

## What Makes a Champion?

By Dr. Gary Hall

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**Do you have what it takes to become a champion?**

**See how you measure up with the following 10 components for greatness.**

When *ESPN Magazine* recently interviewed me about Michael Phelps, I was asked, “What is it about Michael that makes him so great?”

That question made me think about the bigger picture: What are the characteristics of a champion?—for **anyone**, not just Michael.

Following are 10 components that I believe are necessary if a swimmer is to become a champion.

Score yourself from 0 to 5 (with 5 being the best) in each category.

Are you destined to become a champion?

### ANATOMICAL

#### 1) Body Habitus

This is one of the most crucial components.

You just don't see short, squatty, fat and heavily-boned swimmers excel.

No human body is streamlined (like a dolphin's) but some come a lot closer than others.

The closer our shape is to being streamlined, the less resistance in the water and the less force required to overcome that resistance.

Being tall and lean is generally desirable, but almost more important are the wingspan (length of outstretched arms from fingertip to fingertip) and the size of the hands.

Long arms and big hands not only increase surface area for pulling, but also reduce stroke rate and increase efficiency in the water.

The size of the feet is also very important for increasing the efficiency of the kick.

#### 2) Flexibility

This is a key component of nearly every great swimmer.

Since efficiency is such a big factor in swimming, small angular degrees of joint rotation can have a huge impact on speed.

In Breaststroke, for example, the ability to rotate the hip joint and extend (dorsiflex) the ankle can dramatically increase the surface area and improve the efficiency of the kick.

In Butterfly, shoulder flexibility can facilitate the arm recovery and can save energy for the important underwater pull.

In the dolphin and flutter kick, hyper-extension of the knees allows a longer kick in both directions, maximising the power of the legs, while flexion of the ankle provides greater surface area for the kick.

#### 3) Buoyancy

Buoyancy is the ability of the body to float.

About 75% of the human body is water, and the rest of the solid components can either sink (examples: bones, muscles) or float (examples: fat, inflated lungs).

Your weight on land does not determine your weight in the water.

Mark Spitz weighed about 10 pounds more than I did in college, yet he weighed **less** than me in the water.

The most efficient places for us to swim are either above the water (hydro-planing) or underwater.

Swimming through the water creates what is called **surface resistance**, which can really slow us down.

Rules now preclude us from swimming very far underwater, and—so far—no human has been powerful enough to hydroplane.

Therefore, we must swim primarily **through** the water.

However, the higher our bodies are able to rise in the water, the lower the surface drag or resistance—which greatly increases efficiency.

The more buoyant we are, the less energy we need to expend to rise in the water.

Buoyant swimmers may actually train better than non-buoyant swimmers, especially in Butterfly.

### PHYSIOLOGICAL

#### 4) Heart and Lungs

Reduced to the simplest terms, our cardiopulmonary system (heart and lungs) boils down to our ability to produce ATP (adenosine-triphosphate) for our swimming muscles.

ATP is the gasoline that drives our engine.

When oxygen (O<sub>2</sub>) is available to the cell, ATP is produced 18 times more efficiently than when it is not available.

It's like the difference between the rocket fuel and cheap gas.

Also, when we run out of O<sub>2</sub>, a by-product of the so-called anaerobic respiration is lactic acid, which causes the muscles to work even less.

So how do we keep the O<sub>2</sub> channelled to the muscles?

- More breathing, bigger lungs, efficient transport of O<sub>2</sub> to the blood (haemoglobin)
- More haemoglobin to transport the O<sub>2</sub>
- Rapid transfer of haemoglobin to the muscles (stroke volume and heart rate)
- Efficient transfer of O<sub>2</sub> from the haemoglobin to the muscles
- Efficient intracellular components (mitochondria) of the muscles to convert O<sub>2</sub> to ATP

Some of our cardiopulmonary system is inherited, but a lot of it is adapted through training.

Since we all cannot measure our VO<sub>2</sub>max (perhaps the best way to evaluate this system), a simple way to understand yours is to measure your age-adapted respiratory rate, heart rate and—most important—the recovery time after exercise (how quickly the pulse drops back down).

#### 5) Feel for the Water

This is a tough one because feel for the water, or sensory proprioception, is inherited,

and there aren't any sophisticated means to measure it.

Nonetheless, I rate it as one of the most important factors.

What it means is the ability to feel or sense minute pressure changes in the fingers.

The reason that it is important is that we are using our hand not as a paddle (nor our arm as an oar), but as an airfoil, providing lift and power simultaneously.

Doc Counsilman discovered this phenomenon years ago while photographing the hand position in relation to the water, and came to the realisation that the hand is moving from side to side, utilising Bernoulli's Principle to provide lift. Coaches refer to this ability of the swimmer to "hold water".

Doc could tell the proprioceptive ability of a swimmer by measuring the number of air bubbles left behind the hand on the underwater pull.

The great swimmers have the ability to feel the correct position of the hand underwater to maximise efficiency and virtually eliminate all the air behind their hands.

#### 6) Power

No matter how good our other qualities, if we do not have enough muscle mass and tendon strength to produce power for lift and propulsion, we are not going to swim fast.

The dilemma with muscle mass is that while it provides power, the more we get, the less streamlined our body may become and the less buoyant we will be.

The key is to maximise power but without significantly altering our body shape, or losing flexibility.

Also, skeletal muscles are divided into two types: fast-twitch (white) and slow-twitch (red).

Although these can be changed to some degree through training, for the most part the percentage of each is inherited and is largely responsible for determining whether we are headed for the distance lane or the sprint lane.

## 7) Gross Motor Skills

Swimming is not usually considered a sport requiring the type of coordination associated with football, baseball or golf. Yet most great swimmers would probably make excellent athletes in other sports.

Gross motor skills make swimmers more teachable.

When a coach points out something they are doing wrong, they need to be able to understand what they are doing and how to change it in order to get better.

These motor skills also enable a swimmer to become a better starter, turner and finisher of a race.

You can usually assess your skill in this area by your athleticism, but if you're still not sure, just ask your coach—and make sure he is honest.

### PSYCHOLOGICAL

The psychological components of greatness are myriad, but to oversimplify, I have reduced them down to two: the will to train and the will to win (compete).

To reach a level of greatness, one needs to have both.

## 8) Will to Train

Motivation has a lot to do with this component. For example, I always found it easier to get to practice and make practice really count during the Olympic years. Motivation for training does not have to include making the Olympic team. Some may train just for the enjoyment of being in shape. But we will never be judged for greatness based on our workout times.

## 9) Will to Win

Winning is 90% mental. Mark Spitz used to tell me that if eight finalists are similarly prepared and talented, the winner of the race comes down to whoever has the mental edge. In other words—as trite as it may seem—the race usually goes to the one who wants to win the most.

Dr. Rayma Ditson-Sommer, a sports psychologist who worked with some of the U.S.

Olympic athletes preparing for Sydney in 2000, calls this the ability to hyper focus.

A swimmer who has this skill not only can concentrate solely on those few positive thoughts that maximise a performance, but can also block out any negative thoughts that might detract from it.

Some call it the “killer instinct”. I don't think you can teach it, but whenever you stand up on a starting block and you're putting it all on the line, you will figure out whether you have it or not.

### PHYSICAL

## 10) Training/Competition Environment

This is a broad category, but so important. No swimmer can make it to greatness on his own. Today, there is an entire support team required for the training of an Olympic athlete.

This team includes his coaches (usually more than one), training partners, training facilities (pool, strength training), training devices, equipment for competition (suit, cap, goggles), psychologist, nutritionist, resting environment (home), family, massage therapist, hypnotist, astrologist or whatever and whoever helps one swim faster.

The fact is, it doesn't matter if you scored “5” on all nine of the previous categories—without a good score in this category, you will simply become another member of the big school of swimmers with lots of potential.

So if you're serious about swimming—no matter how you scored on the other components—find a good swimming program and join it!

Gary Hall, M.D., a prominent ophthalmologist in Phoenix, Ariz., competed in three Olympiads—1968, 1972 and 1976—winning two silver medals and one bronze.

### TEST RESULTS

41-50	Watch out Michael Phelps! We have the making of another champion!
31-40	You are in a pretty elite class. The way to get to greatness from her is by increasing your level in every category in which you have the ability to change.
21-30	You definitely have talent. You may just need to work harder to earn your stripes.
11-20	You may not make the Olympic team, but who cares? You can become a pretty darned good swimmer with practice.
0-10	Don't worry. You can still enjoy swimming and all the benefits of the world's greatest exercise.