

I wanted to address a recent swimming article published by a local coaching group that provides what I believe is erroneous counsel on swimming technique. In the article, the author contends that the proper “finish” to the freestyle pull (pull defined as the underwater portion of the stroke) is “extending the arm back towards the feet”. The author then explicitly advises not to finish at the hips. By teaching the swimmer to “push back” all the way through to the feet, the author advocates for a linear pulling technique, and in doing so counsels athletes to pull extremely inefficiently, the cost being precious heart beats we can use for the bike and run.

The misconception of the “pull back” technique lies in its linear nature, the subsequent large fluctuation in power output with that technique and the excess muscle fatigue placed on the tricep at no material gain of speed. If you were to plot out a power curve for a freestyle pull (using watts or distance per second on the “Y”-axis and time on the “X”-axis), what you would see on a “pull back” swimmer is two spikes. The first, and most dramatic, would be at the beginning of the stroke, occurring after the “catch” phase of the pull when the swimmer “catches” the water in front of the body (and better so, as far in front as possible without sacrificing the structural integrity or rigidity of the swimmer’s core). Assuming the swimmer maintains a high elbow position, the first several inches of the pull after the “catch” phase will create a spike in power. As the hand pulls back past the chest (note: fingers ALWAYS pointed towards the bottom of the pool NOT toward the sides of the pool), power decelerates towards the hips. And here is where the two philosophies, hip exit v. pull back, diverge.

In the “pull back” technique, the swimmer pushes all the way through past their hips until their finger tips extend towards their feet, palms facing up. Again, referencing the power curve, by accelerating the finger tips towards the feet, we notice a spike in power after the deceleration coming off of the initial post-catch movement. What is not necessarily quantifiable by a mere power graph, though, is that this speed is mitigated by the large surface area the swimmer reveals to the water surface as the hand AND forearm exit in the same parallel line as they begin the “recovery” phase of the stroke. In simplest terms, the more surface area, the more drag. The more drag, the more immediate loss of power. Moreover, this technique creates a linear pull-recovery relationship. When the hand is extended all the way back, creating a straight line between shoulder and finger tips, it requires much more energy by the swimmer to then “recover” the arm forward back out of the water towards the front of the body. Indeed, it’s not recovery.

We know from cycling and running, lines are not efficient propulsive movements. We don’t teach cyclists to push in lines up and down – commonly known as mashing. The technique is more circular in nature, minimizing spikes in power, and in doing so, allowing more efficiency in power output as measured by speed and heart rate. Likewise, in running, we don’t advocate for kicking back with the heels, effectively creating a line from hip to heel. The linear nature of the movement, while powerful, is extremely inefficient and untenable for distances, especially after a preceding swim and bike.

The more efficient technique for the finish of the pull is to exit at the hip, elbow leading the vertical forearm out of the water. On the power curve, there is only one spike (after the catch). However, the power that is retained on the finish of the “hip exit” is significantly more than that of the “pull back” technique. By finishing the stroke at the hip, the swimmer lifts the elbow first out of the water to

initiate the recovery (technically speaking, a shoulder shrug initiates the recovery). The forearm and hand are effectively hidden UNDERNEATH the elbow/triceps thereby minimizing the surface area of the arm that will exit the water on the recovery. Remember the surface area presented to the surface of during the “push back” technique? Cut it in half during a hip exit. Again, less surface area, less drag, less loss of power. Most importantly, the hip exit is a circular motion. It’s more efficient at holding on to the energy that is created during the pull and literally recycling as much of it as possible back to the front of the stroke until the post-catch phase can begin again to establish more power. Additionally, because of its circular nature, it’s easier to manipulate cadence, critical to open water swimming and the variable forces at play in open water (currents, swells, chop, etc). Ultimately, the metabolic costs of a “hip exit” are significantly less. We can now allocate those heart beats saved towards the bike and the run where we need them most.

But what about the straight arm recoveries we sometimes see in elite level swimmers (i.e., Janet Evans)? Look closely to their finishes. They finish at their hips, hide the forearm and hand and THEN extend the line straight arm afterwards. While I was coaching at Stanford in the late 90s, we experimented with straight-arm recovery techniques with our sprint freestylers, Jenny Thompson included, and found no discernible difference in speed. The critical factor, however, was the “hip exit”.

Unfortunately the “pull back” technique is commonly taught by coaches and swimmers who haven’t been involved in higher level coaching or swimming in 10-12 years. It seems to make sense to these advocates, especially when you engage in this technique and can “feel the burn in the triceps” from extending back towards the feet. If it burns, it must be right, no? Think again. I tend to go with circles over lines when it comes to propulsive actions and the only way to create a circle in the pull-recovery motion is through a hip exit.

