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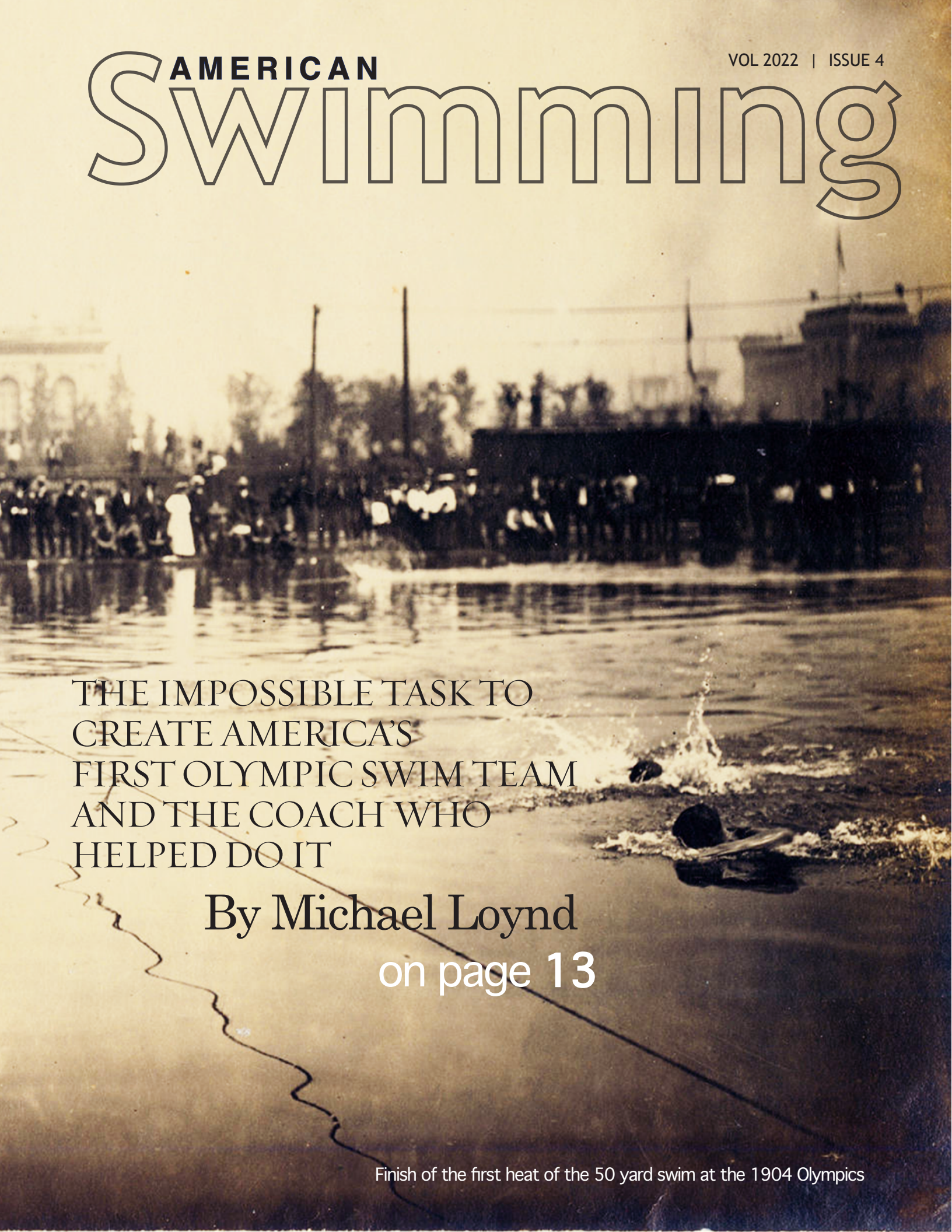

THE IMPOSSIBLE TASK TO CREATE AMERICA'S FIRST OLYMPIC SWIM TEAM AND THE COACH WHO HELPED DO IT

By Michael Loynd

on page 13

Finish of the first heat of the 50 yard swim at the 1904 Olympics


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INTRODUCING A SYMMETRY SCORE IN FREESTYLE SWIMMING USING A MEMS BASED SENSOR Part 1

Andy Stamm PhD[1, 2,3], Igor Shlyonsky[3]

1 Faculty of Technology and Bionics, Rhine-Waal University of Applied Sciences, 47533 Cleve, Germany
2 Griffith School of Engineering, Griffith University, 4111 Nathan, QLD, Australia
3 MySwimEdge Inc., USA

Swimming research is as old as the technical devices allowing us to measure some swimming metrics. This includes for example stop watches, video camera systems, or tethered velocity meters. In recent years, sensors based on MEMS (Micro Electrical Mechanical Systems) have been used in research as well as being available commercially in many different forms. The author started working with these sensors in 2009 and developed multiple algorithms to find key parameters of interest to athletes and coaches. One may ask the question why that is important as there are already other systems on the market that can measure some parameters. The answer is short: It is a) difficult to operate such complex equipment and b) such equipment is rather expensive. This all led to the idea to design a device and algorithm which should be able to deliver these values of interest without the need of having a scientist on site to accompany the training session.

The main goal was to introduce a product which allows the athlete to conduct a training session just with the sensor and the coach automatically has access to the recorded training data. All of this took around ten years from the first contact to a working prototype. Now as these steps have successfully been done, the investigations went further. Many meetings with different athletes and coaches took place which identified the need for investigating symmetry in swimming based on the recorded sensor data.

This research was published in its original form at the 8th International Conference on Sport Sciences Research and Technology Support in 2020 and won the Best Paper Award titled “Freestyle Swimming Analysis of Symmetry and Velocities using a MEMS based IMU: Introducing a Symmetry Score.” Since then, we have further developed our idea of presenting a symmetry score to athletes and coaches helping them to improve their swimming techniques.

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The data was collected with the 2nd Prototype of the MySwimEdge Sensor and the automatic online analysis.

Measuring velocity in swimming in the past has been done with two major technologies; video systems and tethered velocity meters. Both of them offer the service of measuring even the intra-stroke velocity but not the symmetry directly. Using a video based system takes some time before results are available with the tethered velocity meter offering results shortly after the measurement was done. However both techniques have the problem that the pool at which the measurements are undertaken must be prepared for the measurements. Using a sensor simplifies this as there is no special preparation necessary; only the sensor must be attached to the athlete.

The sensor measures 9-axis of freedom; namely acceleration, rotation, and the magnetic field of the earth, each in all three axes. It comes with built-in Bluetooth for communication, internal memory for data storage, a wireless rechargeable battery, a weight of less than 50 g, and physical dimensions of 41 mm x 78 mm x 19 mm (width, height, depth) in a waterproof casing. Figure 1 shows (a) the sensor and in (b) placed at the swimmer.

Figure 1: (a) Sensor (b) Sensor at the swimmer

The data recorded by the sensor is shown in Figure 2. The body roll of the swimmer can be clearly seen on the first channel (ax) with the second channel (ay) showing the direction of the movement. As the earth gravity is obviously 1g and always present (red lines) this needs to be removed from the measured signal.

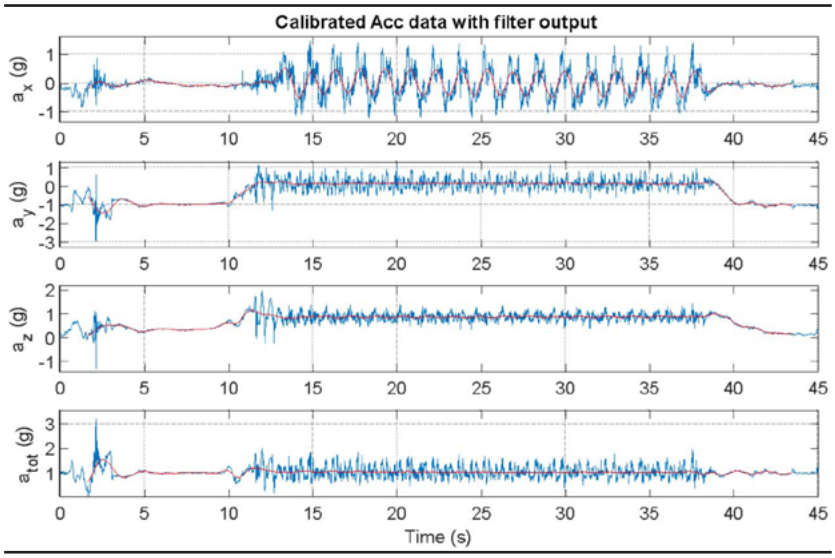

Figure 2: acceleration profile of a swimmer swimming a 50m lap in a pool

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The filtered data was then used to calculate the velocity changes during a lap see Figure 3. This calculated velocity can be used to find the distance covered during the swimming by the swimmer.

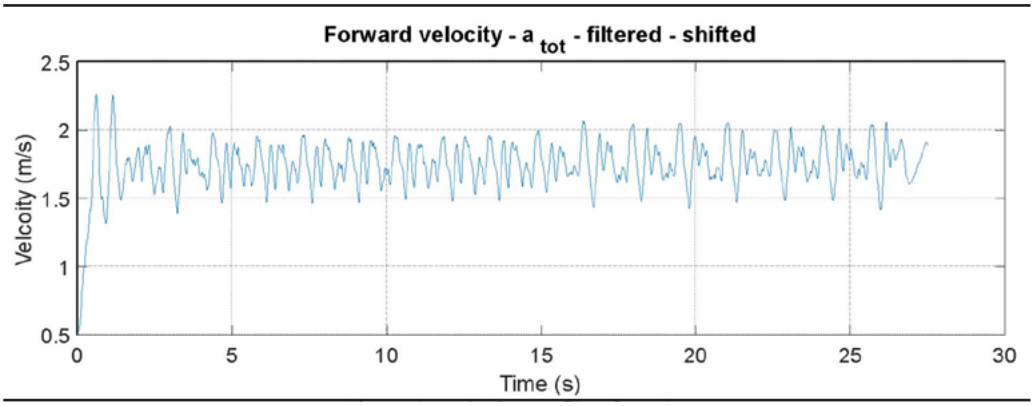

Figure 3: velocity profile of one lap

The measures such as velocity and distance should now be compared in terms of symmetry. For that symmetrical points need to be found on the recorded swimmer data; basically repetitive movements or positions during the swim which can be used to differentiate the left from the right arm. This can be done by looking at the body roll which is such a repetitive movement as shown in Figure 4.

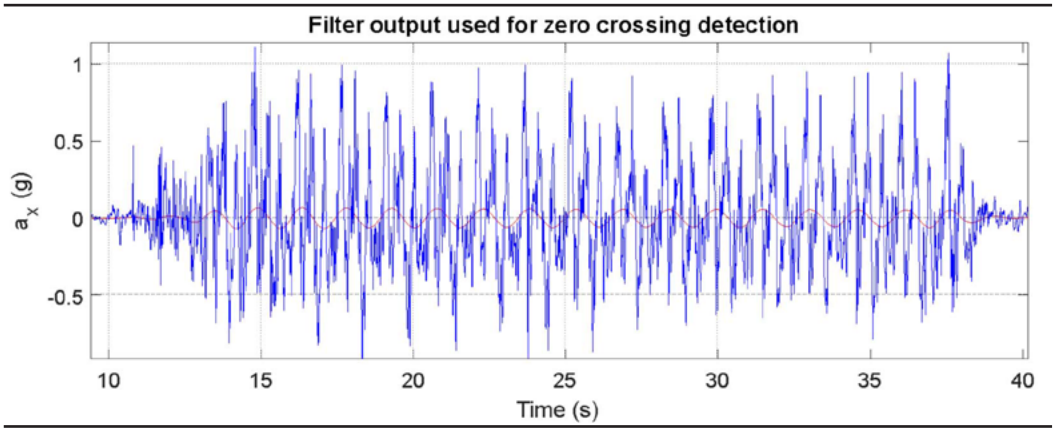

Figure 4: Zero crossing detection in blue with the red line representing the filtered acceleration

These detected zero crossings correspond to the body rotation; namely to the time the body (hips) rotation is back and in plane with the water surface. One can use these timings to differentiate left from right arm timings as this exactly is what happens between the body being in line with the water surface until the next time the body comes into this position. How this exactly is done will be presented in part 2 of this article featured in the next volume of this magazine.

Andy Stamm PhD, Igor Shlyonsky BIOS

Igor Shlyonsky

(M.Sc. in Computer Science, MBA) is a CEO of MySwimEdge, Inc. Before starting MySwimEdge, Inc. Igor worked as a top manager in large companies, he also worked in management consulting with McKinsey & Company, and in venture capital with 3i plc.

Igor Shlyonsky received his M.Sc.in Computer Science from the Moscow Institute of Cybernetics and his MBA from Cornell University (Ithaca, NY). Before starting MySwimEdge, Inc. Igor worked as top manager in electricity, energy efficiency, metals, export support, chemicals in Russia, Ukraine and Israel. He also worked as a management consultant with McKinsey and Company in Russia and USA, and in a venture capital firm 3i plc in the UK. He developed a passion for swimming analysis after he wanted to analyze his own technique and couldn't find an appropriate gadget.

Andy Stamm

received his Diploma Engineering degree in Electrical Engineering from the University of Applied Sciences, Bonn-Rhine-Sieg, Sankt-Augustin, Germany in 2008, and his Ph.D. degree in Electrical Engineering from Griffith University, Brisbane, Australia, in 2013, respectively.

He is currently a Professor with the Faculty of Technology and Bionics, University of Applied Sciences Rhine-Waal, Cleve, Germany, where he is also the Dean of Studies. He has coauthored one patent application, more than 15 publications, and graduated more than 45 students. His research interests include inertial measurement units (IMU's) and embedded systems design and development, data analysis and feature extraction, environmental sustainability in electronics manufacturing, renewable energy systems, and sports engineering. Prof. Stamm is also an Adjunct Professor at Griffith University in Brisbane Australia.


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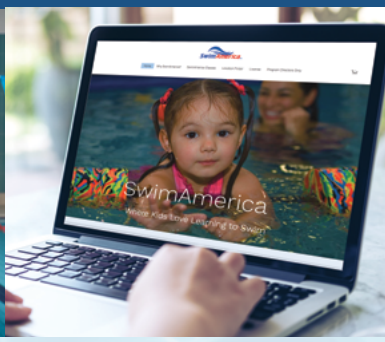

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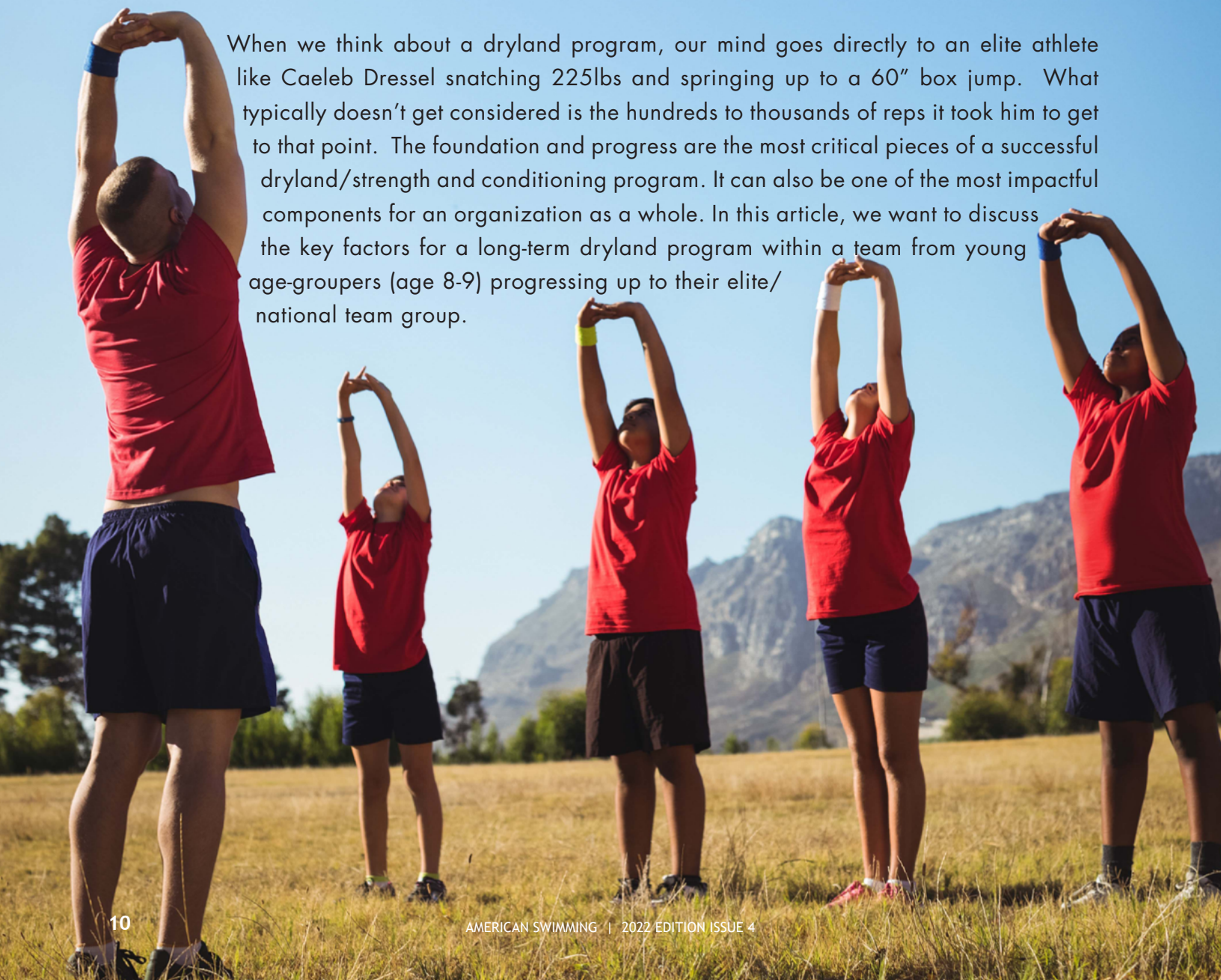
WHY DRYLAND TRAINING & PROGRESSION FROM THE AGE GROUP LEVEL IS VITAL TO LONG TERM SUCCESS

By Todd Anderson and Katie Hoff (Co-Founders of Synergy Dryland)



When we think about a dryland program, our mind goes directly to an elite athlete like Caeleb Dressel snatching 225lbs and springing up to a 60" box jump. What typically doesn't get considered is the hundreds to thousands of reps it took him to get to that point. The foundation and progress are the most critical pieces of a successful dryland/strength and conditioning program. It can also be one of the most impactful components for an organization as a whole. In this article, we want to discuss the key factors for a long-term dryland program within a team from young age-groupers (age 8-9) progressing up to their elite/ national team group.

Mindset - Dryland should be part of a team's DNA. It is something we execute and something we attack together. If this is introduced at an early age within the program, it will only flourish through the progression of each age group. There is an element of camaraderie and extraordinary energy that arises from top to bottom when you have kids training to swim at a collegiate and/or national level doing a similar, consistent dynamic warm up as the age group athlete just starting out.

Culture - There is something special about going through adversity with people. It unveils a certain amount of vulnerability and struggle few ever see. It is through these struggles that teams bond and cultivate relationships that will last a lifetime. The weight room (or specified area on the pool deck) is the perfect place for controlled, safe, and motivating adversity. Each set, each rep, each workout is an opportunity to push yourself and each other to become better than the previous time you stepped into the building. Everyone can see the work being put in and there is no faking strong effort.

Injury Prevention - I think we can all agree humans did not evolve swimming in the water 24/7. Swimming places extraordinary demand on joints, ranges of motion, and producing force in a unique environment. Because of this, we must take an extraordinary approach to our out of pool programming. We cannot approach these athletes like most land-based sports that, for the most part, are dealing with gravity instead of the resistance of water. Gravity is very predictable, and our systems have adapted to it for millions of years. Get in a pool and throw that all out the window. Focusing on maintaining ranges of motion and developing swim specific strength will eliminate many injuries before they ever happen.

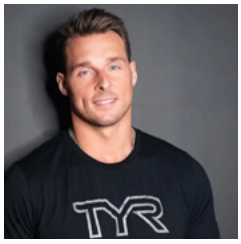
Peak Performance - We always like to say, "you can't shoot a cannon from a rowboat." You must have a robust foundation to build world class power, strength, and athleticism. Learning fundamental movement patterns at a young developmental age allows an athlete to build an early foundation and enables them to push towards achieving their maximum potential sooner than later. It takes time building a foundation so the later they start, the smaller the window becomes.

Preparation - At this point every major college program will have a robust strength and conditioning program. Many times, athletes will come in and hit the ground running. When any athlete comes into the college swim program often times the team lifts together and there's a certain expectation that these athletes have already learned basic fundamental movements and have a foundation of strength. As coaches, it's our duty to prepare these athletes to perform at the highest level. It is vital to squeeze out every possibility to improve, get better and maximize our time with them. We are responsible for getting them prepared for the workload and demands well into their future in the sport and in life.

At the end of the day, that's the why behind it all….to make a meaningful, positive impact on these athletes' lives.

Katie Hoff

Katie is a two-time USA Olympian swimmer, 8x World Champion and 3x Olympic Medalist. She still currently holds the American Record in the 400 IM. Apart from a passion for keynote speaking, fitness and conducting clinics, she feels there is a way to make a positive impact on the dryland side of swimming. In her career, Katie has experienced highly effective dryland programs where the results correlated directly to her success in the pool. She has also experienced negative effects from a lacking dryland program. Her ultimate goal is to collaborate with Todd to provide teams with the tools to strengthen and empower their swimmers with movements that enhance performance in the pool. Coaches shouldn't have to worry about programming land movements when their ultimate focus needs to be in the water.



Todd Anderson

Todd started as a fullback for MSU and moved on to play in the NFL for the Rams in 2012. In retirement, he took his passion for the strength and conditioning side of the sport to performance coaching. He started as a trainer and moved quickly into management. He is a certified strength and conditioning coach and trained Katie to best times at the end of her career. Todd has also trained a variety of athletes from high school to professional in swimming, tennis, soccer, lacrosse, baseball and football. Additionally, Todd is a sleep coach and conducts team and corporate seminars with Fortune 500 companies on topics which include sleep, brain health and stress.
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THE IMPOSSIBLE TASK TO CREATE AMERICA'S FIRST OLYMPIC SWIM TEAM AND THE COACH WHO HELPED DO IT

by Michael Loynd

The Austrian who sought to become America's first Olympic swim coach faced an impossible task. The abysmal state of American swimming was worse than he had imagined. The entire United States had only a dozen year-round competition pools that were mostly in the hands of exclusive male athletic clubs. Only 600 of the country's 75 million people swam competitively—and none of them very well. America's powerful Amateur Athletic Union didn't take the sport seriously. And they especially had no interest in sponsoring an Olympic swim team just to watch them get embarrassed by the British Empire's vastly superior watermen who had dominated the sport ever since inventing it 75 years earlier.

Yet, the 23-year-old Austrian, the recent winner of two second-place swimming medals for his country in the 1900 Paris Olympics, felt it his destiny to make swimming a part of American culture when he emigrated to the US in 1901. In fact, given the potential he saw in his adopted country, he became determined to build the greatest program the world had ever seen. His determination was only bolstered when he learned about the hurricane that had leveled the thriving city of Galveston, Texas, littering its beaches with as many as twelve thousand bodies—many of whom could have survived had they only known how to swim.

Growing up in Vienna, Otto Wahle (pronounced "Wally") had used swimming to transcend the anti-Semitism that barred Jews like him from the city's popular athletic societies. As a boy, the only place truly open to practice athletic skills on equal footing with other Austrians was the large outdoor bath along the Danube River that was built to promote cleanliness amongst all citizens. Defying the cruel stereotypes that Jews were inferior, Wahle became one of Austria's top swimmers. The sport had allowed him to rise above his circumstances and enjoy a sense of dignity, and his success made him want to empower others.

Soon after arriving in the US, Wahle competed at the 1901 American championships held in a muddy lake at the Buffalo World's Fair. While England's annual swimming championships drew close to 100,000 spectators, this contest drew only a small gathering of curiosity seekers who seemed more interested in seeing if the lake's resident ducks would interfere with the swimmers than in the actual outcome of the races. At a time when the crawl stroke had yet to be invented, only two American champions even knew how to swim the trudgen—both of them taught by former British champions living in America. But here there were no rules or standards. No official governing body like England's Amateur Swimming Association. In many events, Wahle was shocked to see that there were only as many entrants as medals, and that America's record times were laughable. Wahle's American-record-setting swims at these championships would not earn even a top-three finish at England's championships. The half-mile American record that he broke was a whole three minutes slower than the British champion had swum the previous summer at the Paris games. After only six months in his new country, Wahle took it upon himself to write an American version of the official rule book on swimming, based on England's of course. But the terrible state of American swimming needed a complete cultural revolution to turn it around. The sport demanded more year-round pools, and greater exposure. Somehow American youth needed to be encouraged to take to the water early in life, like the Brits. But none of that could happen without Americans of all ages first being inspired to swim. The only way that might happen was if some underdog American upstart, born with exceptional natural ability defied all odds to beat the Brits and Aussies at their own game and inspire his country to dream big.

In 1904, Wahle found his unlikely champion in Charles Daniels. The 19-year-old Daniels was gangly, quiet, and still could not swim a decent stroke, but possessed an insatiable drive to redeem his ruined family name by trying to become a champion swimmer. Both men swam for the New York Athletic Club, but their circumstances required them to be unofficial members—Wahle, because he was Jewish, and Daniels, because of his disgraced family. Together, over the next decade, they willed into existence the U.S. Olympic Swim Team, won its first gold medal in 1904, created the freestyle stroke, and gave birth to a swimming culture that led to America having now won more Olympic gold medals than the next eleven countries combined. Wahle would become the first U.S. Olympic Swim Coach in 1912, and for 64 years Daniels' seven Olympic medals would remain the record for the most won—until Mark Spitz beat it in 1972.

You can learn more about this remarkable story in Michael Loynd's new book The Watermen: The Birth of American Swimming and One Young Man's Fight to Capture Olympic Gold, Ballantine Books, 2022

Pre Team Skills & Drills Primer

By Ann Searle Horowitz

The Pre Team is the future of any program. It can also be the most overlooked squad on a team. Often (ill-advisedly) assigned to junior coach staff, Pre Team practices are multi-tasking challenges that strive to simultaneously: develop skills/technique, hold short attention spans, establish productive routines and, preserve a love of the water. Here are some common issues (not an exhaustive list) and targeted fixes, with gratitude to coaches from whom I've learned:

Freestyle Skill Deficit:

1. Lifting head vs. side breathing
2. Taking too-long breaths
3. Turning head too far on breaths
4 Low elbow recovery

Drill to fix it:

1. Barbell – kick with alternating arm strokes during each 25, opposite straight arm holds barbell, hypoxic 3 rotary breathing
2. 2-second breaths – swim 25s, swimmer counts to "two-one-thousand" for duration of each breath
3. Half goggles – swim 25s, hypoxic 3 breathing, only half of goggles showing above water
4. Zipper – swimmer "zips" thumb up side of body to armpit before hand recovers over water

Backstroke Skill Deficit:

1. Arms bent, hands slap at entry
2. Legs hang low
3. Rolling/bobbing head
4. Flat body position

Drill to fix it:

1. Queen's Wave – thumb out, straight arm recovery pauses at 90-degree angle, rotate arm, pinky in
2. Swim with kick progression by 25s: arms + zero kick; arms + small/medium kick; fast arms to match leg tempo + fast kick; arms + whitewater kick
3. Place object (rubber duck, diving ring, half-full cup) on swimmer's forehead and kick, drill, or swim
4. Log Roll – hands at side, keeping head still, rotate shoulders, hips, rib cage, and legs simultaneously, every 6 kicks

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Breaststroke Skill Deficit:

1. Scissor kick
2. Pointed toes
3. Improper kick after arms added
4. Arms sweep too wide/low
5. Low knees
6. Point/flex at wrong times

Drill to fix it:

1. Kick on back, hold board on surface over body, straight arms, avoid knees hitting board
2. Kick (horizontal or vertical) or swim wearing flip flops – must flex and point to keep them on
3. Back to basics! 10 perfect kicks, flat body position, straight arms, hanging onto wall/lane line
4. Standing in waist-deep water, mirror coach doing 10 perfect pulls, visualizing upside-down heart
5. Kick on back, hands at side, knees/feet under water
6. Vertical eggbeater kick

Butterfly Skill Deficit:

1. No hip action, and legs flutter
2. Low hips
3. Arms don't clear the water
4. Difficulty maintaining both arms for full lap

Drill to fix it:

1. Body dolphins on surface, hands at side, with reminders to "super-glue" legs/feet together, varying dolphin speed to find correct rate
2. Kick or swim with fins
3. Standing on shallow end "T," push off bottom to launch single giant butterfly stroke all the way to wall
4. Streamline (arms at 11:00 and 1:00) butterfly kick with 1-right, 1- left, 1 both arms

Flip Turn Skill Deficit:

1. Sloppy somersault
2. Tangled turn (rushing to do too many things at once!)

Drill to fix it:

1. During down time between sets, swimmers do 5 underwater somersaults; can dive over/perpendicular to lane line, then wrap around it for "guided" somersault
2. Simplify turn into 3 steps: somersault; rotate onto stomach; push off in streamline

Streamline Dolphin Skill Deficit:

1. Difficulty staying underwater

Drill to fix it:

1. Sit on wall facing width-wise, push off into streamline dolphin kick underneath first two/three/four lane lines

Reaction Time Skill Deficit:

1. Don't understand importance of getting off the block quickly

Drill to fix it:

1. "Take your mark, go!" game: swimmers sit on deck, legs criss-crossed, palms down at their side, clapping on "go" to see who reacts fastest

Racing Start Skill Deficit:

1. "Table dive" start (you know the one . . . arms and legs enter simultaneously)

Drill to fix it:

1. Build dive skills (staying at each height until perfected) starting from seated position with soles of feet pushing off wall, progressing to kneeling, compact (crouching), standing and, finally, off-the-block dives

Attention Skill Deficit:

1. Unfocused energy

Drill to fix it:

1. Teach "in water Ready Position" on day #1: arms straight, one hand on the gutter/ wall, other hand pointing to the opposite end of the pool, always facing coa

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Coach
Ann Searle Horowitz

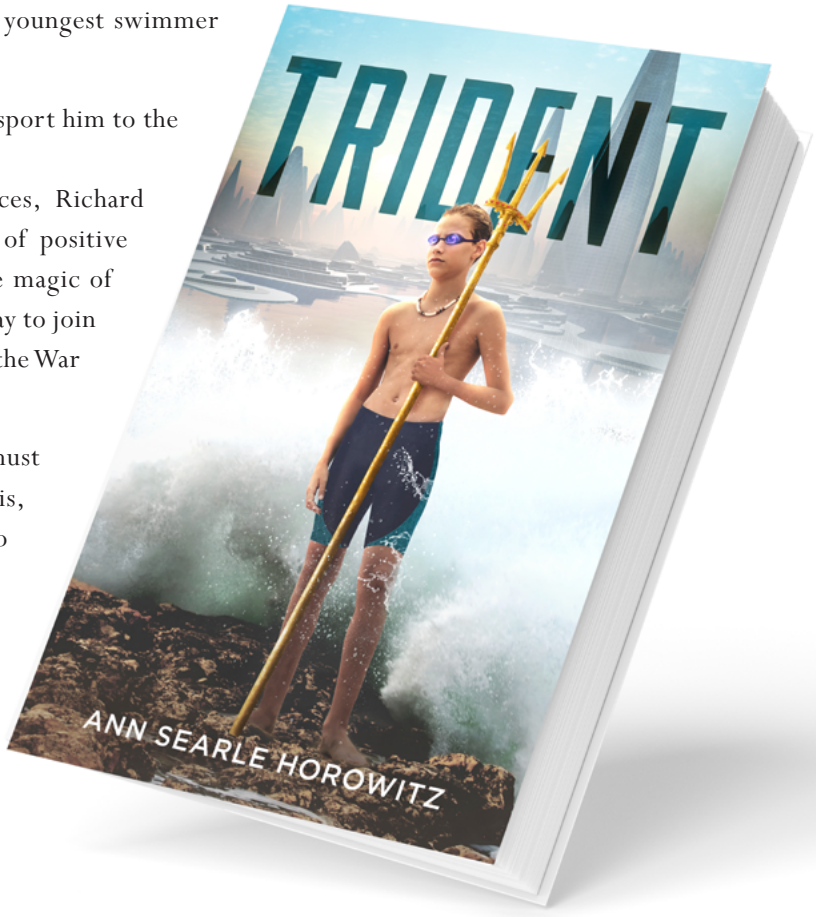
Coach Ann Searle Horowitz currently focuses on 12/under swimmers, including the delightfully fun-loving Pre Teamers, at the Rye YMCA, NY. During a recent off-season, Coach Ann published *Trident*, a fantasy-adventure novel for eight to twelve-year-old readers, featuring a competitive swimmer protagonist. (See companion article.)

Trident:
Good Read for Swimmers
By Ann Searle Horowitz

What do coaches do in the off-season?

Coach Ann Searle Horowitz, from the Rye YMCA Wave Ryeders (NY), decided to publish her first fantasy-adventure novel, *Trident*, written for eight- to 12-year-old readers. It's a story swimmers will enjoy, featuring a competitive swimmer protagonist. Here's the gist:

Twelve-year-old Richard Tomlin has almost given up on finding his dad. Instead, he focuses all of his energy on being the youngest swimmer ever on his team to qualify for Junior Olympics.



But everything changes when his new goggles transport him to the Lost City of Atlantis!
Confronting shapeshifters and dark magical forces, Richard channels his inner science geek and the power of positive thinking to stay alive. As he struggles to tame the magic of his goggles, his strong-willed twin, Lucy, finds a way to join him under the sea, and the siblings are thrust into the War of Generations.

To win the war—and save the planet—Richard must embrace his role in an ancient prophecy. Problem is, the prophecy appears to predict his own death. So what's a warrior to do?

Trident was named a quarterfinalist in the 2021 Publishers Weekly/BookLife Prize Fiction Contest, and is a 2020 Author Elite Award Top Ten Finalist, with five-star reviews on Amazon. It's been featured on the USA Swimming site, and has gained endorsements from Metropolitan/USA Swimming and YMCA Northeast Swimming.

To learn more visit https://annshorowitz.wixsite.com/author

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