Developing Swimmers
For Lifelong Success

Memo To:	TAC Community
From:	Derek Wall Executive Director
Subject:	Movement Economy
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At the Triangle Aquatic Center, our mission is simple but ambitious: Developing Swimmers for Lifelong Success.

In March, we introduced to you the Long-Term Athlete Development framework (LTAD) - the map that guides every training decision at TAC. If you missed it, the short version: athletic development happens in stages, each with a specific window and a specific purpose. The sequence is not optional (without consequences). Today's memo builds directly on that foundation.

The concept is one you may already know, just not from swimming.

Running Economy... heard of it?

If you follow triathlon, road racing, or marathon training, you've encountered the term. Running economy is the measure of how much energy a runner burns to cover a given distance at a steady pace. It is why elite coaches build strides, drills, and neuromuscular work into endurance programs that might otherwise look like pure mileage. A runner with better economy travels faster on less fuel and holds their form longer when fatigue sets in.

For years, sports scientists believed VO2 max, the maximum rate at which the body can take in and use oxygen, was the primary predictor of endurance performance. Then researchers began studying elite East African distance runners and found something that challenged the model. Athletes with lower VO2 max scores were consistently outperforming athletes with higher ones. The missing variable was economy.

Those runners were not burning less energy because they were less fit. They were burning less because every stride was optimized. Almost no energy was wasted on vertical bounce, lateral drift, or mechanical inefficiency. More of each calorie spent became forward motion. Further research confirmed: among elite athletes, movement economy is a stronger predictor of race performance than VO2 max alone.

There was a second finding that changed how coaches structure training: economy is trainable. High-intensity stride work (short, fast bursts that force the neuromuscular system to find more efficient patterns) improved running economy in already-elite athletes with no meaningful change in VO2 max. Just cleaner mechanics. In endurance sport, even small economy gains separate podium finishes from the middle of the pack.

Air vs. Water

Swimming is shaped by the same physiological laws. The medium is different; the science is identical. Water is roughly 800 times denser than air, which means drag forces are dramatically higher at every speed, and technical inefficiencies are punished far more severely than they would be on the road or track.

In the pool, we call it stroke economy. A swimmer with good economy moves through the water with minimal wasted effort: aligned body position, an efficient catch, a purposeful kick. Less drag. Less energy per stroke cycle. More speed for the same aerobic output.

A swimmer with poor economy fights the water. Energy spent on crossovers, dropped elbows, core instability, and broken body lines: the aquatic equivalent of a runner's wasted vertical bounce. None of it produces forward motion. All of it accumulates as fatigue.

The gap this creates is significant. The power required to move through water increases with the cube of velocity, meaning a technical flaw that costs modest energy at easy pace becomes dramatically more expensive

at race pace. Two swimmers with similar aerobic fitness can produce dramatically different race results based almost entirely on stroke economy. Beyond a certain point, more yardage does not close that gap. It just produces a fitter, more tired swimmer with the same mechanical inefficiencies.

"Just Keep Swimming" … or not!

This is why the LTAD framework places technical development before volume. You can see this reflected in Coach Bruce Marchionda's recently shared "Developmental Percentages" document: for athletes 12 and under, roughly half of the coaching focus is on technique and kicking. That is not arbitrary. It reflects when the window for building economy is widest.

In the FUNdamentals and Learn to Train stages, the nervous system is highly plastic. Movement patterns are easy to establish, easy to refine, and most importantly, easy to make automatic before high training loads are introduced. Economy built at this stage becomes the chassis that everything else is loaded onto.

Volume loaded onto a technically deficient athlete does not produce economy. It reinforces the inefficiency at higher repetition counts, accelerates injury risk, and sets a ceiling on development that is genuinely hard to raise later. The "pile on early yardage" approach to youth distance swimming can produce age-group results, and occasionally a wunderkind. It rarely produces durable high performers.

For athletes in the Train to Compete and Perform stage (which includes masters swimmers, triathletes, and lap swimmers at any age) the goal shifts from building the pattern to holding it under pressure: maintaining efficiency at race pace, under fatigue, in competition.

So don't "just keep swimming" … keep swimming, correctly!

What Builds Stroke Economy

In running, coaches discovered that stride work and strength training were the two most effective levers for improving economy, not because they increased fitness, but because they forced the neuromuscular system to find and reinforce efficient movement patterns. The same two levers exist in swimming.

Sprint work in the pool does what strides do on the track. At maximum effort, inefficiencies that are invisible at slower speeds become glaring. The body is forced to find a more economical path. Athletes who train at both ends of the speed spectrum, aerobic work and true sprint intensity, develop economy across the full range of race conditions.

Strength training does something different: it builds the structural architecture that allows efficient patterns to hold under fatigue. A strong catch. A stable core. A posterior chain that does not give out in the back half of a long race or the final leg of a triathlon. Research on elite distance runners found that strength training improved running economy by 2–5% without meaningfully increasing body mass. The swim parallel is direct, and it is the subject of a future memo.

The Bigger Picture

Movement economy is not a drill concept or a youth development concept. It is the framework that connects everything we do at TAC - from how our youngest swimmers are introduced to the water, to how our professional-level athletes prepare for international competition.

Whether you are a competitive age-grouper, a masters swimmer who has hit a plateau, or a triathlete trying to get on the bike with more in the tank - stroke economy is likely where your biggest untapped gains live. Not more yards. Better ones.

The running scientists figured this out by studying the best endurance athletes on earth. The physiology transfers completely. The application at TAC is intentional.

This is a conversation our coaches and staff welcome. If you have questions or topics you'd like addressed in future communications, we invite you to share them with us here.

Thank you for being part of that journey with us.

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