

(Excerpt from the August 1998 Florida LMSC Newsletter)

Rotation: Again and Again

by Coach George Bole

Hip rotation is the expression now in coaching. Alas, everybody interprets the expression to suit their own peculiarities. Recently I came across an old article (July, 1994) written by a wonderful stroke technician and analyst, viz. Bill Boomer, who analyzes all the Olympians' performances. I've had the great pleasure of listening to some of Bill's lectures and have no hesitation in saying that he is far and away ahead in his conceptions of stroke technique and efficiency.

Quoting Bill's article, "Swimming techniques, like training philosophies, have underlying assumptions. For instance, what are the critical aspects of the freestyle stroke? What are the components of freestyle you should never throw out and what parts are negotiable as you change speeds? Success is not an accident. The discovery of excellence doesn't just appear--beyond looking for little tips here and there, you need to develop a rationale for how to construct your freestyle patterns.

"One widely held assumption in freestyle swimming is the belief that the more force we create at the hands and feet (the creative propelling units), the faster we will go. That is why we commit so much time and energy to strengthening training, for example. But perhaps this might not be entirely true. Perhaps the elimination of drag is just as important as the creation of force. Maybe, as you swim faster, eliminating drag is just as important as the creation of force. Every time you double your speed, you create four times as much resistance. So, the faster you get, the thicker the water feels. And the harder it is to make it through it. Therefore, given your limited ability to create energy, it may be better to maximize the energy you do have by getting every drop of speed out of each heartbeat. This means using creative body positioning to eliminate as much as possible the ever-increasing resistance of water as you increase speed."

Bill goes on to say, "We can do this by examining the natural tendencies of the human body in the water. It is very important to understand your 'vertical balance,' the relationship between your 'center of mass' and your 'center of rotation.'"

"The center of mass is a point on or near the body, where all the weighted body parts at one moment of time are in gravitational balance. The center of rotation (also called the center of air) is the single fulcrum point around which gravity pulls your center of mass. The tendency for your center of mass to rotate towards the pool bottom around your center of rotation is called torque.

"Understanding and counterbalancing this torque, without using 'racing heartbeats' to do it, is to really understand the central issues for fast, even very fast, swimming. The underlying assumption here is that stroking patterns should be developed around the needs for balance (countering torque) and eliminating frontal resistance (streamlining) and the development of cycling rate (rhythm centers). These considerations are never thrown out as you attempt to create greater propelling forces at the hands and feet. By positioning and shaping your body for a more balanced and streamlined profile, it will take less energy (heartbeats) to push you through the water. The fewer heartbeats you devote to keeping your body balanced, fighting the increasing frontal drag of poor streamlining and having to use your hands and feet to correct errors caused by bad posture, the more energy you will have for fast swimming. Most stroking errors, as we know them, are caused by the swimmer having to use the hands and feet to compensate for the swimmer assuming that force creation comes from drag elimination."

Bill goes on, "Let's begin at ground zero. What naturally happens to your body in the water when you hold your breath and do nothing, when you just hang there and float? Some peoples' bodies will assume a low-hanging, almost vertical, dead man's float. Obviously, the nearly vertical dead man's float and those positions in between are not very streamlined, as gravity pulls the heaviest parts of your body downward. You will find that the most buoyant part of your body is between your armpits and the heaviest part is somewhere around the belt buckle. You have the choice about what floats and you need to counteract the force of gravity to bring your body into a relaxed, streamlined position, without using heartbeats (kicking) to do it.

"Think of your body as a long lever arm like a see saw. The length of the balancing line in the lever system of your body runs from the point of your extended finger tips to your extended toes and includes your head/spine line. A see saw is in balance when both ends are unsupported, stabilized, and motionless. The equation does not require equal lengths and weights on both sides of the balancing point. To balance, you need equal products: the relationships between length and weight.

"The same conditions apply to the human body when trying to balance. To accomplish this, you need to be able to shift your center of mass towards your center of flotation. This

necessitates that you connect the product of the weight and length of your hips and legs on one side of the see saw to the following on the other side: (1) the product of the weight and length of your arms, (2) the weight of your head, and (3) a downward pressure on the head/chest unit (T-pressure). The closer these two points, the less potential torque is in the system. Putting your center of mass on the gravity line from the center of rotation leaves you with no torque pressure on your body's lever system.

"Creating and understanding this balanced system will eliminate the need to kick your body into a streamlined position. It also gives you a more stable base or platform from which to freely direct your arms. In freestyle, this establishes a rhythm line where the cycling rhythm (stroke rate) can originate at the hips-- a critical condition for being able to change speeds in freestyle swimming. The same ability to shift and control your center of mass in the short axis strokes (fly and breast) creates the rhythm and momentum transfers that lead to higher average speeds in these two strokes.

"Until now, you have subconsciously adjusted your kick, shifted your head weight, or used your leading hand/arm unit (platforming) to counterbalance errors. You have had to do this because your rhythm center has been located in your hands. The assumption here being, that to pick up the pace, you do it with your hands. WRONG! If pace changes occur in the force-creating units (hands and feet) it will destroy your balance rhythm and posture; it puts the 'cart before the horse!' Freestyle rhythm changes occur at the hips and they never interfere with balance and posture. Swimmers need to evaluate the impact of any such change on the entire body -- your hips, your head, your legs, your arms -- as that change impacts your balance rhythm and posture.

"We all have a natural rhythm to our stroke and that rhythm manifests itself along our balancing line which includes the head/spine and hips if we are to create this rhythm line. We can then marry our own balance line (head-spine line) to our rhythm line and direct our energies outward towards our hands and feet, the force creators. Our hips won't bounce, our hands won't sweep out, and we won't need to crossover kick to compensate for our head every time we breathe."

There is more to this article but I think if you get the message about streamline and correct balance line, then you will appreciate the application of Bill Boomer's suggestions. If you have any queries on this, I'd be pleased to try and answer.

One more point -- in short -- rotate the core position of the body, i.e. the line between the belt buckle and the upper thighs, keeping the head-spine line in balance.

George Bole (1916-2012), a former English Olympic coach, coached St Pete Masters from 1984 – 2001. The 25 meter pool at the North Shore complex was dedicated to George as the “George E Bole Memorial Pool” on April 5, 2014.