

Swim Training for Triathlons

Purpose

This material is for runners and bikers who need to improve their swimming. I have run classes for these athletes for three years. My students have all improved with only 8 or 16 hours of class training. This handout explains the logic behind my instructional program and references articles on the swimnews.ch website that provide additional technical information on the subjects addressed. I want everyone who signs up for my class to know what the objectives and focus points are. There are not many swimming programs for the tri-athlete. I want to inspire others to create similar classes based on this information.

Bob Boder

Appendix A lists swimnews.ch articles that are most appropriate for triathlon training. My "A brief and basic competitive swimming stroke clinic handout" from the site is the companion document to this class. It is a booklet of about thirty pages. It covers all four competitive strokes and some other aspects of training and competing. About 10 pages are appropriate for just swimming front crawl. These include both written and visual explanations of correct stroke technique. It is a good first document to read and is for age group and inexperienced adult swimmers so is simple and to the point. I use it with my age group swim team and in age group and Masters clinics. It serves as a great reference document after memories of a class or clinic have faded.

The class objective is to have students capable of completing the race swimming portion at a preplanned pace with the least energy expenditure. It is unlikely many of my students will ever lead in the swimming, **but** if they can be close without being tired, they will greatly improve their overall finish. All the training goals are to meet this objective. If you are a poor swimmer, you will never win a triathlon. The time loss and/or energy expenditure for poor swimmers is too great to overcome. Learning to be a reasonably good runner or biker is easier than becoming a good swimmer without proper coaching. I try to provide that coaching.

In the class, I have three major goals.

- Teach front crawl stroke fundamentals so you can complete the swim in less time with less effort
- Teach workout planning so you can plan your own training and know the drills and swimming sets needed to meet your objectives
- Teach pacing so you race to best of your ability.

What follows are general descriptions of what I do and why.

Fundamentals of a good front crawl stroke.

Developing a good crawl stroke is improving the stroke elements in the following order. First comes learning the correct body position to reduce resistance. This means learning how to control the body's centers of gravity and buoyancy. There are three primary methods to control body position. The controls are head position, arm extension and leg movement. The objective is to have the body in a straight line with top of head, hips and heels at the water surface. Proper positioning of the head adjusts horizontal alignment by compensating as the lungs (center of buoyancy) float up and the hip/upper leg area (center of gravity) sinks. Think of the body as a seesaw. The two centers must move together or you will be standing in the water.

Next are proper arm and leg movements to provide propulsion. Arms are the primary power source in swimming. Legs are to keep the center of gravity at the surface. The leg muscles consume too much energy for the propulsion they provide in long distance swimming.

The focus points for arm movements are:

- Proper extension is to improve horizontal body position and reduce drag
- High elbow pull is to employ the core body muscles for power.
- Pretend you are swimming in 3 feet of water over coral. Bend those elbows!

Runners often interpret the term pull as spinning the arms in the same manner as wheels spin at a drag race start. All smoke and no forward motion! The hand/arm just like a tire and must **grip** to move the body forward. This feeling is natural only to outstanding swimmers. The rest of us have to learn it.

The focus points for legs are:

- Proper kick initiation is from the upper leg muscles and not from the knees.
- The feet are like a whale's tail. When pointed towards the bottom they are a brake. Relax the ankles for more flexibility and pigeon toe the feet for extra fore and aft extension.
- Kicks are kept within the shadow of the body and do not create extra drag. They move at a slow pace. This is two to four leg movements to one cycle of the arms.
- Teach vertical kicking and sitting in a chair doing a straight leg kick. Upper legs drive the leg motion. Knees follow and flex. These are the best ways to learn the movement and result in *abs of steel* as a byproduct.

Having a poor kick is like running into the wind.

Correct breathing is the final important aspect of swimming properly. The four major points are:

- Do not lift your head. Roll your body to get the mouth out of the water
- Do not try to take in too much air. Breathe as you would while walking briskly
- Exhale when your mouth is underwater
- Breathe early in the stroke cycle. This starts when the forearm on the breathing side points straight down and is slightly in front of the hip. It is when the opposite arm is at about the catch point. The objective is to prevent the opposite arm from hooking under the body when the mouth is up.

I do not address the issue of breathing in rough water or raising the head to navigate. These are easy modifications of the correct technique to practice when swimming in open water. As a teenager in Ft. Lauderdale, I swam many miles along the beach and never thought about adjusting my breathing. It just came naturally after learning proper breathing in a pool. I did learn how to read the waves to pick the correct distance off the beach to swim.

I do not teach surviving race starts or open water navigation. I have done one open water race in my life at age 17. Any good triathlon book or web site will address these topics. One tip I do offer is swim in a pool for close to a length with your eyes closed. If you hit a lane line or sidewall, your stroke is not balanced and you need to adjust the pull. Do not lift your head to navigate on every stroke. With your increased speed after the class let the great swimmers in front do most of the navigation.

Just relax while swimming correctly and you will go faster with less effort. Learn this through practice.

Elements of making good workout plans.

Triathlon swimming is a form of open water swimming. Open water training presents advantages and disadvantages to most swimmers. Experienced pool competitive swimmers have good technique and can swim straight without looking for landmarks very often. For the less experienced swimmer, pool training is necessary to go with open water experience. One of the cardinal rules of competitive swimming stroke training is only swim as long as you can swim correctly. Do not practice your mistakes! In a pool, you can stop and take a break. You can also employ interval training and easily time yourself over specific distances. Most tri-athletes do not have practice groups and coaches. Some practice with Masters groups which focus on sprint or middle distance pool racing. The training objectives of the two racing forms are not exactly the same. You are mostly on your own so you need to know what to do and why.

Another reality of pool training is congestion. Rarely will you even get a half lane to yourself. Since Olympic swimmers deal with this, so can you. Unless you have a coach, you will have to plan your own workouts. To me, it is important to explain training options to my swimmers. Sprints, drills, interval swims and every other form of training have advantages and disadvantages. You need to understand these and apply them to your own needs. The reality of pool conditions during workout time dictates much of a workout plan. Plan in advance but be ready to take advantage of an opportunity. If the pool is overcrowded, do more drills or just kicking. Empty pool means faster interval swims with less rest time. Always make the most of your pool time. Kicking is very important. Most runners have poor kicks. Even though you will not kick hard, every kick should be efficient. Every time those big leg muscles move, you pay a price. Get your money's worth. Kicking is great when done in a crowded lane. Control your speed and the kick board protects you. Roll and kick on your side. This will make you comfortable with body roll during the stroke and help you balance your body. If your legs are tired from a long bike ride or run during the day, focus on pulling. Remember to bring a water bottle and take occasional sips during the workout to avoid cramps.

When you are in with slower swimmers, try doing just pulls with a pull buoy. You now know how sports car drivers feel when they are behind bikers on a narrow road. Swimming is an upper body sport. Running and biking are lower body. You will need to develop upper body strength and muscle memory for the correct movements. Using the pull buoy is important. It helps the body get into a correct horizontal alignment. You will also find breathing easier and understand why not to kick too hard! I find having inexperienced swimmers use a pull buoy is the fastest way for them to understand the importance of good body position. Do kick down and swim back laps. Limit your breaths per length during the swims. This really feels good on those days you know you need to be in the water but are not up to a hard workout. It also slows down your speed per lap so you do not hit the slowpokes as often.

Your practices are important. They are not as important as showing respect for your fellow swimmers. Be nice and smart in your workouts. If the gods smile and you get a lane to yourself, work on your pacing and serious interval training. Swim multiple 100 or 200-yard swims at the pace you want to race at or even faster. Watch your time and keep track of your pulse. This serves two functions. First is to know what race pace feels like. Second over time, you want to swim faster at the same heart rate. This means you are getting better and improving your technique. Now you can change your objective to have either a faster swim and/or lower heart rate. The best intervals for swims of this nature are with a 15 to 30 second rest between swims. The number of repartitions increases as your race swim distances increase. Short rest intervals are to build aerobic conditioning. You should rest for longer intervals when working on technique. Also, count your strokes per length. The theory is the fewer strokes the more efficient the stroke. Good swimmers are in the lower teens of total arm movements per length.

Some sprinting is important. It is a way to insure you can keep a correct stroke as the pace increases. For many swimmers excitement overcomes reason and training when wanting to go fast.

Finally remember to allow your body to recover after workouts. You should alternate high intensity and lower intensity workouts. For hard days of biking or running just use, swim time to relax and stretch. Have a taper period between your peak training and actual event. A couple weeks of easy work and rest will help you perform at your best. You will have to swim at least three days a week to improve. Each workout can take under an hour.

Remember the end objective of practice is to go as fast as you need to with the **least** amount of energy expenditure. You have a bike and run to go before you win.

A typical one-hour class follows this format

- Warm up of 200 yards. Get the swimmers in the water so they do not get cold on the pool deck. This is the time to evaluate your swimmers' ability and progress. Adjust the rest of the class accordingly.
- A little lecture time
 1. In the first meeting, explain the class objectives. In following classes do technical stroke and training explanations as needed.
 2. Tell swimmers to stop when they go from slightly tired to being exhausted. The students will have various levels of conditioning. The purpose of the class is to teach strokes only.
- Instructional drills
 1. For the first classes, spend 15 to 30 minutes on drills to teach the basic skills.
 2. Explain the purpose of each drill then monitor and correct execution.
 3. Only cover no more than two fundamental techniques per class in the beginning.
 4. This is where the pull only and kick only drills take place.
- Swimming sets
 1. Introduce different types of training sets such as interval or ladders with a number of repartitions and a rest interval. Explain the purpose of each set and useful variations.
 2. Over the course of the class, the swim distances and/or repartitions should increase. Rest time decreases.
 3. Introduce and practice pacing during the sets.
 - Have swimmers set a pace goal such as swim each 100 yards in 1:30 (1 minute 30 seconds). Over time, you want them to reduce their pulse count. When the pulse count goes down, reduce the rest interval and maintain the pace. Finally reduce the pace objective and

go through the full cycle again. Make sure you do your homework on what are appropriate pulse counts for rates of energy expenditure. Read Appendix B. It is a brief introduction to aerobic training concepts.

- Set pace goals by breaking race swim distances into additive swims of 100 or 200 yards. For example if you want to swim a quarter mile in six minutes each 100 yards takes one minute and thirty seconds. Not exactly accurate but no one wants to do division while standing in a pool. Keep it simple. In fact do pulse counting the same way. Take your pulse for six seconds and multiple it by ten.

By the end of an eight-week class session, I like to have my swimmers able to swim 2000 yards in a class. They should also have the knowledge to put together their own workout plans with appropriate drills and sets. Each swimmer has specific drills for their needs. All should have pace objectives. Finally, I take and review under and above water videos with each class. These really help.

Pacing for performance

The final object of training is pacing. This is swimming at a planned speed. The triathlon swim portion is too short to get too far ahead for anyone to catch you. On the other hand, if your swim is too slow or you are too tired you cannot catch the leaders. Triathlons are three phase races. Like any multi-lap race pace is important. No one cares who was ahead in the first 100 yards. You need to plan how fast to go in each phase of the event. For running and biking, it is easy to look at your watch. This does not work in swimming. Therefore, an important part of training is to know your pace and your heart rate at that pace. You need to know what your heart rate will be over various speeds of swimming for specific distances. My race theory is to swim at the pace needed for your triathlon time objective at the lowest possible aerobic intensity. Over time, you want to increase speed **without** increasing the energy expenditure. That is why stroke training is so important. The advantage efficient swimmers have is they can swim at a fast pace with a lower energy expenditure. Once you pass from aerobic to anaerobic energy expenditure you are dead meat. Most tri-athletes should have good aerobic conditioning and sense of pace from their bike and run training. Take advantage of these in the swim. Pace training takes place during the workouts. Swimmer must learn how to use the pace clock and monitor their heart rate.

Pacing is a very easy form of goal setting that will offset the monotony of swim workouts. Swimmers will at first find they are swimming their quarter or half miles without being as tired. Next, they will become faster. These are steps of success and serve as continued motivation. Track your progress. It is also a major reason why pool training is important to their overall success.

In conclusion, I believe this combination of swimming with an efficient, low resistance stroke at an aerobic heart rate and a competitive pace will improve the overall performance in triathlons. Do better by swimming with less effort at the right pace! I take and analyze above and underwater videos of my swimmers. Every program should do this or have a spouse or friend do the job. Any digital camera or DVD recorder is all you need. Compare your stroke to what is available on web sites of the Olympians.



Bob Boder is an American Swimming Coaches Association Level 3 certified coach and a Masters swimmer. He has achieved USA national top ten finishes in three age groups and has numerous New England Masters Top Ten times. You can read his articles on US Masters and Swimnews.ch web sites. As the New England Masters Vice President for Clinics, he is currently working on a project to bring the use of video analysis to practice groups. He has been a guest coach at the North Shore YMCA and Harvard swim camps. With the Needham Channel, he produces a series of swimming shows for public access cable television. To contact send an [Email to Bob](#).

Appendix A

Go to the [swimnews.ch](#) website. Click on the Tips in English link on the middle left side of the screen. This will bring up the Swimming Technique, Training Principles page. Below are the appropriate entries relative to this article. After each entry in blue is the goal, the article addresses.

1. Analysis of Grant Hackett's and Ian Thorpe's Swimming Technique

[Fundamentals of a good front crawl stroke](#)

[This is a must read after gaining some knowledge of what is necessary for a good stroke.](#)

2. Swim Faster with Good Posture and Floating

[Elements of making good workout plans](#)

3. Why the Right Body Position is Crucial

[Elements of making good workout plans](#)

4. Basic Drills to Learn Balance and Body Position

[Fundamentals of a good front crawl stroke and elements of making good workout plans](#)

5. Learn to Swim Freestyle More Efficiently

[Fundamentals of a good front crawl stroke](#)

6. Elbows High

[Fundamentals of a good front crawl stroke](#)

[My methods to teach the pull based clinics with KarylN Pipes-Neilsen and information in article 1 above.](#)

7. Timing of Armstroke in Freestyle Swimming

[Fundamentals of a good front crawl stroke](#)

8. Pull Buoy: Don't touch the crutch - it might hurt your swimming much!

[Fundamentals of a good front crawl stroke](#)

[Don't let the title fool you. The article makes some positive points about pull buoys.](#)

9. Swim Clinics and Use of Video Analysis

Robert Boder's "A brief and basic competitive swimming stroke clinic handout": Explaining strokes basics in terms that are easy to understand and remember. Learn and execute what is here to swim faster with less effort. Great swimmers are fast not because they are stronger. They are fast because they move further using less energy [Download].

[Download this document. It is the companion to the triathlon class and the New England Masters Workout Group video clinics.](#)

[Fundamentals of a good front crawl stroke](#)

10. About Wetsuits and Bodysuits

11. No pain no gain - is it true?

[Elements of making good workout plans](#)

Appendix B - A Hot-rodder Explains Aerobic Conditioning

Your body works much like a car's engine does. Muscles provide the power. Heart/lungs provide the oxygen for fuel combustion. Body organs store and make the fuel. Unlike a car engine, muscles can work for periods of time without oxygen. When this is occurring, the body tells you through lactic acid in the muscles to stop so the fuel system can catch up.

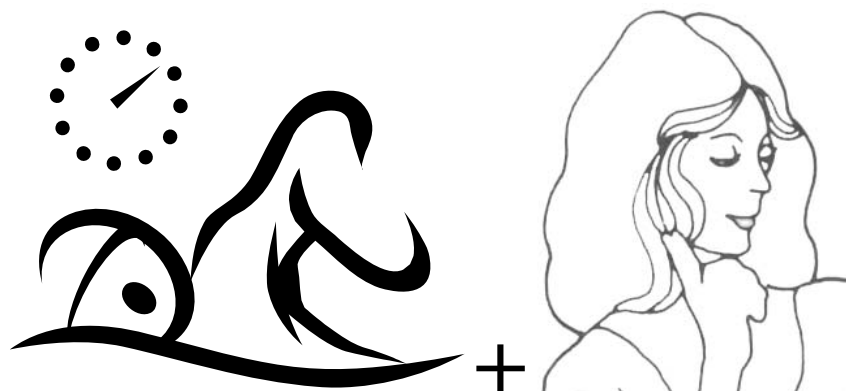
With sufficient oxygen and fuel deliveries to the muscles, you are operating within the aerobic zone of your work capacity. This is cruising on a Friday night. You are working well within you body's abilities. Insufficient oxygen deliveries to the muscles, place you in the anaerobic zone of work. This is like red lining the tachometer or having the engine warning light come on. Muscles store a small amount of fuel. This is to do about fifteen seconds of work without bugging the rest of the body to produce fuel. When this internal muscle fuel empties, it takes about forty five seconds for the rest of the system to respond and deliver more fuel and extra oxygen. After the fresh fuel gets to the muscles, the work in an aerobic state starts again. Your body can work in an aerobic state for hours. The amount of time depends on how hard you are working. Just as with a car the faster you go the less distance, you can go. The car limit is fuel tank capacity. Your limit is oxygen delivery capacity first and fuel as a secondary limitation. A body's tachometer is heart rate if you consider the speed the car's drive shaft turning as similar to how

fast the heart is beating. Tachometers measure rotations per second (RPM). Heart rate measures pumps (beats) per second. This is pulse rate.

At a pulse rate of up to 120, you can cruise for hours at a low speed. For highway speeds, you operate at a pulse rate of 120 to 150 for the slow lane, 140 to 170 for the middle lane, and 160 to 180 for the outside lane. At a pulse rate of over 180 you are speeding. It is just a matter of time before you will stop. These pulse rates are for outstanding swimmers in their prime. Age appropriate rates are available at most gyms or from web sites. A rough approximation of an age appropriate maximum heart rate is to subtract your age from 220. Speeding is OK if you are a sprinter. It does not work for distance runners or swimmers. No matter what rate you work at there comes a point where you will go back into the anaerobic muscle condition. Continue to work in that condition for too long you become exhausted and stop dead in your tracks.

With training, it is possible to make your body systems work longer and more efficiently to some degree. You can change slightly how fast the fuel delivery process takes place and the amount of oxygen the blood can deliver. This will determine how long you can operate at medium and high speed. The ability to endure the pain caused by lactic acid is increasable. There is a better way to prepare for athletic greatness. This is to train to complete your event before the anaerobic collapse occurs. Great middle distance swimmers to marathon runners do this. They combine efficient movement with increased aerobic capacity. Sprint swimmers to middle distance runners learn to deal with continuing to operate in an anaerobic state. They also have efficient movement and increased aerobic capacity so they can spend minimum the time in anaerobic agony. Under a minute in an anaerobic state is relatively easy to endure.

To sum this up in swimming terms, go as fast and long as you need to at the lowest possible pulse rate. Stroke training lets you operate efficiently. Interval training increases your aerobic capacity. To be successful you need a proper mixture of the two.



Common Freestyle Flaws and How to Fix Them

Even top swimmers can benefit from technique work, so working out stroke inefficiencies is time well spent.

Steve Tarpinian
Triathlete magazine

Your weakness is your strength! Cliche? Yes, but like many cliches, this maxim contains an element of truth, since every imperfection presents an opportunity for improvement. And when it comes to swimming, ironing out wrinkles in your stroke can yield huge dividends in terms of improved efficiency and lowered splits.

What's more, regardless of your level of proficiency in the water, there is always room for improvement, so even the most talented swimmers can improve by continually tweaking and refining their strokes.

Start by Taking a Breather

Let's back up. Before we talk about technique, let's start where most problems begin in the water: breathing. When you're swimming freestyle, it's critical to exhale when your face is in the water so you are able to take a full breath when you roll to the side.

However, because they can't relax in the water, many swimmers hold their breath or only partially exhale, which subsequently prevents them from taking in a complete lungful of air. Invariably, these swimmers need to breathe every stroke and usually go hypoxic after a short swim, not from the effort but merely from lack of oxygen.

Prescription: Always focus on breathing while warming up and cooling down. This is the perfect time to smooth out your breathing and relax in preparation for the technique work and main set to follow.

Another useful exercise is to take five breaths on each side at the edge of the pool. If you are breathing to your left, place your right arm on the wall and rotate to the side, exhaling while your face is in the water and inhaling when you turn to breathe. This is not a physically demanding drill, but it helps to reinforce rhythm and relaxation.

Technique Troubleshooter

As noted, even top swimmers can benefit from technique work, so taking the time to work out inefficiencies in your stroke is time well spent. Here are a few of the most common sources of waterborne frustration for triathletes along with a few suggestions for improvement:

Crossover: When your hand enters the water at the beginning of each stroke, you must ensure it doesn't cross your body's imaginary midline running from head to toe. Crossing over puts a tremendous amount of strain on the shoulder joint and makes your body fishtail or swing from side to side, increasing drag.

Prescription: Single-arm and catch-up drills. Exaggerate the width of your entry point. At first it may feel as though you are entering far too wide, but this is simply because relative to where you were entering, it feels wide. Video analysis is usually necessary to monitor progress.

Entering too early: An early hand entry at the start of each stroke almost always causes the swimmer to drive down with his or her arm rather than extend forward. The driving-down motion causes an ineffective straight-arm pull that generates little power.

Prescription: Catch-up, finger-tip drag and single-arm drills.

Short finish: When you are sprinting, a shortened finish, which boosts stroke rate, is advantageous; however, for most distance swimmers, full or almost full extension at the end of the pull phase is much more efficient.

Prescription: Catch-up drill with thumb scrape on your leg to ensure you are completing the end of each stroke.

Dropping the elbow: Oftentimes, swimmers drop their elbows after their hands enter the water at the start of each stroke (instead, the elbow should remain high while the fingertips point down -- think of reaching over a barrel on its side). This freestyle no-no robs swimmers of speed more than any other flaw. A similar flaw with the same prescription is pulling with a straight arm. In both cases, most of the resultant force vectors are directed down.

Prescription: Fist and single-arm drill. Also, visualize pulling over a barrel with each stroke.

No long-axis rotation: This is also described as flat swimming, where the swimmer doesn't rotate from side to side. This flaw shortens the pull, reduces the length of the stroke and increases drag.

Prescription: Kick on side drill and catch-up drill.

Slapping and overextending entry: This is usually caused when a swimmer is working to lengthen his or her stroke; however, a long stroke must be generated by extending underwater and rolling onto the side. Otherwise, overextending on the entry can push a swimmer's body down in the water and lead to a straight-arm pull.

Prescription: Catch-up, finger-tip drag and single-arm drills.

When working on the above drills, take the time to do them properly and concentrate on the skills you are developing. With practice, your stroke will respond and you can enjoy increased efficiency and faster splits in the water.

Coach Steve Tarpinian is the creator of the new Swimpower DVD and author of Swimming for Triathlons. He is also a keynote speaker on swimming and triathlons worldwide. For more information, please visit www.swimpower.com.