletes -- who can adopt FQS with a rhythm that feels comfortable, I explain that this is nonetheless still a practice strategy for imprinting timing that is not natural or instinctive. Do a good job of that by purposefully and consciously working on FQS at lower speeds in training, and when you start chasing the pack on race day, the nervous system will just know how to maintain the greatest efficiency at what feels like an appropriate and sustainable SR. You'll be able to swim freely at the stroke rates and rhythms that move you fastest.

What about those of you who might like to swim a short freestyle event in a Masters meet? Is it true that FQS doesn’t work if you need to swim really fast? I can only say that I personally watched Alexander Popov for a cumulative total of several hours, both in meet warmup/warmdowns and in practice, while he was in New York for the 1998 Goodwill Games.
Other coaches I know have also observed Popov's practices during his visits to the USA, for anywhere from a couple of hours to three weeks. And we all observed the same thing: He swam most of his practice laps relatively slowly with impeccable form, and every stroke on those slower laps was done with FQS timing.

The payoff comes on race day when, as a result of this rigorous nervous-system training in practice, Popov maintains greater stroke length at his highest stroke rate than do swimmers who fail to practice FQS. That's also why he held his form better in the closing stages of races, and won so many races over the final 10 to 15 meters.

I wanted the sprinters I coached at West Point to be able to do that too, so here's how we got the best out of FQS while ensuring they had the necessary SR to swim short races. At super-slow practice paces, we consciously practiced the greatest degree of overlap or FQS timing. As the pace increased, we gave up overlap bit by bit, trying to hold on to as much as possible without feeling restricted. I instructed them, as they approached race pace and race tempo, to just do what feels most natural.

The results, over the course of each six-month season during my three years coaching at West Point, were undeniable: a significant improvement in the SL my swimmers were able to maintain at their highest speeds. And by season's end they invariably swam significantly faster, and with significantly improved SL. As a long-distance open-water swimmer myself, I have used exactly the same approach in my own training. I can tell you from personal experience that it doesn't just work for the youngest and fastest among us, either. Over several years of working on my stroke timing, I have been able to steadily reduce the number of strokes it takes me to swim 100 yards at super-slow speeds (from 52 to 39), to gradually improve my speed at every stroke count (13 spl, 14 spl, etc.), and have dropped my spl in mile races in the pool from 19/20 to 15/16. This progressive increase in Stroke Length and economy has made me feel much more smooth and controlled at my top speeds. Best of all, it has helped minimize speed loss over my 12 years of Masters racing, from age 38 to, now, 50.

* * *

You’re almost fishlike. You’ve improved balance to save energy, letting the water do work that you once struggled to do. And you've reduced drag with a longer vessel so more of your energy goes into speed instead of making waves. All that’s left is the final stage of the metamorphosis: learning how to slip through the smallest possible hole in the water.

Chapter 7

Slippery Swimming: The Smarter Way to Speed

I began swimming with aspiration upon entering my first race at age 15 in 1966. As soon as speed replaced fun as the goal of my pool time, I became aware of the gospel: “Swimming is hard.” Virtually everything I’ve heard or read on swimming since has described the price of speed as “more” and “harder.” No surprise then that the whole world understands the swimming speed problem in the same way.
Unfortunately the whole world has it wrong. The one non-negotiable, unavoidable, unyielding limit to speed is **resistance**, not your capacity for long or hard work. There is no workout, wet or dry, that can overcome the amount of drag produced by your body as it travels through the water.

Consider this: Even Ian Thorpe or Alexander Popov, who swim as efficiently as a human can (gliding 25 yards in as few as six or seven freestyle strokes) use -- at best -- 10 percent of their energy for propulsion. More than 90 percent is consumed by wavemaking and other inefficiencies. What about athletes who take 22 or more strokes per 25-yard length? They may be spending as much as 97 percent of their energy making waves.

If you're one of the countless triathletes who find swimming exhausting or frustrating, it’s a virtual certainty that drag, not your fitness, is to blame. It’s drag that limits human-swimming speed to 5 mph or less, while some fish hit 50 mph with seeming ease. Fish are so much faster because evolution has shaped them to minimize drag. Arm-thrashing, leg-churning humans are almost as ideally designed to **maximize** drag. And no matter how conscientiously you streamline, just the fact that you swim "like a human" still creates a huge amount of water resistance. But a strategy like one that already works well for you in cycling can make a big difference.

I've spent about 40 years enjoying cycling, and have always had a general understanding that I could ride more easily when I was tucked over the handlebars than when I was "tall in the saddle." But I didn't fully appreciate how powerfully drag could influence cycling speed until I read that relatively little of a cyclist's energy output actually makes the wheels turn; most of it is spent pushing air out of the way. Thus, as every triathlete knows, a great deal of cycling speed can be created simply by lessening air resistance, instead of laboring to build leg power or aerobic conditioning.

I recall precisely when I realized drag must be an even bigger factor in swimming. In 1978 in Midlothian, Virginia, I began coaching at a pool with an underwater window. The first time I climbed down to watch my team during a set, I was spellbound by a graphic picture that had eluded me all the years I'd watched swimming from above. Watching my swimmers push off the wall, I could see that the tightly streamlined ones traveled a **looooong** way before they began stroking. They really looked like fish in an aquarium -- so long as they were in streamline. The moment they began pulling and kicking, they worked much harder and moved much slower.

Those who maintained a sleek shape could cover up to eight fast and easy yards before they took their first stroke. Any swimmer not tightly molded into a torpedo shape lost speed so dramatically that he looked exactly as if he’d run into a wall. And they had. To a poorly streamlined body, the water is a wall. I understood, in that instant, that the primary thing limiting how fast my swimmers could go was not the workouts I spent hours devising, but the effect of drag on their bodies. Clearly the most valuable skill to teach was streamlining -- not just on the pushoff, but the whole length of the pool.

This was a logical conclusion, based on the fact that water is about 800 times denser than the "thin" air that costs cyclists such a stunning amount of energy. In a medium as thick as water, the payoff for reducing drag at even the slowest speeds can be enormous. And water gets "thicker" as you go faster: Drag increases exponentially as speed goes up, so the payoff for **avoiding** drag also increases exponentially the better you avoid it.

**Why Water Is a Wall**

Boats, cars, and planes avoid drag best when they are long, sleek, and tapered. Humans can enjoy a moment or two of that as we push off, but as soon as we begin stroking again, most of us revert to blocky and angular shapes. (Seeing these shapes for the first time on slow-motion underwater video is an incredibly revealing moment for students at TI workshops.) Fast
swimmers maintain the most streamlined position as they stroke; slow swimmers do not. *This is the most important distinction between them.*

But drag isn’t just some general retarding force. There are three distinct forms of drag, which you can avoid better by understanding them. Two can be minimized by changes in technique, one by changing your suit.

1. **Form drag** is resistance caused by your human-body shape. As you swim, you push water in front of you, creating an area of higher pressure. Behind you, your body leaves a turbulent swirl, creating an area of lower pressure. Higher pressure in front and lower pressure behind creates a vacuum that, in effect, sucks you back. (That's why drafting off other swimmers -- or cyclists -- feels so much easier. The low-pressure area trailing the swimmer in front of you sucks you *forward.* ) Form drag increases as the square of your velocity. Thus, twice as fast means *four* times as much form drag.

   Your body's size and shape determine form drag, and the best way to minimize that drag is to *pierce* the water or slip through the smallest possible "hole." You do that by staying in a balanced, horizontal position and by making sure any side-to-side movement is rotation -- not snaking or fishtailing. TI Coach Emmett Hines puts it succinctly: "If you're perfectly streamlined -- as in the pushoff -- *any* motion will increase form drag." That means it's critical, once you begin swimming after the pushoff, to make your propelling actions as smooth and economical as possible. Concentrate, even as you pull and kick, on fitting through the smallest possible hole in the water, and you'll be on the right track.

   And, while swimming freestyle, you're at your sleakest when you spend most of each stroke cycle on your side, particularly in the brief interval between strokes. But doing that requires an impeccable sense of dynamic balance and side balance.

2. **Wave drag.** Just like a boat, you leave a wake while swimming. Wave drag is the resistance caused by the waves or turbulence you create. As Hines quips, "Making waves takes energy -- *all* of it supplied by you." The bigger your wake, the greater your energy loss. Unlike form drag, which increases as the square of velocity, wave drag increases as its *cube.* So as you double your speed, energy spent on wavemaking increases eightfold.

   The key factor in wave drag is how smoothly you stroke. A rough, choppy, or rushed stroke increases turbulence, and turbulent water increases resistance. That’s one of the reasons a long stroke is such an advantage: It lets you use a slower, more controlled turnover at any speed, which in turn means less turbulence, fewer waves -- and less drag.

3. **Surface drag** is friction between the water and your skin. No technique can change this law of nature, but you can affect how it applies to you by wearing the right suit. Shed your billowy boxers for a skin-tight suit, and just feel the huge difference it makes. Racers, as you probably know, also shave down, and on top of that may don special racing suits of Teflon-like fabrics to reduce surface drag further still. So slippery is the material when compared to skin, that an increasing number of elite (and many sub-elite) competitors now wear styles that cover more and more of the body. For the rest of us, however, a well-fitting lycra suit will do the trick.

**Tuning in to Drag**

Besides the drag-defeating strategies noted above, the simplest and best strategy for slipping more easily through that wall of water is to pay attention to it. Alexander Popov may be the world's fastest swimmer, but he often practices swimming "super slowly" at speeds where he can feel the resistance trying to hold him back, so he can figure out how to minimize it. Even without Popov's super-sensitive "drag antennae" to pick up signals, there are ways you can heighten your own sensitivity to it:

First, intentionally create more drag. Push off the wall with your arms wide and head high. Feel the resistance. Then push off in the most streamlined position, and notice how much
it’s reduced. Use that "awareness training" in your regular swimming to recognize the ways in which the water resists you, and to the stroke changes -- such as keeping your head in a neutral position -- that enable you to feel less of it.

Second, use your ears. Tune in to how much noise you make while swimming. Do you splash, plop, or plunk? Sound is energy, and the less of your mechanical energy you convert into noise, the more remains to move you forward. More to the point, anything that results in noisy swimming is evidence of inefficiency. Working on "silent swimming" is one of the best ways to tune in more acutely to how you're flowing through the water, and can help you improve your fluency.

Third, use your eyes. Are there bubbles in your stroke? Goggles make it easy to tell, and marathon swimmer and TI coach Don Walsh uses his to observe one of the most available pieces of "swimming knowledge" you can have about yourself. In fact for a full year of practice, Don thought more about eliminating bubbles than about anything else and credits that focus with helping him complete the 28.5-mile Manhattan Island Marathon in 14,000 fewer strokes than his rivals.

That number is no figment. Walsh actually calculated it, by having his boat crew monitor his stroke rate and compare it with that of other swimmers. He swam just as fast at 50 strokes per minute as other swimmers did at about 72. That means in the nine hours it took Walsh to swim up the East River and down the Hudson, he took something on the order of 27,000 strokes, while virtually every other swimmer in the race – including many who finished behind him! -- ended up needing about 41,000. That many strokes would have sent Don halfway around Manhattan again! Viewed another way, he got a "free ride" of almost 10 miles by being so slippery. If you could learn to slip through the water rather than battling it, you'll see far fewer bubbles, and there will be much less turbulence in your wake.

Finally, imagine your body has a kind of shadow trailing behind you as you swim. Remember: You're creating a wake similar to that of a boat, and though it spreads a bit as it reaches your feet, it doesn't spread much. Consider that wake your shadow, and anything that slips outside it as drag. Your feet, for instance, may be helping you along as you kick, but as soon as they slip outside your "shadow," they increase drag.

The Choice Is Yours

You have a choice to make each time you arrive at the pool: Spend your time training hard and long to muscle up your propulsive force and inflate your aerobic capacity, or focus on trimming drag and reducing the energy spent making waves. A trip to any aquarium will show you the smarter path is the path of least resistance.

Up to this point we've been focusing on good "vessel design," exploring all the ways to stay balanced, long, and sleek. Now that your "hull" is as efficient as it can be, it's time to tune up your engine to run with the same, smart efficiency.

Chapter 8

“95-Mph Freestyle” – Power from the Core
So far, our strategy for mastering fast, fluent, "fishlike" swimming has focused on minimizing resistance – not on maximizing propulsion. But once you’ve conquered drag, you can create new efficiencies by learning to tap an effortless power source as you stroke. The good news is that the eliminating skills you learned to minimize drag are the same skills you’ll use to maximize propulsion. You just think about them differently and apply them in different ways.

Over time, all the counterintuitive things you’ve learned you must do in a concentrated way to be Fishlike – hiding your head, pressing your “buoy,” lengthening your vessel – will gradually grow into habits. As they do, you’ll be able to shift some of your brainpower to making your propelling actions smooth, controlled, and fluent. The first step is to learn to use your most effortless power source: the core body.

You’ll see the most persuasive argument for that by visiting an aquarium. Watching fish under water makes it clear that the best "engine" for propulsion in a fluid is the core body. Lacking arms and legs, fish can’t propel by pulling and kicking; they use rhythmic body undulation or oscillation to move with stunning speed, grace, and ease. Watch from poolside (or on TV) at an elite-level meet and you'll see the world's best swimmers apply the same principle: The torso sets the rhythm and the arms and legs synchronize with it. Then watch lap swimmers at your pool. Most do just the opposite: arms flail, legs churn and the core body isn’t involved or works at cross-purposes.

So, let's begin a whole-body tune-up of your power train, from the engine (your torso) to the propellers (your hands).

The Kinetic Chain: Power from the Core

It's only natural to think of our arms and legs as the "engine" for fast swimming. When we want to go faster, we instinctively work them harder and faster. And when swimmers devote countless yards to pulling with a foam buoy immobilizing their legs, or kicking with arms holding a board, they’re reinforcing these instincts in their muscle memory. The shift from arm-dominated to core-based propulsion will take time, patience, persistence, and attention. But I promise the rewards will be more than worth it.

If you really want to learn to swim like a fish, consider again how fish actually swim. They scoot through the water in a most uncomplicated way, by rhythmically oscillating or undulating the entire body, which produces tail-whip, and off they go. Fishlike propulsion for humans is based on the same principle: core-body rotation for long-axis strokes (freestyle and backstroke), undulation for the short-axis strokes of butterfly and breaststroke.

In an ideal world it wouldn't be necessary for swimmers to learn hip rotation. Rolling from side to side is already the most natural way for your body to accommodate the alternating-arm action of freestyle. Prove it to yourself by standing in place and moving your arms as if swimming freestyle. Roll your hips and you move freely; keep them immobile and you feel restricted. Because rolling is a natural accomodation, a freestyler must actually expend energy to remain flat (usually by splaying the arms or legs). This isn’t usually intentional; swimmers remain flat because they haven't mastered sidelying balance. As soon as they become comfortable with sidelying balance -- something not natural or instinctive in most people but that can be learned -- they stop fighting themselves and roll more freely.

Though coaches speak of hip rotation as a way to swim more powerfully, in truth it has an even greater advantage: As I explained in the last chapter, your body slips through the water more easily in the sidelying position. Remember: Techniques that reduce drag are always more beneficial than those that increase power.

But as you become more slippery by learning the balance that frees your body to roll, you also gain access to an incredibly powerful "engine" for swimming propulsion: the kinetic chain,
the same power source that uncorks 95-mph fastballs. A baseball pitcher’s power originates in the legs and gradually gets magnified as it travels up the chain for delivery to his pitching arm to uncork a blistering fastball.

The world’s best swimmers know this instinctively. While inefficient swimmers use arms and shoulders to do most of the work, Olympic swimmers get their power in the torso and use their arms and shoulders mainly to transmit this force to the water. Great technique can be a great equalizer: Mastery of the kinetic chain is what allows Tiger Woods, for example, to drive a golf ball farther than rivals who are bigger and stronger. It also provides the power for nearly any kind of hitting or throwing motion.

The kinetic chain is not a complicated concept. In fact, you probably learned naturally to use it, many years ago, on a playground swing. I hazily recall starting with vigorous leg kicking, which just made the swing shake a bit, but certainly not soar. But I can vividly recall how satisfying it was when I began to figure it out and experienced, for the first time, the effect of engaging every muscle in finely timed, coordinated action. If I leaned forward slightly, the swing would move back a little. As gravity pulled it down again, I helped it along by leaning back. Each time gravity reversed me, I added enough leverage to make it go a little farther. And farther, and farther.

The most thrilling moment was when I reached the apogee of the backward swing, having figured out how to put all my muscle and mass into a perfectly linked series of arcs. The simple desire to go higher and faster taught me to pull on the chain with my hands and tighten my stomach muscles to link the tension of my backward-pulling arms to the stretching toes of my forward-straining legs, adding my power to the accelerating force of gravity. This skill, simple enough to be learned by any child, produced a breathtakingly powerful swoop through space, with such marvelous efficiency that I could continue endlessly without tiring. Engaging the kinetic chain, when you get it right, can be an addictive experience. It’s no less so for your swimming, when you learn to use it fully.

Effortless power for fishlike swimming is produced in much the same way. Energy for the most powerful movements ripples through our bodies like a cracked whip until it finally arrives at its release point. In freestyle and backstroke, body rotation provides a big chunk of the power -- as it does when we throw a rock, a javelin, or a karate blow. In all these cases, the legs and hips power the torso, which in turn drives the arm. In the body undulation of butterfly and breaststroke, the arms are powered simultaneously by a "force coupler" in which core muscles link hips and shoulders in the same way as when you’re doing a pullup, double-poling on skis...or soaring on a playground swing.

And linking your effort to the force of gravity, as you do on a playground swing, also works extremely well when swimming freestyle. The rhythmic body rolling, which sends power to your stroke, is aided by the same kind of gravity-assisted weight shifts you use in cross-country skiing and in-line skating. These weight shifts, triggered by the timing of Front-Quadrant Swimming, are fairly easy to learn by diligently practicing the “Switch” drills in the TI learning sequence. Here are the steps you can follow to link the engine of the Kinetic Chain to your stroke:

XXX Learn FQS timing with switch drills. XXX

1. **Learn sidelying balance.** Until you are completely comfortable being on your side and rolling freely from one side to the other, you’ll probably swim too flat, which disables the kinetic chain. Practice Drill 2 in Lesson One and Drill 3 in Lesson Two to become completely comfortable on your side.

2. **Improve your dynamic balance.** Stay slippery by maintaining a needle shape. Breathe by rolling that needle shape to where the air is. Propel by rolling that needle shape rhythmically
back and forth. You begin to set this dynamic process in motion by practicing Drill 4 in Lesson Two and Drill 5 in Lesson Three.

3. **Learn to use gravity to trigger the kinetic chain.** The timing of Front-Quadrant Swimming will teach you how to use gravity and stroke timing to your advantage. You learn this by practicing the “switch” drills in Lessons Four and Five.

4. **Keep the core body central to your swimming with purposeful whole-stroke practice.** Once you’ve learned the basic skills with drills as suggested, it’s still important to reinforce the principles of the drills in your whole-stroke sets. You need to fight the instincts that can take you back to too much reliance on arms and legs. Some helpful focal points that can be helpful include:

   • Swim with your whole body. Any time you feel your stroke breaking down into an unconnected mess sloppy, concentrate on the feeling of swimming with your whole body, with your arms connected to the actic extension by leaning into your armpit. This will help ensure that you finish the weight shift.

   • Put your weight on your armpit. As you enter and extend each hand -- as if down a sleeve -- through t

   • Think about your third eye. You can also accentuate your body rotation by thinking of your belly-button as a third eye and imagine looking at each side wall with it on every stroke cycle.

5. **Accentuate your use of the kinetic chain with LA Combo.** “Purposeful exaggeration” can help imprint any skill more deeply. You can exaggerate body roll by rolling 360 degrees from time to time while swimming. Doing Long-Axis Combinations, alternating cycles of freestyle and backstroke, either drilling or swimming, is guaranteed to make any swimmer roll more. See the video *Freestyle and Backstroke: The Total Immersion Way* for more information on how to do this.

One of the things most likely to interfere with your use of the kinetic chain for propulsion is overeager use of your arms to muscle through the water. Since we’ve already provided another power source for propulsion, freeing the arms and shoulders of that job, let’s see how you can use your arms simply to deliver the power your body provides.

**Chapter 9**

**A New Role for Your Hands: Standing Still**

Most swimmers believe that stroke technique means “how you push water back with your hands,” and give that motion most of their attention. Working on "technique" therefore means tweaking the armstroke, and "power" means putting more force and acceleration into it. Between what instinct suggests, and traditional instruction reinforces, the hands do seem to be 90% of swimming.

Most swimming books also share a keen fascination with hand movements, reporting in staggering detail on angle of attack, sweeps, pitches, vectors, lift forces, etc. The hands of gifted swimmers unquestionably *do* move in highly nuanced ways. But while that information may have academic interest, its practical value is nil. The movements described happen so quickly that no swimmer can consciously control the adjustments needed to get them just right. And elite
swimmers don’t get their wonderful technique from reading those books; they just do what feels best. And you can acquire a lot of that advantageous feel by following the advice in this chapter.

But understand this: Even if swimmers did have the concentration and precise muscular control to make the fine adjustments to get the hand pattern just right, at the end of the day it's still just a little hand pushing against water...trying to propel a big body through a resistant medium. Always minimize drag first.

Learn to "Anchor" Your Hands

My mentor, Coach Bill Boomer, once said: “Your hips are the engine for swimming; your hands are just the propellers.” And one of the surest ways to disconnect your propeller from its engine is overly aggressive stroking. A "controlled" stroke, one that stays connected to its power source through its full length, is one that begins with an "anchored" hand.

On land, the power-producing kinetic chain starts from a fixed (or "anchored") point -- feet planted on the ground. You begin by twisting the body away from the intended direction of the movement -- e.g., rearing back to throw a baseball or taking a backswing in golf. With the feet fixed in place, you get an effect known as elastic loading, similar to stretching a rubber band. The cocked hip then acts like a whip handle, throwing energy upward through torso, shoulders, and arms, with increasing speed and power.

With no foot-to-ground anchor, a swimmer’s hips cannot act as a whip handle. But they can deliver power by working as a unit with the torso and arms. Still, the process must start with an anchoring point to create that fingers-to-toes band of engaged muscle we used to such dynamic effect on the playground swing. In fishlike swimming that power-linkage starts with an "anchored hand." While your instincts tell you to grab water and push it back hard, you can actually tap far more effortless power by extending your hand fully, and then just holding on to your place in the water -- as if grasping a rung on a ladder -- rather than hurriedly pushing back. Try to make your hand stand still, then let the kinetic chain roll you past the spot where your hand is anchored.

This was first observed in 1970, when famed Indiana University coach Doc Counsilman filmed swimming legend Mark Spitz, the world's greatest swimmer at the time, with an underwater camera. Attaching tiny lights to Spitz’s hands to highlight their movements, Counsilman shot him from the side, against a gridlike backdrop. When he viewed the film at slow motion, Counsilman was startled to see that Spitz's hands exited the water forward of where they had entered. Spitz could not possibly be pushing his hands back, if they came out ahead of their entry point.

Nor could Jackie Hatherly, a 35-year-old Ironman qualifier from Toronto, who attended a TI workshop in April, 2000 and who quickly developed one of the most fishlike strokes we've ever seen. Watching from the side on underwater video on the second day, it was obvious that her hands entered and exited at the same place, while her body slid sleekly past their anchoring point on each stroke. Small wonder that she swam 25 meters freestyle in 11 strokes, after taking 17 strokes to swim the same distance just a day earlier.

Learn to "Feel the Water"

Training yourself to make your hand stand still rather than pushing it back does seem odd. How can your body go in one direction unless your hand goes the other? Admittedly, the water doesn’t offer a convenient grip. But when you develop an acute "feel of the water," you can use your grip on the water to move yourself forward very nearly as a rock climber uses his hold on the rock to move upward. Coaches often describe "feel of the water" as a prize with a staggering price. They can’t define it exactly, but suggest you must have been born with a gift for
controlling elusive water molecules…or must spend millions of yards patiently acquiring this special knack.

There is no doubt that most elite swimmers have a variety of gifts that help them perform on a higher plane, and "feel of the water" is among the most important. But it's not difficult to explain. It’s simply a heightened ability to sense minute differences in water pressure, and maximize that pressure with the body's propelling surfaces while minimizing it with the rest of the body. There is also no doubt that feel of the water can be an acquired skill. And it needn't take years to acquire. Here’s how you can get a better grip on the ability to hold the water:

1. **Get the catch right.** Swimmers usually give about 90 percent of their technique focus to the armstroke, and by now you know I think that's a poor use of your brainpower, preferring you pay more attention to drag because that brings faster, better results. But, when you do focus on propelling actions (mainly after you are balanced, tall, slippery, and moving fluently), give 90% of that attention to the "catch." Focus on your hands while they're in front of your head (see below for guidance), and once they've passed your shoulders, just let them fall off your mental radar screen. Once properly initiated, a stroke doesn't benefit from further guidance.

2. **Start each stroke by making your hands stand still.** Your instincts tell you to grab the water and push back. Ignore them. Instead, teach yourself to make your hand stay in front while you bring your body over it. Yes, this is a difficult goal, but work at it patiently and mindfully anyway. Such efforts will help you resist the urge to muscle the water back.

3. **Drill, drill, drill.** Learning a skill as elusive and refined as this takes a lot of concentration, the kind you get in drills, where you repeat simple movements with full attention instead of trying to tweak something that happens in a millisecond in whole-stroke swimming. The "Switch" drills in Lessons Three, Four, and Five teach you to connect your hands to your core body, and move them in perfect coordination. They also help you learn to anchor your hands and bring your body over them. To multiply the effect of any drills -- but particularly drills used to teach anchoring -- do them with the fistglove® stroke trainer (see pages 00 to 00).

4. **Swim super slowly.** Drills teach you how things will feel when they're "right." When you begin to apply what you've learned in drills, you'll retain far more of that feeling if you swim verrry slowly. The more slowly you swim, the more "concentration space" you give yourself to cultivate a finer sense of water pressure on the catch. Just be patient. Leave your hand out in front of you. S-t-r-e-t-c-h that moment, pressing gently on the water until you feel the water return some of that pressure to your hands (another awareness hugely heightened by fistgloves®). And while you're swimming slowly...

5. **Count your strokes.** A reduced stroke count is a simple, reliable indicator that you're not pulling back. If you've whittled your count for a single 25-yard pool length down to, say, 13 or fewer strokes, one of the things you're likely to be doing well is holding on to the water. As you go faster (and your stroke count increases) stay hyper-alert to any sense of water-slippage, like a car spinning its wheels.

6. **Try to have slow hands.** Compare the speed at which you sense your hands moving back, with how fast you feel your body moving forward. Try to have "slow hands and a faster body" or, at the very least, match the speed of your hands to the speed of your body. This is a great corrective any time you feel your stroke getting rough and ragged.

7. **Last but not least...** Teaching and my own training experience have convinced me that the most beneficial tool for acquiring feel is the fistglove® stroke trainer. I’ll let Scott Lemley, their inventor, tell you about them.
The fistglove® stroke trainer

How Those Little Black Gloves Can Lead to Huge Improvements in Your Stroke

By Scott Lemley

Scott Lemley has been coaching and teaching swimming for 20-plus years. He is currently head coach of the Midnight Sun Swim Team in Fairbanks, Alaska. As a longtime student and instructor in the martial art of Aikido, Scott observed that the key steps to mastering any martial art – finding your balance, focusing your mind, and relaxing your body – are the key steps to mastering any swimming stroke.

One aspect of martial-arts teaching that particularly intrigued Scott was the practice of blindfolding students to compel them to become receptive to sensory information derived from sources other than the eyes, to develop a whole-body sense of balance. Reasoning that “feel” with the hands was the swimming equivalent of the perspective gained through sight on land, Scott set about developing “a blindfold for the hands.” The result was the fistglove® stroke trainer. Below, Scott explains some of the many benefits of training with fistgloves®.

Before becoming a swim coach I taught Aikido, a martial art that emphasizes relaxation. Aikido training taught me that the more I relaxed, the more self-aware I became and the more efficiently and quickly I could move. I adopted these same principles to my swim coaching and have made it a core goal to teach my swimmers to combine the ability to focus mentally while relaxing physically. I used fist swimming a fair amount, but also felt that I could improve that practice by finding a way to swim effortlessly with fists closed for longer periods without having to expend either mental or physical energy. I tested this theory on myself by duct-taping my hands closed and warming up that way for 30 minutes before swimming with "normal" hands.

As an unexpected benefit, for the first time I became acutely aware of my lack of balance, the pressure of the water on my forearms, and the "sharp edges" I exposed to the water's resistance as I pushed off. I also discovered that my hands became very sensitive to pressure after I removed the duct tape, allowing me to "hold on to the water" with far more nuanced technique. After I began taping my swimmers' hands, I observed that every swimmer gained noticeable fluidity in their strokes. Instead of having one or two "gifted" swimmers and a host of dedicated but "less gifted" swimmers, I soon had what I came to think of as a team full of dedicated and gifted swimmers. After experimenting with "taped" fists for 17 years, I finally designed, patented, and began to manufacture a prototype latex glove, which I named the "fistglove® stroke trainer."

XXX fistgloves® make you more aware of how balanced and streamlined you are. XXX

Fistgloves®: How They Work

One essential in the acquisition of improved swim technique is our ability to change the way we interact with our environment. Humans seem to be “hardwired” to interact with the water in a particular way, but I believe we can change that in very significant ways. This is a constant theme underlying how I ask my swimmers to train. Using fistgloves® has given them unprecedented choice and control over how they interact with the water.

I want my swimmers to be able to choose finesse over brute strength. When they make this choice, they swim best or near-best times with far greater consistency. But finesse in the water must be taught; it rarely comes naturally. Finesse has much to do with how we feel “pressure” on our hands. Reading this pressure is both a source of information and a distraction.
Because we’re instinctively “hand-dominant” when swimming, most of us are so fixated on what’s happening with our hands that we tune out other body parts. As long as our hands feel the pressure of the water’s resistive force, we figure we’re “good to go” and proceed to push it toward our feet in a way that satisfies our palms and psyches – but often neglects our body position. Is our entire body balanced and streamlined to avoid drag? It’s hard to tell if we are thinking only about our palms. Add to the hand-dominant theme our human proclivity to solve problems with force, and it’s no wonder that we see a lot of manhandling the water.

Another pitfall of being a swimmer who gets satisfaction from feeling pressure against the hands (and the more the better), is that it’s all too easy to think that being unbalanced and unstreamlined is OK – perhaps even good. After all, an unstreamlined body will encounter massive resistance, and that resistance will feel correct and productive to most swimmers. Pushing against a substance as dense as water gives us a great sense of accomplishment. All too often the only accomplishment is to burn calories. To truly swim well, we must learn how to “feel” the water with our entire body, not just the hands, and learn to find our balance and cease our endless struggling to plow ahead.

All humans have proprioceptors (specialized nerve endings) in our joints, muscles, and skin that give us constantly updated information on how our joints are angled, how fast we’re moving our limbs, how our arms and legs are positioned relative to each other, and the pressure of the water against various body parts. This wealth of feedback can overwhelm us if we don’t know how to process it – or can help us achieve balance and flow if we learn to organize it and use it correctly. Usually our brain is so busy processing the information coming from our eyes and hands that we’re not conscious of being out of alignment or off balance in the water.

Wearing fistgloves® helps you make balance a priority. Attempting to swim for the first time without the use of your hands, you'll probably thrash around for 5 or 10 minutes, completely helpless. But your brain will seek to solve this new puzzle by using other sources of information and other means of locomotion. Almost automatically, you'll start to swim with more finesse and less brute force. With the fistgloves®, you must learn to be balanced and streamlined; otherwise, you'll make no forward progress in the pool.

After wearing the gloves for 30 minutes or so, swim with open hands. You'll immediately experience what we call the fistglove® effect – a rush of information from your previously constrained, but now highly sensitive, hands to your brain. The result is that you’ll become very discriminating in terms of how you angle your hands against the water, instinctively choosing the angles that give maximum purchase on what is a pretty slippery medium. You’ll also become ultra-sensitive to the importance of “gripping” the water instead of “slipping” through it.

The first 30 minutes spent wearing fistgloves® will make you more aware of how balanced and streamlined you are. The next 30 minutes swimming without the gloves will help you learn to “hold” the water better. Fistgloves® help us become more effective on both sides of the equation. Give them a try. I think you’ll enjoy the experience.