THE TRUTH ABOUT USRPT | BACKSTROKE SPIN DRILL | CATCH-UP FREESTYLE

SWIMMING TECHNIQUE

FEBRUARY 2015 • VOLUME 42 • NO 1

IN THIS ISSUE:

WE HEARD YOU MISSED US

WE'RE BACK!


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WE RESPECT WATER AS AN OPPONENT,
BUT WE WILL NEVER BEND TO ITS WILL.
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Welcome back. We are happy to be back! In the new version of Swimming Technique Magazine, we are dedicated to bringing you the best information in the areas we feel are vital to swimming and coaching better. We've broken down our content in six categories, and every issue we will do our best to give info in each. The categories are as follows:

- MP — MENTAL PREPAREDNESS
- T/D — TECHNIQUE/DRILLS
- N/R — NUTRITION/RECOVERY
- WO — WORKOUTS
- DL — DRYLAND
- RS — RACE STRATGEY/PREP

So dive into our first issue, and we hope you enjoy the NEW Swimming Technique!

On the Cover: Chase Kalisz by Delly Carr

Introducing an Old Friend: Swimming Technique Magazine

The one thing that we have learned through 60 years of publishing news about the sport of swimming is that coaches, swimmers and parents cannot get enough content about technique. Due to popular demand, we are bringing back *Swimming Technique Magazine* in a digital format with this issue.

Swimming Technique was first published in February of 1980 and remained a quarterly magazine until 2005 when we stopped printing it as a stand-alone magazine.

Now 35 years to the month, *Swimming Technique* is being relaunched as a quarterly digital magazine.

Times have certainly changed, but the content remains the same. The NEW *Swimming Technique* will continue to cover recent swimming trends in the coaching profession while offering thought-provoking features and columns written by top professionals within the coaching community. The publication will provide articles about the following areas of interest four times per year:

- *Coach Interviews*
- *Technique and Training Drills*
- *Race Strategies*
- *The Science behind the Sport*
- *Exercise Physiology*
- *Training Theory and Methodology*
- *Biomechanical Innovations*
- *Dryland Training*

Swimming Technique has always been described as the "how-to" magazine for better swimmers. The content will continue to provide an in-depth look at all aspects related to an athlete's physiological and mechanical development.

Throughout the year, *Swimming Technique* will be dedicated to keeping coaches, committed swimmers and informed parents knowledgeable about the fine details of swimming and training innovations.

Join us on our new journey as we present our first digital issue of *Swimming Technique Magazine.*

Brent T. Rutemiller - *Publisher*

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ULTRA-SHORT RACE-PACE TRAINING

Breakthrough or a Phantom from the Past?

by Dr. Sergei Beliaev
Ph.D. in exercise physiology / methodology of sports training from Moscow National Sports University
Founder - Super Sport Systems - www.supersportsystems.com

Without a doubt the use of Ultra-Short Race-Pace Training (USRPT) has become one of the most hotly contested topics among swim coaches and Masters swimmers today. Proponents of USRPT swear by it, and detractors warn sternly about its inherent long- and short-term dangers. There are many glowing testimonials and just as many horror stories posted in blogs from coaches and swimmers who have used it.

So what's a coach to do, especially when the welfare of his athletes hangs in the balance? Although anecdotal evidence can be important, it's time to clear the air with a more rigorous analysis based on physiology, exercise science and the scientific discipline of training methodology. With that approach, we can eliminate the ballyhooing, name-calling and scientific inaccuracies so rampant in this debate, and give you enough factual evidence to actually make your own decision to use USRPT or not.

If you dig deeply enough into the training strategies incorporated in USRPT, it can easily be classified as a variation of Parametric Training. That concept and its application have been well-proven to be an extremely powerful and effective training tool, when used under specific conditions and in appropriate training phases (S. Gordon et al, 1970 – 2003. 27 separate studies).

In classic Parametric Training only one parameter (e.g. speed or distance) is held constant at a time, but this is not exactly the case with USRPT. It also deviates from the traditional Parametric Training approach in two other ways:

- Sets and their conditions are poorly defined in terms of how long athletes need to stay in specific training zones. Also in USRPT since the number of "effective" repetitions is not a known quantity, it is impossible to quantify the desired maximum adaptation effect.
- The suggested modality of executing sets is somewhat "hybrid," mixing different parametric strategies together (e.g. increasing the number of "successful" repetitions in time on one hand, and increasing relative intensity/pace on the other). According to studies (S. Gordon, E. Starodubtseva, 2005) this actually reduces the final training effect that can be achieved. Moreover, increasing total training distance under ever increasing relative intensity can easily lead to fast exhaustion of adaptation resources, which limits overall progress and the development of an athlete's true potential. This does not occur when pace alone is held constant, as in true Parametric Training.

Because USRPT is using Parametric training modality (albeit a distaff version), it can actually be effective for a limited time and to a limited extent, but only when applied as suggested (S. Beliaev; S. Gordon, M. Kredich). Once individual adaptation potential is saturated, you can expect to see "stagnation" (lack of progress or just reduced rate of progress). Actually, that is typically what happens in nearly all forms of race pace/ high intensity training (parametric studies, exhaustive strategies, Gordon et al, 1972-2003).

In reality, though, USRPT may actually favor some types of athletes, especially those with a higher distribution of fast-twitch fibers in their muscles (i.e. "bright" sprinters). That will be especially true when training at *continued on 6*

continued from 5 lower-than-usual training volumes, but the long-term effect of using a training approach like this is very questionable and most likely short-lived, due to favoring just one color in the spectrum of an athlete's preparation. Various studies suggest that prior distance-oriented training, especially in an athlete's early development phases, contributes to his ability to reach individual maximum results at a later age (e.g. A. Vorontsoff, 2000).

What USRPT isn't

Many coaches and swimmers mistakenly believe that USRPT is a training "system," but it lacks sufficient structure and organization to be classified. And it isn't a "method" either. Since there really is no scientific basis underlying its suggested course of action, or precise definition of training components, it cannot control the training process or its outcome with any degree of certainty or precision.

How valid are their claims?

USRPT authors make quite a few claims that are not entirely correct. According to Dr. Rushall ("Swimming in 21st Century," *Swimming Science Bulletin*), USRPT produces the following benefits in comparison to "traditional" (anything not USRPT) training:

Feature	USRPT	Traditional Training
Trains race physiology/fitness	Yes	No
Trains physiological capacities better	Yes	No
Primarily uses alactacid and aerobic energy	Yes	No
Varying work-to-rest ratios produces different metabolic responses. [Mixed sets are bad.]	No	Yes
Produces largest volume of beneficial work	Yes	No
Produces greatest energy expenditure	Yes	No
Produces better carbohydrate and fat utilization	Yes	No
Best developer of aerobic adaptation	Yes	No
Needed to improve maximal accumulated oxygen deficit	Yes	No
Best for developing lactate tolerance	Yes	No
Best for developing power	Yes	No
Conditions swimmers better to race	Yes	No

When these claims and comparisons are examined in depth, most are found to be at best only "partially true," while a few are simply misleading. The reality of the situation is that any form of training conditions athletes to perform better and covers most of the factors mentioned.

Well then, what can we believe? For instance is there any truth in USRPT's claim that it is "best for developing power"? Actually, we would find it hard to agree with that, since the method itself is inappropriate for power maximization. The facts are… interval training modality, especially with a large number of repetitions (6-8 or more), is hardly appropriate for developing maximal power as a rule.

Actually, the parametric training modality (which USRPT uses) is well-known for being the best way to develop "capacity" at a given level of power output. On the other hand, if we were to believe for an instant that USRPT could indeed be "the" way to achieve maximum power, that would conflict with their "core claim"… that at no time do athletes reach levels of exhaustion close to VO_2 max.

In order to maximize "power," we need to proceed to a repetitive modality with few repetitions close to full-out effort and plenty of rest in between them to allow for a comfortable recovery. This type of effort, especially with the time of each rep close to 30 seconds, leads to very high levels of lactate in the blood, and is usually chosen to develop "anaerobic" power. But the range of improvement in that department is usually associated with an athlete's level of aerobic capacity and individual lactate tolerance limits. Certain other factors contribute to this as well.

While it is true that excessive development of aerobic training prohibits anaerobic power development (J. Olbrecht, 2000), the separation of training by season phases helps to mitigate that issue. Additionally, the time required to reach peak anaerobic power is also quite short… typically only 4-6 weeks. It is also important to remember that the level of improvement in speed is limited by the level of development of other abilities (Verchoshansky, 1988, Volkov, 1991, Gordon, 2005).

In other words, speed on our main distance depends on the level of performance on ALL distances (Gordon, 2008). Additionally, the power an athlete can achieve on his main distance correlates with his current aerobic capacity levels as well. It is true that swimming at fast (race) paces with a large number of repetitions will surely tax an athlete's anaerobic capacity in a positive direction, resulting in almost immediate improvement in that department as well as his race performance.

However, these changes are short-lived and require a total reset of the training cycle after the athlete reaches saturation, which unfortunately is inevitable. That is one of the

reasons USRPT followers have mixed results.

Can it be avoided? Sure, if you include other necessary components of preparation in the training process and properly position them over time according to the season phase.

Is it really all that different?

According to Dr. Rushall, the periodization model used in USRPT is different from the "classic" approach most coaches still use (L. Matveev, 1968 - 1977, T. Bompa, 1973 - 1999). That is actually very important and quite desirable, since Parametric Training strategies work best when training stimuli are adequate to individual adaptation threshold at any given time (S. Gordon, 2005-2008, Beliaev, 2010). Once you embrace this way of thinking, you may find that new training methods, USRPT included, require rethinking of your approaches to periodization.

The author of USRPT himself believes that "high intensity training methods deny 'Principle of Pendulum' (Stress – Recovery – Stress), the main principle of conventional periodization theory." Now that's something we can agree with wholeheartedly. Including recovery days and periods in its protocols suggests that "overload" still plays a significant role in achieving desired adaptation.

So in that sense, USRPT, as yet another race-pace training method, is very similar to other high-intensity/short-effort training protocols (D. Pendergast et al, V. Selyanov, Tabatha et al) and shares the same long-term limitations observed in this category.

Then what can it do?

Some coaches believe USRPT is the best way to develop aerobic capacity, but we can't find evidence to support that… especially when compared to the results you can achieve with pure first parametric training strategy. This is because USRPT mixes increased total set distance with increased pace over time… another recipe for lost potential.

One last rabbit hole

Maintaining the "principle of specificity" is a lynchpin of USRPT, where specificity is defined as the need to swim at race paces all the time. But the commonly used interpretation of that term means something quite different. It is generally accepted that for an athlete to achieve better results, he needs to specialize and train in a selected activity or single sport, without reference to its intensity, though studies (J.E. Rink, 1985) support the idea that learning skills at desired speed can be beneficial. But USRPT takes that notion to an extreme level, and in doing that, actually violates the "principle of skills acquisition."

Accordingly, in order to control a specific movement pattern, an athlete needs to possess cognitive understanding of all of its elements. Learning skills and their elements work best by starting with separate movements, allowing full control over its quality. But control at initial phases when movements (strokes) are being learned is hard to do under high-intensity/fast-swim conditions.

Ideally, we learn to control the quality of each movement gradually, with a gradual increase of intensity. And while it is generally true that requirements of technical skills can be different at different paces, attaining proper technique at different speeds is still a gradual process, which is why we start executing various stroke elements at low speeds.

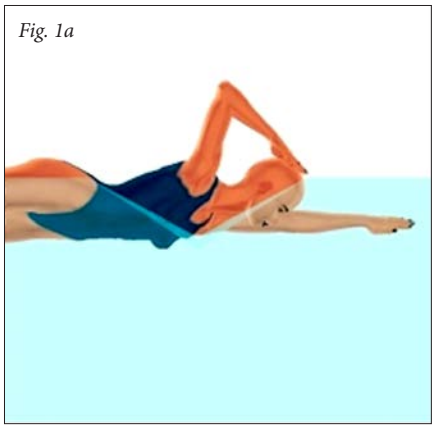
Putting it all together

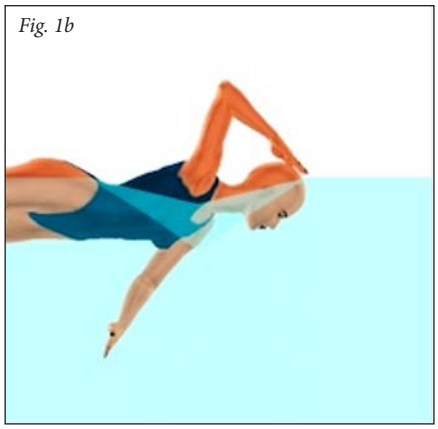
It is a known fact that any structured training program is more effective than an unstructured one. USRPT is a "semi-structured" training program that focuses on just one out of at least 4 of the elements needed to prepare an athlete for competition. Yes, it can be effective in the short-term, especially when coming from a poorly designed or unstructured program. But I would argue that this method is not as effective as other well-designed or, even better, optimized training programs in either the short or long haul.

USRPT makes many claims that just sound right to a person who is not very familiar with the laws of human adaptation or exercise physiology. But once you start checking under the hood, the "miracle effects" attributed to this program don't seem to have any real substance behind them, and seem questionable at the very least.

In the final analysis, the format provided by USRPT does not allow for intelligent management of all the factors that influence adaptation progression. Therefore, as a tool, it lacks the precision coaches need to train their athletes predictably, effectively and efficiently. And without that, there is no way for an athlete to develop his true potential.

Sorry… but in our opinion, USRPT is long on promise, short on delivery, and just too dangerous a weapon to be used across the board. ◄





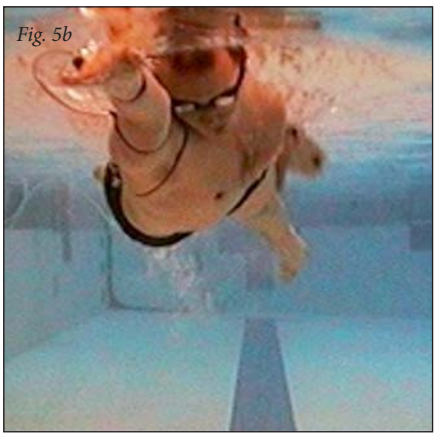


fig. 1 > ineffective "catch-up" arm synchronization (a) and effective opposition synchronization (b).

T/D

CATCH-UP FREESTYLE

By ROD HAVRILUK | Reprinted from Swimming World, January 2014

The perception that all the technique elements of fast swimmers are effective has resulted in the adoption of numerous ineffective technique elements. In reality, the fastest swimmers are often able to overcome their technique limitations because they are very strong and very well-conditioned. The twofold purpose of this series of articles (print and online) is to address scientifically the technique misconceptions that have become "conventional wisdom," and to present more effective options.

Swimming Technique Misconception: "Catch-up" freestyle is an effective arm coordination as a drill or stroke.

Definition and Identification of Catch-Up Coordination

A common swimming technique misconception is that "catch-up" freestyle is an effective arm coordination as a drill or stroke. Catch-up stroke is best defined with the Index of Coordination (or IdC) developed by Didier Chollet in 2003. Chollet explained that when the arm coordination produces gaps in propulsion (as in catch-up), the IdC is negative. In contrast, when one arm begins propulsion before the other arm finishes, there is an overlap in propulsion (also called superposition) and the IdC is positive. When there is no gap or overlap, the arms are in "opposition," and the IdC is zero.

When observed from the pool deck, catch-up stroke can be identified as one arm enters. If a swimmer has catch-up coordination, one arm is maintained in a stationary position as the other arm "catches up" (see Fig. 1a). If a swimmer has opposition or superposition coordination, one arm will already be pushing back past the shoulders as the other arm enters (see Fig. 1b).

A Brief History of Catch-Up Coordination

Catch-up arm synchronization dates back to the Japanese crawl of the 1930s. In 1955, James "Doc" Counsilman published a study that found a continuous source of propulsion (as provided by overlaps in propulsion) was superior to intermittent propulsion (catch-up stroke). Subsequent studies supported continuous propulsion for a more constant body velocity. Mitsumasa Miyashita (1971) explained that "uniform speed is more economical." Ingvar Holmer (1979) stated that superior swimming technique minimizes velocity fluctuations. Chollet (2003) reported that the IdC increases (more overlap in propulsion) with swimming velocity. Ralph Richards (2006) summarized that optimum efficiency requires continuous force ("i.e., no gaps between impulses").

Regrettably, the scientific publications have not convinced all practitioners. Many current swimmers, including some very successful ones, have a negative IdC. Their success has contributed to the enduring belief that catch-up coordination is effective. This is unfortunate, as these champions are modeled for the wrong reason. They are not successful because of, but rather in spite of catch-up stroke. Elite swimmers using catch-up synchronization have physical attributes that offset their technique limitation.

Performance Limitaions of Catch-Up Coordination

The persistence of catch-up style suggests that a thorough evaluation is required to convert remaining disciples. The science clearly shows that catch-up stroke is biome-

chanically ineffective, physiologically inefficient, anatomically stressful and counterproductive from a skill-learning perspective.

Biomechanics. At the completion of the arm entry, catch-up stroke typically positions the arm parallel to the surface. The resulting angle at the shoulder provides poor leverage to begin the pull. Because the arm is in a weak and awkward position to begin the pull, the swimmer can only generate a trivial amount of force (see Fig. 2, bottom, left). In addition, the arm begins to move very slowly, which negatively impacts the stroke rate.

Physiology. While the entry arm is moving slowly at the beginning of the pull, the other arm "catches up." The delay in beginning propulsion with the entry arm results in gaps in propulsion. When there is a gap, the body velocity slows and must then be accelerated. The fluctuations in body velocity result in an inefficient use of energy. Fig. 3 (bottom, right) shows a swimmer with a gap in propulsion after the left arm entry (from catch-up) and an overlap after the right arm entry (from superposition).

Anatomy. Maintaining the arm in position in front of the body and parallel to the surface stresses the shoulder. This position reduces the space for the soft tissue between the upper arm and shoulder (see Fig. 4, top), causing irritation and decreased blood flow, and is classically related to shoulder impingement. Torso rotation with this arm position further stresses the shoulder and increases the "time of exposure" to shoulder stress (see Fig. 5, previous page).

Skill-Learning. Research shows that faster swimmers have a higher IdC than slower swimmers and that swimmers increase their IdC when swimming faster (Ludovic Seifert, 2010). Therefore, practicing caup coordination is counterproductive from a skill-learning perspective. This applies not only to competitive swimmers, but also to beginners. Opposition synchronization is easy to learn, naturally transitions to superposition with an increase in stroke rate, and avoids having to learn a new arm coordination. Any of the professed advantages of catch-up drill can be more quickly and more precisely addressed with specific cues using opposition coordination.

Summary

Compared with catch-up synchronization, superposition coordination provides a more continuous source of propulsion for a more constant body velocity, a more efficient use of energy, less "time of exposure" to shoulder stress, and practice with the arm synchronization that is consistent with the fastest swimming. Catch-up synchronization is counterproductive both as a swimming style and as a drill. ◄

Dr. Rod Havriluk is the president of Swimming Technology Research (Tallahassee, Fla.). He also presently serves as president of the International Society of Swimming Coaching.

He can be reached at the STR website: ***www.SwimmingTechnology.com***

visit www.SwimmingWorld.com regularly to read more of Dr. Havriluk's articles on swimming technique misconceptions.

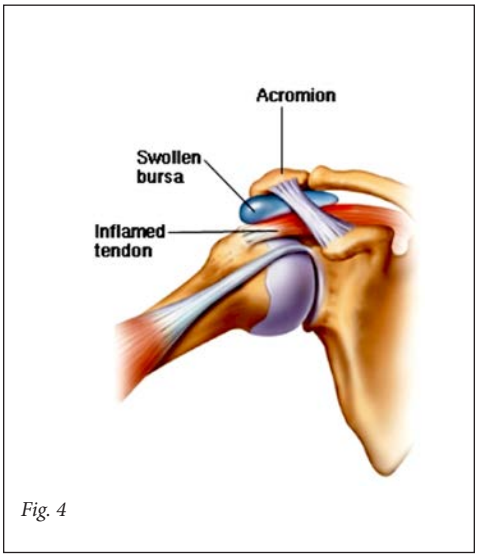


Fig. 4

FIG. 2 (BOTTOM, LEFT) > THIS SWIMMER GENERATES MINIMAL FORCE WITH THE RIGHT HAND FOR A CONSIDERABLE AMOUNT OF TIME AT THE BEGINNING OF THE STROKE. THIS IS THE RESULT OF THE POOR LEVERAGE AFFORDED BY THE ARM POSITION. THE VERTICAL GRAY LINES ON THE FORCE CURVES ARE SYNCHRONIZED WITH THE VIDEO IMAGE.

FIG. 3 (BOTTOM, RIGHT) > THIS SWIMMER HAS A GAP IN PROPULSION (AFTER THE LEFT ARM ENTRY) AND AN OVERLAP (AFTER THE RIGHT ARM ENTRY). THE VERTICAL GRAY LINES ON THE FORCE CURVES ARE SYNCHRONIZED WITH THE VIDEO IMAGE.

FIG. 4 (TOP, RIGHT) > WHEN THE SPACE BETWEEN THE BONES OF THE UPPER ARM AND SHOULDER IS REDUCED BY ARM ELEVATION, THE SOFT TISSUE IS COMPRESSED AND CAN CAUSE TENDINITIS.

FIG. 5 (PREVIOUS PAGE) > (A) SHOWS THE ARM POSITION THAT STRESSES THE SHOULDER AT THE COMPLETION OF ARM ENTRY DURING CATCH-UP STROKE. (B) SHOWS HOW THE SHOULDER IS FURTHER STRESSED WHEN THE ARM POSITION IS MAINTAINED AS THE TORSO ROTATES.

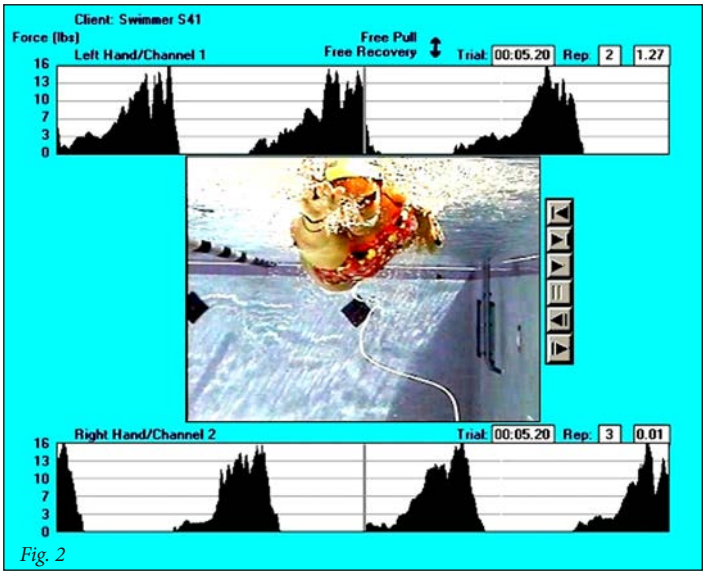


Fig. 2

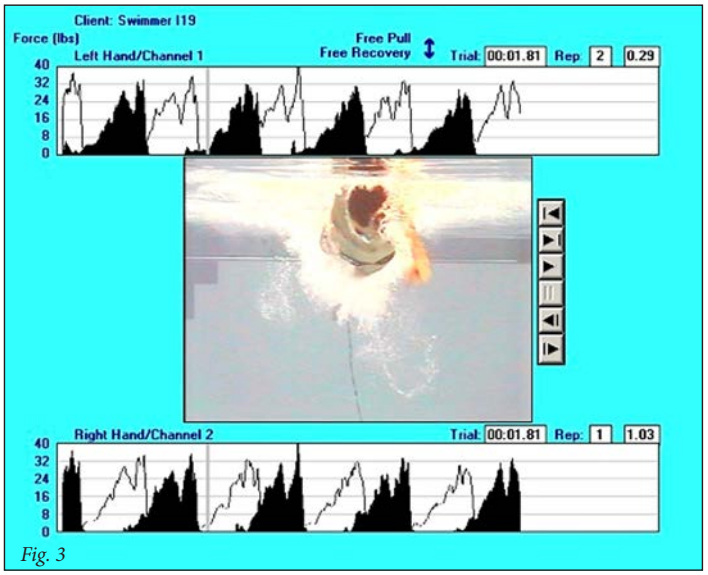


Fig. 3

DL

DRYLAND EXERCISES FOR THE BEGINNER

BY J.R. ROSANIA | PHOTOS BY KAITLIN KELLY
DEMONSTRATED BY SAMANTHA CALDWELL AND J.R. ROSANIA

Just in the last five years, dryland training for swimming has gone mainstream!

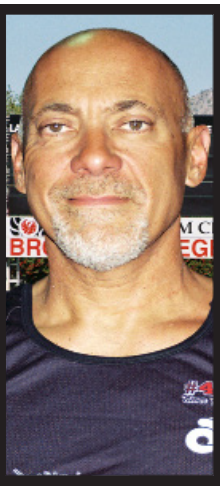
The best swimmers in the world now spend as much as six hours a week training "out of the water," doing dryland performance training. Years ago, only a few swimmers engaged in activities out of the water such as weight training.

Today it seems every swimmer is now seeking some form of resistance training—from Olympic medal winners to the "Weekend Warrior," from the pre-teen swimmer to the college performer.

Never before have I seen such a demand for dryland training for swimmers. In 1999, I was part of a team of coaches who worked with Misty Hyman. Together we developed a training program that would help her win the gold medal in the women's 200 fly at the 2000 Sydney Olympics. Since then, I have worked with thousands of swimmers of all ages and abilities to achieve their very best through resistance training.

Here are five great dryland exercises for the beginner level. Perform two sets of 20 reps per exercise.

In the following months, I will offer more dryland exercises that, if done correctly, will certainly improve your swimming performance.



J.R. Rosania, B.S., exercise science, is one of the nation's top performance enhancement coaches. He is the owner and CEO of Healthplex, LLC, and has finished the Ironman Triathlon 18 times. He also serves as Swimming World Magazine's fitness trainer and was named one of "America's Top Trainers" by Men's Journal and Vogue magazines. Check out Rosania's website at www.jrhealthplex.net.

1

PHYSIO BALL ALTERNATING DUMBBELL BENCH PRESS

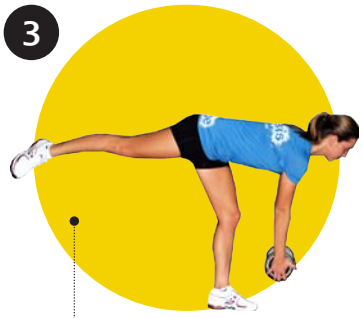
Lying on your back on the physio ball, perform a one-arm bench press movement while alternating your arms.

2

PHYSIO BALL DUMBBELL PULLOVER

Lying on your back on the physio ball and holding one dumbbell, keep your arms straight as you slowly lower the dumbbell behind your head until it is parallel with the floor. Raise your arms back to the starting position.

3



SINGLE LEG DEAD LIFT

Holding a medicine ball or light dumbbell, stand on one leg and lower the weight to the floor slowly. Keep your opposite leg straight and parallel with the floor. Return to the starting position.

4

BOX JUMP

Standing in front of a box onto which you can jump safely, first lower into a squat position and jump upward onto the top of the box.

MED BALL START JUMPS INTO STREAMLINE

While holding a med ball, lower yourself into your normal starting position on the blocks. Explode upward and forward into a vertical jump.

5

Originally Printed in Swimming World - July 2013

AVICTOR

THE ULTIMATE ADVANTAGE.

MEGAN ROMANO | WORLD CHAMPIONSHIP GOLD MEDALIST

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Leading-edge technology causes water to surround the fabric, rather than saturate it. The hydrospheric effect optimizes the swimmer's position in the water, thus reducing drag and maximizing speed and efficiency.

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T/D

Breaststroke Pullouts

Take Your Pullouts to the Max With These Simple Steps.

by JEFF COMMINGS

Photos By Christopher Rattray | Demonstrated by EETU KARVONEN

ORIGNALLY PRINTED IN SWIMMING WORLD, JANUARY 2014

In a short course pool, the underwater breaststroke pullout makes up about half of the race for elite swimmers, so it's a very important part of a breaststroker's arsenal. Even in a long course race, the pullout can make or break a swimmer's potential to win a race. Here are the six phases of the underwater pullout that are keys to success.

Eetu Karvonen won the 100 and 200 yard breaststrokes at the 2012 and 2013 NCAA Championships, setting Division II records in both while swimming for Grand Canyon University. He represents Finland internationally, most recently competing in the semifinals of the 50 breast at the World Championships. Read his blog at: www.eetukarvonen.com

STARTING THE PULL

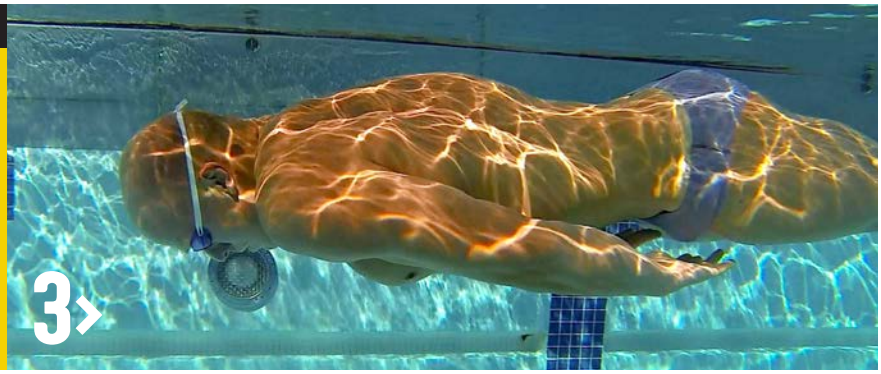
*As you begin the pulldown for the one underwater stroke permitted after the start and each turn, the hands are just outside of the shoulder line. Keeping your elbows high, accelerate your hands as they grip the water and as you pull down and back to your hips. If you're looking to put the one dolphin kick you are allowed into the start of the pull phase, you should do it just before you initiate the pulldown, but **after** the hands have separated from the streamline position.*

PROPULSIVE PHASE

*Make sure to bring your hands together at the strongest part of the underwater pull, doing so just as your hands pass your diaphragm or the lower part of your breastplate. Also, keep your wrists strong to maintain the hold your palms have on the water. Keep your palms facing back toward your feet at all points during the pulldown, and push back to the hips. If you choose, you can put the single dolphin kick here, **but remember: only one dolphin kick per underwater pull!***

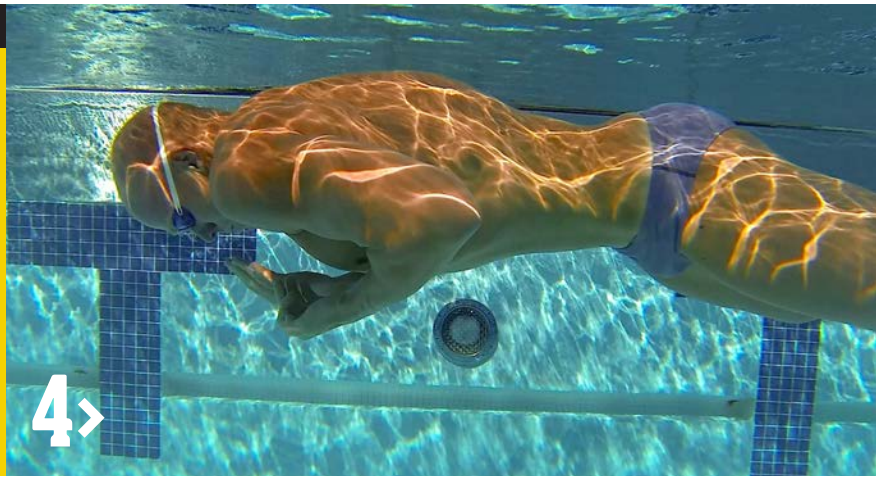
GLIDE PHASE

How long you glide at this point in the underwater pull depends on the length of the race, your position in the water and the speed you carry into this phase. Once you've finished the pulldown, keep your hands close to your body to reduce drag. Suck in your stomach and keep your head in a neutral position, looking directly below you. Shrug your shoulders up to your ears to reduce drag even further.



RECOVERY PHASE

This is the part where poor technique can bring you to a complete stop. As you bring your hands and arms forward to prepare for the first stroke, slide them up your torso, keeping your elbows close to your sides. Your palms should face upward until they pass your face, allowing you to stay streamlined. Make the recovery quick—you want to spend as little time in this phase as possible! Your breaststroke kick happens at this moment as well, and the faster you move your hands, the faster and stronger your kick will be!



SETTING UP THE FIRST STROKE

The biggest mistake you can make at this point is lifting your head to see how deep you are in the water. Lifting your head creates drag and ruins the perfect bodyline you've been holding for the entire pullout! To ensure that you are neither too deep nor too shallow after your pulldown, keep practicing to find the ideal depth on the push off the wall. Too deep, and you will find yourself gliding too long to reach the surface. Too shallow, and you will be pulling along a surface wave that slows you down drastically.

BREAKOUT

Even the best breaststrokers in the world occasionally have pullouts that are less than ideal. When that happens, they improvise with their body position so that their first stroke carries as much of the speed they generated off the wall and during the pulldown as possible. Don't be lazy on your first stroke!

RS

MASTERING THE MEDLEY

Coaches Gregg Troy, Michael Brooks & Tony Batis discuss how swimmers can strengthen a weak stroke to win the 200 IM.

by MICHAEL J. STOTT

REPRINTED FROM SWIMMING WORLD, SEPTEMBER 2013

Cal's Teri McKeever says that Gregg Troy is the best IM coach in the world. So is it any wonder that a highly successful Michael Brooks at the York (Pa.) YMCA shares some of Troy's views on training and swimming the 200 IM?

At April's YMCA National Championships, two of Brooks' swimmers, 14-year-old Meghan Small (meet record, 1:58.85) and 17-year-old Niki Price finished 1-2 in the event.

"I'm a big believer that all age group programs should be medley-oriented," says Troy. "No matter how good you are in one thing, you can benefit from swimming all four strokes."

Why? "Because as bodies develop, strokes that might have once been the best or weakest can change dramatically," he says. "From an age group standpoint, that is very important."

At Bolles and at the University of Florida when Troy found a medley candidate, he devoted blocks of training time to strengthen the swimmer's weakest stroke, treating it as if it were the swimmer's primary stroke. They then rotated through the other strokes based on observations made in competition.

"In high school, it might be a three-to-12-week training cycle. We were always cycling through blocks, training segments that could vary by season or time available. Looking more long-term, you might vary by a year or a half, depending upon the individual and his goals.

"To me the biggest problem comes when you identify a weak stroke. Athletes drill it, do technique work, swim it, but they don't train it. I tell my medley swimmers if your weak stroke is backstroke, then you need to train with the backstrokers on backstroke day and on the backstroke intervals—not some special interval because you are a weak backstroker," he says.

In Brooks' program, everyone is expected to work his or her weakest strokes. "One's best stroke may be 99 percent as good as it is going to be while the weakest may be only 50 percent of optimal. That represents the opportunity for greatest improvement," he says.

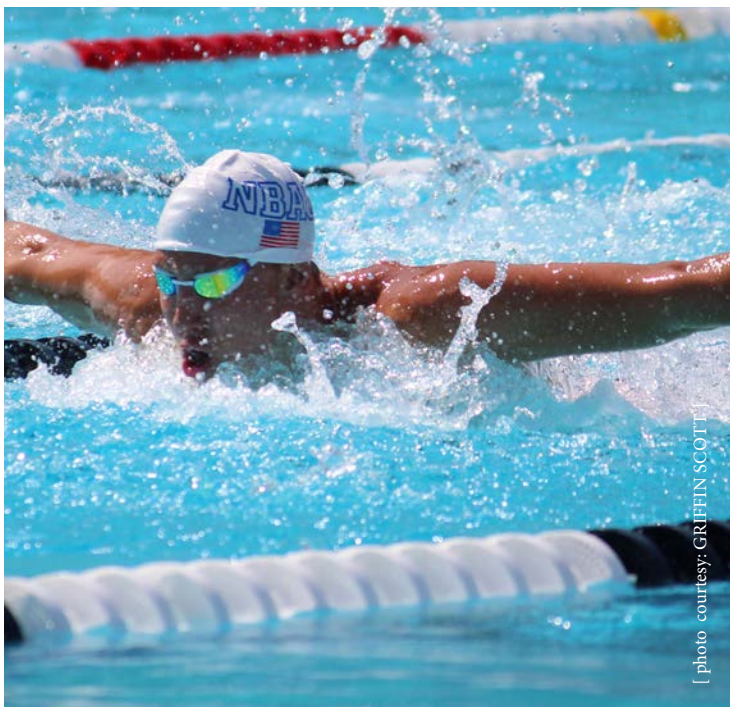
Brooks does a lot of major/minor stroke training as opposed to straight IM. Extra practices are devoted to weak stroke, but the critical ingredient to a swift 200 IM is "swimming fast in practice. For us, all four strokes are training strokes. Everybody is expected to do the program, so you can't get out of breaststroke just because you are terrible," he says.

Areas of Focus

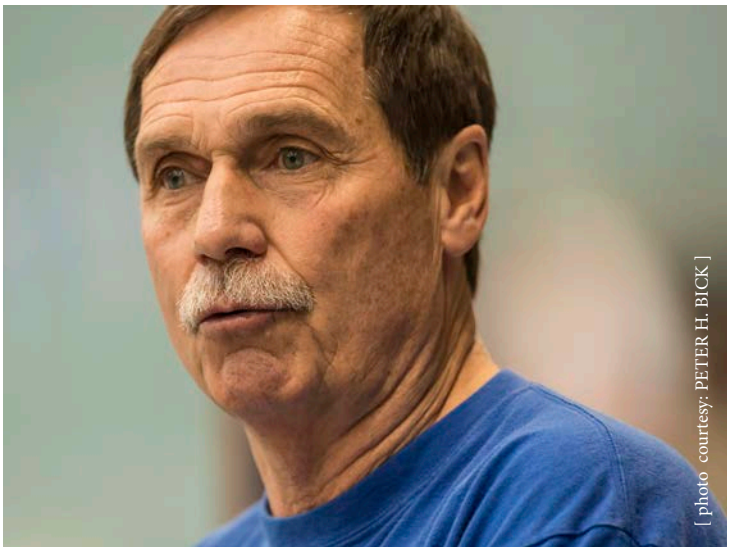
At Palo Alto Stanford Aquatics, head coach Tony Batis treats weak strokes as "areas of focus," especially in the fall when his swimmers train all strokes. When athletes are given choices, they are encouraged to swim their weak stroke. "We want them to believe that all strokes are improving and that we are continually working on minimizing the gap between their strongest and weakest stroke," he says.

From a technical standpoint, Batis looks to Ikkos, a video stroke system that allows coaches and swimmers to watch strokes in slow motion and make technical adjustments to movements in the water.

"It is important that the foundation of what you are trying to create is emphasized early and often," he says. "Mentally, we stress that all strokes need to be proficient, and we are on a continuous journey to make it happen. Some athletes will



[photo courtesy: GRIFFIN SCOTT]


[photo courtesy: PETER H. BICK]

eliminate their weak stroke quickly, while others will take a lot longer. In either case, you are still striving to refine and improve what they are working on."

Is there an Achilles heel for IMers? Brooks suggests it is breaststroke, mainly because those who struggle are often plagued by a lack of hip, knee and ankle flexibility.

"It's usually not the pull that is the problem, but the kick," says Brooks. "Swimmers can improve by judicious stretching and making the best of what they have as opposed to taking the day off when they have a breaststroke kick set."

Batis thinks of breast as the stroke most beneficial to a good or great IMer. "You can disguise most weak strokes in an IM, but a bad breaststroke is hard to overcome. It is the launching point for the back half of your race and a place where a strong move can be made," he says.

Transition Swimming

Brooks and Troy believe that the stroke right before one's weak stroke is critical. "You do not want two weak strokes together. So whatever is happening right before your weak stroke better be good because you want to be going into the weak stroke from a position of strength," says Brooks.

"We do a lot of transition swimming," says Troy. "I think the weak stroke is not always what it appears to be. Many times people say, 'I've got a weak breaststroke,' but when you pull them out of the medley and they swim breaststroke, they are mechanically sound and they do the right things, but the breast split on the IM is not what it needs to be."

There can be three reasons for that, observes Troy.

"Some people just don't transition well from one stroke to another in any sort of rhythm. Others may not be physically fit enough to swim it. By breaststroke, they are just tired. That's where just swimming and training more breaststroke makes a difference.

> *"I'm a big believer that all age group programs should be medley-oriented. No matter how good you are in one thing, you can benefit from swimming all four strokes." - Gregg Troy*

"The third reason, and one that people often miss when the breaststroke mechanics are sound, is that they've swum butterfly so fast that they are worn out when they get to breaststroke. Their energy use in fly is not appropriate to the rest of the race. In order to get into the race, they are swimming faster fly than at any other time, and it shows up in the breaststroke leg. In that case, the person's weak stroke is butterfly—and very few IMers consider fly their weak stroke. The really good IMers control the fly leg. Those who go all out don't get any benefit from it," he says.

A Power Event

Troy is adamant that the short course 200 IM is a sprint.

"No two ways about it," he says. "If an athlete really wants to swim the 200 IM, he can disguise almost every weakness because it is very much a power event. It is about transition turns. We tell all of our athletes if you are a weak breaststroker, you don't have to do breaststroke in the IM, but you have to turn like a breaststroker. If you have a weak backstroke, you have to turn like a backstroker.

"If you are really good with your turns and underwaters, so much of the race goes away that it is not a weakness. You can brute-force yourself to where you need to be. In the 400, you cannot get away with that."

In Gainesville, all Gator medley swimmers spend two mornings a week almost exclusively on backstroke and breaststroke.

"To me, that is the succeed part of the race from a technical standpoint. What you do in the middle, how you manage your energy systems, turns and get to the next stroke is key," Troy says.

Troy recommends pulling for swimmers whose fly and back are the weakest parts of their medley.

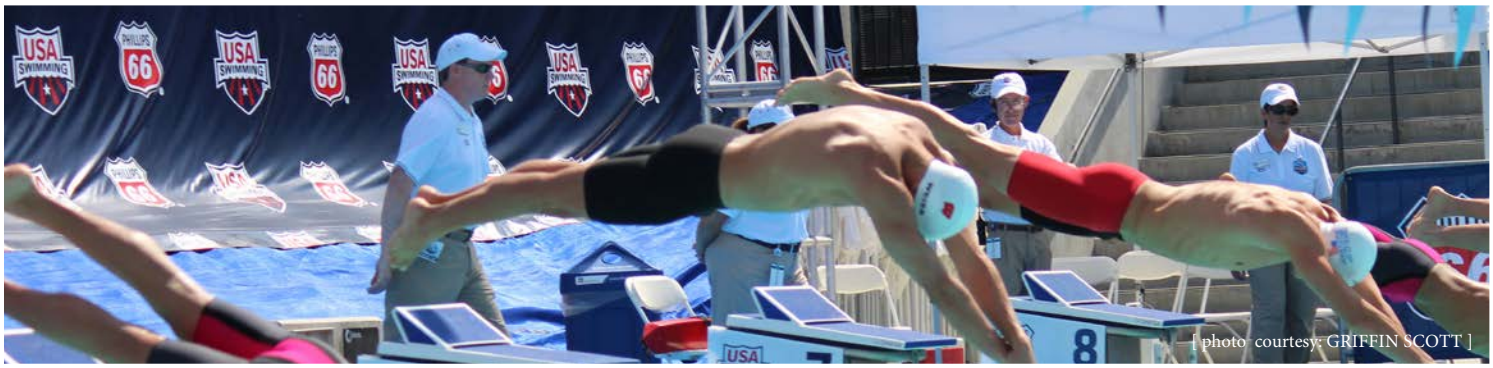
"You can pull those strokes a whole lot because the idea is to conserve energy in the front half and still be fast. You can learn that by pulling a lot of butterfly and especially backstroke. But you can't pull it slow. You have to pull it fast so it is race-relevant," he says. ◄

Michael J. Stott, one of Swimming World Magazine's USA contributors, is based in Richmond, Va.

T/D

THE ART OF THE START

by MICHAEL J. STOTT | ORIGNALLY PRINTED IN SWIMMING WORLD, OCTOBER 2013



[photo courtesy: GRIFFIN SCOTT]

DISCLAIMER: TO ENSURE MAXIMUM SAFETY, PRACTICING AND PERFECTING RACING STARTS SHOULD BE DONE ONLY UNDER THE DIRECT SUPERVISION OF A QUALIFIED PROFESSIONAL COACH/TRAINER.

Dave Robertson, International Swimming Hall of Fame coach (New Trier High School, 1946-76; Waubonsie Valley High School, 1977-87) and founder of the Illinois Swimming Coaches Association, always espoused, "Be first off the block, then improve your position." While start techniques have changed in recent years, the basic concept has not.

• • •

David Marsh, CEO and director of coaching at SwimMAC Carolina, produced a DVD series (Swimming Faster) while winning 13 NCAA team titles at Auburn. In the video, "Starts for All Strokes," he details start essentials that allow an athlete to be proactive by carrying the proper body line and power into the water and maintaining it through the breakout.

"Off the blocks, the separate elements are pulling arms, attaining and maintaining the line, establishment of the kick, separation from the water and transition into the swim. These days, no one should come up before 10 meters," he says.

SwimMAC swimmers do starts religiously, practicing in 10 feet of water, learning positioning, mastering angles and modifying techniques until comfortable. Marsh has beginners progress from the knee to the deck to jumping drills from the block.

"These days, so many kids crawl to the blocks," he says. "They need to spend time getting comfortable there, standing tall, taking deep breaths, focusing on the other end and getting ready to go."

• • •

At the University of Cincinnati, Monty Hopkins coached 2010 NCAA 50 free champion Josh Schneider. He believes the start "is a symphony beginning with the walk toward the blocks—or even the ready room—to when you remove your warm-ups to when you finally reach free swimming speed." He recalls seeing a swimmer the day before a national meet, sitting on the bench behind the blocks fully dressed.

"Next, he prepared the block to his preference, wiping off the top and edges. He went through everything from taking off his sweats and folding them to checking last-second details before approaching the blocks," says Hopkins.

"Then he got up, did a start, swam a little, got out, got dressed and repeated this whole sequence a couple more times. I was impressed that he was leaving nothing to chance. Of course, on race day this should all be automatic."

Hopkins suggests that athletes:

- *Do starts on a regular basis (UC swimmers do five starts in at least three practices per week).*
- *Choose a style and perfect it. Design your start around what you do best.*
- *Be relaxed and comfortable pre-start.*
- *Have a clear mind on the block, and then just react!*
- *Emphasize quickness, leading to explosiveness, in all the little things.*
- *Have the head lead the body with hips in front of the feet moving on the flight line.*
- *Stand tall on the block prior to the command, "Take your mark."*

Hopkins believes reaction time is important, but not to the exclusion of hitting swimming speed as far down the pool as possible.

"If you have a swimmer who gets off the platform under .6, that's great, but if that same swimmer is already swimming at 10 meters,

it's probably not worth it," he says. "My first mentor coach, Mike Arata (Mariemont High School, Cincinnati, Ohio), used to say, 'The last thing you want to do in a swimming race is swim."

• • •

Brian Reynolds has coached at Drury University for 31 years and has won 20 men's and women's NCAA Division II titles, including both in 2013. Strength, physics and film are intrinsic to the Panthers' success. Like Marsh, Reynolds emphasizes a chest-up and flat upper back angle alignment as swimmers leave the block.

"You have to be strong to generate force off the block, and the two essential physical elements for a good start are good core strength and strong back muscles. We are in the weight room a lot," he says.

Reynolds uses film—especially freeze-frame—to address specific athlete weaknesses: "I like swimmers to pull themselves off the block, throw their hands back and have the arms come up under the body and out front upon entry, moving into a dolphin, then a flutter kick to a strong breakout."

> *"They need to spend time getting comfortable there, standing tall, taking deep breaths, focusing on the other end and getting ready to go."*
> *- David Marsh*

This year, Drury's Vladimir Sordikin won D-II titles in the 50 (20.05), 100 (43.28) and 200 (1:36.77) yard freestyles. "He was a big strong guy," says Reynolds. "With him, I worried less about reaction time (.71 on his 100 and .73 on the 200) than his angle of entry and his speed to the 15-meter mark."

History Lesson

Rowdy Gaines was the only swimmer to use the track start in the 1984 Olympics. "I changed my start dramatically in 1982 after they instituted the no-false-start rule," he says. "I did it primarily to give me stability on the blocks. It enabled me to get more power off my back foot and use my arms to gain propulsion."

While Gaines agrees that proper alignment, entry and speed into the water are important, he is adamant that reaction time is paramount: "If you don't have good reaction time, you are not going to have a good 15-meter time. There was nobody better in the world in the first 15 meters than Bill Pilczuk, and it all started with his reaction time. I've always felt that first breakout stroke was the most important because it sets the momentum for the length. That's another reason he was so good. Bill had an explosive first stroke."


[photo courtesy: SCOTT GRANT/ SWIM CANADA]

Pilczuk, Savannah Swim Team junior national coach, is a former Auburn swimmer who knocked off Alex Popov in the 50 free at the 1998 World Championships. He notes that the wedge has altered the starting paradigm: "The wedge is showing us how to start using the force of the back foot with an arm pull. I'm a big believer in track starts because I've never seen a legal grab start with a faster time to 15 meters."
Pilczuk's keys begin with flexibility of the hips, legs and back.

"If you can't get into a start position and remain loose and ready to fire out, you will not get a good jump or fast reaction," he says. "To do that, you need to work on jumping. And then it is all about power and velocity off the block with angle of attack on entry and transition, holding speed.

"Reaction time isn't nearly as important as velocity off the blocks—and even less with the wedge. Now you'll find that everyone is about .5 to .6 on reactions at the top end with the wedge. Take the wedge away, and it's a little more critical. The best starters need about .6 to develop the velocity with the pull without the wedge; .8 is considered slow for the big guys.

"Anything below .8 is good, .6 is great, .7 is average, but the key is holding a lot of velocity into the hole, then holding that speed through the transition. At breakout, swimmers need to hold transition speed and not slow down until they are actually about three strokes up.

"Men and women have slightly different starts. Technique depends on an individual's center of gravity—how strong their arms and legs are so they can move that CG," he says.

Pilczuk maintains drills for starts depend upon swimmer needs: "I like dryland starts and dive-and-glides. All swimmers over age 14 should be able to make it to 15 meters with no movement. Drills that focus on the arm pull and back foot push are also great. Runners, if done properly, help maintain the speed in the water." *continued on 18*

[photo courtesy: SCOTT GRANT/ SWIM CANADA]

continued from 17

Going Backward

Excellent reaction time and explosive first strokes are critical for the backstroke as well. Two-time Olympic medalist Nick Thoman offers these tips for excelling at dorsal starts:

"When starting, I try to keep my hands, shoulders, hips, knees and feet in line. This is especially important for young women as they have a tendency to put their feet wide and knees in close. That makes it virtually impossible to get a powerful jump.

"I like to keep my head and spine in line on my start so I have much less to uncoil. That way, I am already in my streamline body position so I don't over-extend in the air.

"Reaction time can be hit or miss, so I'm all about getting myself in a good setup on the wall for a powerful start and a great body line so I can get to 15 meters efficiently and quickly.

"Without a good start and entry, you cannot have a great angle for the breakout. You don't want to be too steep or too shallow because angle of entry and resulting streamline dictate the angle of your breakout," he says.

There are many exercises to hone the backstroke start. Two Thoman favorites are the in-water "seat-drop" drill that accentuates distance off the wall. On land, he favors streamline squat jumps, touching the ground on each rep at the bottom and seeking a perfect streamline during the jump.

Pilczuk notes that initial block position on the backstroke start varies a lot, depending upon swimmer size.

"I've seen a flat back and high pull work very well for athletes six feet tall, but lower traditional starts tend to be the preference for taller athletes. Either way, it's about getting into the dolphin kick and getting up on the water with speed," he says.

"All the little details need to fit and arrive in a common point of effectiveness," asserts Hopkins. He favors swimmers who completely clear the surface, commit to an aggressive 'upside-down' dive and excel at all underwater techniques, especially kicking.

So, is there a difference in starts for a sprint versus mid or long distance?

"The start is always about maximizing time until the swimmer arrives at free swimming speed," says Hopkins. "For sprint races, that is a larger proportion of the total race time. A sprinter who swims the 50 meters in 22.0 may spend 15 to 20 percent of his race before degrading to swimming velocity.

"A distance swimmer doing the 1500 in 15:00 only spends .004 percent of the race before arriving at swimming speed. It may be more important for the distance swimmer to smoothly and cleanly get into the water with as little stress as possible, while for the 50 sprinter, the start is potentially 20 percent or more of the total outcome."

Back to the Future

Swimming has come a long way since Doc Counsilman's primitive use of film for stroke analysis. These days, thanks to digital advancements and social media, there is a plethora of visuals for coaches and swimmers.

Hopkins views general athleticism as a beginning platform for teaching great starts: "After establishing and mastering the basics, coach and swimmer should strive to custom-tailor techniques to an individual swimmer's skill set. Subsequent repetition and purposeful practice will elevate a swimmer from reactive to proactive."

"The start is never going to be perfect," says Gaines. "It is one of those things that you have to practice over and over." ◄

Michael J. Stott, one of Swimming World Magazine's USA contributors, is based in Richmond, Va.

DRYLAND TIPS
with G. John Mullen

[photo courtesy: SWIMMINGWORLD.TV/CENTER FOR OPTIMAL RESTORATION]

Many believe core training is beneficial for swimmers, yet the research is lacking on this notion. Other studies and sports have found positive associates with core training on throwing accuracy and proprioception (Lust 2009). In fact, studies have suggested throwing velocity can improve about 4.9 percent in handball players (Saeterbakken 2011). Balance has also been suggested to improve with core training (Sandrey 2013).

Only one study (Weston, 2014) has trialed core strength and swimmers. In this study, 20 national-level junior swimmers (around 16 years old) were split into either an intervention or control group. The intervention group completed core training, which included lumbo-pelvic complex and upper region extending to the scapula three times per week for 12 weeks. The core training group had a significant improvement in the 50-meter swim (about 2 percent improvement) as well as on land tests. Peak EMG activity also increased.

Many core exercises exist to help diversify dryland training. Try this walking plank exercise in your next dryland routine!

Directions: Form a pillar or bridge by supporting your body on your stomach with only the feet and forearms touching the ground. Next, keep your body straight with the elbows directly beneath the shoulders, the hands flat on the floor and the head looking down, and contract your quadriceps and glutes with your feet pointed. Next, step forward with your arms, attempting not to move your hips side to side. ◄

TO SEE VIDEO OF THIS EXERCISE IN ACTION, CLICK HERE

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BLAST FROM THE PAST

Every issue, Swimming Technique will dive into the archives of Swimming Technique Magazine to bring you a look back at what was considered forward-thinking swimming philosophies and theories. Was it something way ahead of its time, or completely off the wall? Read and see for yourself.

RS T/D

RETHINKING SPRINT BREASTSTROKE

Should sprint breaststrokers breathe every stroke or use alternate breathing? The suggestion is made that there is a benefit to alternate breathing, while Olympian Mike Barrowman offers his reaction.

by WAYNE McCAULEY | Originally Published in the Oct - Dec 2001 Issue of Swimming Technique Magazine

The Proposal

Why do swimmers breathe every stroke in the 50 and 200 short course breaststroke races? Coaches say, "Breathing is part of the biomechanics of the stroke. Therefore, why not?"

That answer is not good enough for me.

Consider the facts derived from scientific research and published by the American Swimming Coaches Association:

- Breaststroke requires more strength (power) than any other stroke, including butterfly.
- Anaerobic glycolysis is the primary energy system used for the first 40 seconds of a sprint. This encompasses all 50s. Discounting the dive, 40 seconds accounts for about 75 to 80 percent of the 100 yard breaststroke. The fastest men's 100 yard breaststroke is 51.86; the women's record is 59.05.
- More coaches are teaching breast and fly together as the short axis strokes: "pressing the T," "the outstroke is identical in both," the butt rises in both, the minute the butt sinks, swimmers using both strokes start swimming "uphill" instead of the desired "downhill."

The speed generated by college sprint breaststrokers is amazing: there have been numerous relay splits of sub-23.5 for short course yards. Jeremy Linn's split was 24.28

Mike Barrowman [photo courtesy: BILL COLLINS]

on the way to his amazing 52.86 American record for the 100 yard breast in 1997. Even Masters swimmers at age 52 have done 28.0 for 50 yards.

Mark Wamecke of Germany owns the 50 short course meters world record at 26.70 from 1998. The record for the 100 is 57.66 by Ed Moses (who also set the 200 breast record of 2:06.40 one day later).

In addition, Moses also holds the long course WR in the 50 meter breast with a 27.39 from the U.S. nationals in March. And in the 200, Russia's Roman Sloudnov became the first man to break a minute when he went 59.97 in June. He later lowered that to 59.94 at the World Championships in Fukuoka, Japan.

How can these times be improved?

Probably not by strength alone—former breaststrokers Steve Lundquist, Richard Schroeder, John Moffet and Linn were probably some of the strongest swimmers ever to race. Dimitri Volkov won the Olympic 100 breast in Seoul and had, perhaps, the best start and underwater stroke in history; likewise, Penny Heyns among the women. Increasing already strong men's and women's flexibility to improve streamlining can certainly help to better these world records. And we must always work on reducing water resistance.

Consider This...

I propose another idea for sprint breaststroke: how about rethinking the idea of breathing every stroke?

Coaches do not insist that their freestylers and flyers breathe every stroke. In the 50 fly, more than two breaths will cost a swimmer a race because someone will breathe less and win.

It has been established that we use the anaerobic glycolysis for the first 40 seconds of a race. This means we are using energy stored in the muscles (CP) and energy stored in the liver (glycogen) for the first 40 seconds. This can occur without any oxygen (anerobic), meaning we don't need to breathe at all for 40 seconds!

So why not breathe every other stroke or every third stroke in the 50 and 100 breaststroke races?

The reasoning for not breathing every stroke in butterfly also applies to breaststroke. Too many breaststrokers have too much vertical force. By not breathing, the head and body remain in a position where the swimmer can apply more horizontal force (swimming "downhill").

Let's discuss the 50 breast first.

Breaststrokers cut their underwater timing by 1-2 seconds to maintain race speed, get to the race stroke and "power" the swim. The problems begin when swimmers break their streamline early to breathe on the first stroke up (after breaking the surface of the water).

I advocate not breathing at all on the first stroke up—it's only five to seven seconds into the race, and it should be the most powerful part of the entire race. By not breathing on the first stroke up, we accomplish two things:

- We can maintain our streamline by not coming up so high out of the water;
- We can concentrate more on the first and second arm sculls to keep a more horizontal force component.

The first stroke up is so very important—more races have been lost at this time when swimmers concentrate on the first breath instead of the pull (scull).

Different Breaststroke Styles

I am currently a Masters swimmer who swims breaststroke, and I have experimented with the stroke for 35 years. I was always best at the 200 and horrible at the 50.

In the 1960s, I swam the Russian style of breaststroke when most U.S. swimmers were trying to be like Chet the "Jet" Jastremski. I know close to 55 different breaststroke styles, such as undulating, flat, chicken wing, Russian, "Chet the Jet," the wave, etc.

Only when I started practicing and racing the 50 breast by breathing every other stroke did my 50 times come down. And, boy, did they ever! I dropped two seconds and achieved a Masters All-American ranking. I even won a Masters national championship in the 50 breaststroke!

It seems that more and more Masters breaststrokers are swimming their races by breathing every other stroke. Almost everybody who does reports a drop in his time. I have also experimented with age group girls (ages 10-13), and they have dropped their times by one second per 25.

Swimmers need to have fast hands and fast feet for the 50, without any slipping. By concentrating on the sculls and not breathing, the sculls become faster with more power output.

If anaerobic glycolysis is the energy system used for the first 40 seconds, there is probably no reason to breathe at all in the 50. Probably the only reason is to exhale carbon dioxide to delay the effects of lactic acid and acidosis. This will help in your next race, but not in the 50 you are swimming or just swam. The 50 does not begin to produce acidic blood pH like it does in the 200 breast.

I foresee 23-flat splits for the 50 yard breaststroke leg of the men's college 200 medley relay if swimmers use two or three strokes between breaths. And in short course meters, I believe a 26-flat for the men's 50 breast is possible.

What about the 100 meter long course breaststroke in the Olympics? The fastest split is not Lundquist's from '84 or Frederic deBurghgraeve's in '96. It was Russia's Dimitri Volkov's 28.12 in 1988. He swam that fast because he had the best start and underwater stroke in history. He was the last swimmer to break the surface after the start of the race, but he emerged over one body length ahead of the field—streamlining and body position are everything! *continued on 22*

continued from 21 I maintain that a properly trained breaststroker who breathes every other stroke could go out in 28.0 and come back in 31.5 for a 59.5 long course meters breaststroke. Too many times I have seen races won in 1:01 with a swimmer sprinting hard at the end, but with lots of "gas left in the tank" because he went out in 29+.

High school and college coaches should be the first to benefit from this new thinking in sprint breaststroke. Teach the drills to freshmen and sophomores, and by the time they are seniors, they'll be record holders.

Recommended Drills

- *Forward eggbeaters (25 yards), all-out pumping each leg. This helps develop speed and leg endurance.*
- *All-out sculls (25 yards), with Zoomers or other fins, using dolphin and flutter kick. This helps develop hand speed and awareness of water speed as well as streamlining at above race speed. Have your swimmers try to break 10 seconds.*
- *Sprint full stroke (25 yards) completely underwater, all-out.*
- *Dive 12.5 yards with no breath on any strokes.*
- *Push-off and dive 25 yards, quick underwater and no breath first stroke up, then breathe every other stroke.*

Sprint breaststrokers should always do their sprints during the first 30 to 40 minutes of workout because studies have shown that after 20 to 30 minutes, the fast-twitch muscle fibers were completely depleted of ATP-CP, and slow-twitch fibers use their ATP-CP more sparingly, so only slow-twitch fibers are still available for work.

You cannot use anaerobic glycolysis at the end of a workout because there is no glycogen left for sprinting. And you must use anaerobic glycolysis for your sprint breaststrokers. Do lots of dryland training and lots of plyometric training for sprint breaststroke. Convert all the muscle fibers you can to fast-twitch. Train the anaerobic systems. Improve the ATP-CP within the cells and muscles. Do much of the drills at SP 1, SP 2, SP 3 and EN 3. Train them as you would a sprint freestyler, but remember that the breaststroker needs to be stronger.

Another important thing to consider is the taper. Freestylers, flyers and backstrokers can use Zoomers to exceed race pace speed in order to work on race pace streamlining, breakouts, etc. But there is nothing available to breaststrokers except assisted pulling devices—and I believe they do not work properly for breaststrokers, anyway. If you eliminate the timing between the sculls and the kick, you are not swimming the same stroke.

The hardest thing for a sprinter to master is the feel of the water after shaving down. Everything feels strange and out of control. Try having your breaststroke sprinters shave down a week before the big meet—at the point of the taper when things are starting to feel good again.

This accomplishes two things:

- *It allows them to train at race speed;*
- *It allows them to adjust to the faster speed in the turns and under water stroke.*

The shave-down on race day will still produce the desired results—it's just that your swimmer will swim under control.

In conclusion, breaststroke has always been a thinking person's stroke—so how about swimmers and coaches rethinking breaststroke ?

The Reaction

Mike Barrowman: Clearly, the author has the right idea regarding how the body functions. And he's not placing emphasis on the wrong races.

The 50 breast may, indeed, work with less than one breath per stroke. The 100 may be a different story. If you look at Steve Lundquist's 1984 Olympic race in the 100 breast, I believe he did exactly what McCauley is talking about—he held his breath on a few strokes on his way to gold and a world record.

However, the 100 is still a bit longer than that period where anaerobic glycolysis is the primary energy system.

Personally, I hate to see someone lock up and die hard at the end of a race. And by depriving the swimmer of even a small amount of precious oxygen, I think this would happen more readily.

The primary question for the 100 is: "Can we train oxygen deprivation well enough to ensure that this would have minimal effect?" Remember, the pullout alone already brings breaststrokers into a pretty severe "state of hell"!

The 50 is different. I think he's on to something that could work. By not having to use energy to lift the 40 or so pounds of upper body out of the water every stroke, the swimmer can now channel that upward motion directly forward. *So far, so good.*

To be able to keep the body more streamlined by not breaking the aquadynamic flat plane of the body...another plus. The major obstacle, as I see it, is the rhythm of the stroke.

Every stroke at the highest level has a rhythm that keeps the elite swimmer moving with less power than the swimmer who falls out of rhythm and must pick it up again.

To breathe one stroke and to change to a different style on the next breaks that rhythm. So, in this regard, there may be another option—just hold the head down through the entire 50.

It's obviously going to take another sweeping revolution in stroke technique, but this is what I see as one possible outcome of McCauley's premise.

In the end, I'd love to see what happens with this idea—I've always been a big fan of stroke improvement. ◄

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[photo courtesy: PETER H. RICK]

Backstroke Spin Drill: For Mature Athletes Only?

by JEFF COMMINGS

The saying, "There is more than one way to skin a cat," applies in all aspects of coaching and teaching swimmers. When it comes to using drills to emphasize a particular aspect of a stroke, any coach could give you 20 ways to help you understand something as basic as the recovery on freestyle or head position on breaststroke.

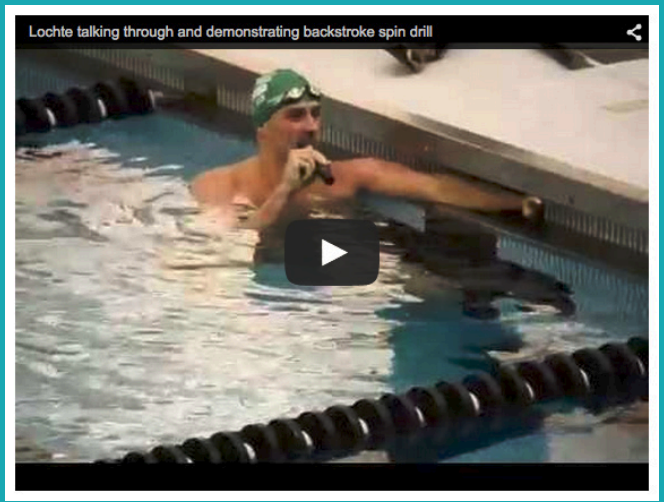
When it comes to getting swimmers to understand the importance of a faster stroke rate on backstroke, the spin drill was the most common tool in a coach's arsenal … or at least it was 20 years ago. If you attended a swim meet in the 1980s and 1990s, you would have seen a lot of backstrokers using the spin drill in their warm-ups to get into the mindset of a quick turnover.

These days, backstroke spin drill has lost its popularity in the sport. Coaches and swimmers have moved away from the spin drill, citing the risk of shoulder injury as a leading cause for ditching it. Others still embrace it as a necessary teaching tool, and in some cases, their only teaching tool.

Backstroke Spin Drill: How It's Done

After pushing off the wall on the back, the swimmer surfaces and assumes a seated position in the water, with the hips bent at nearly 90 degrees. The swimmer should be high enough above the water that the armpits have broken the surface. This will give the arms a better ability to move quickly.

The arms should move through the backstroke pull very fast, with little regard for catching water, as Ryan Lochte demonstrates in the video below:



Backstroke Spin Drill Pros and Cons

Backstroke spin drill appears to be one of the most divisive drills in swimming. No consensus can be made for or against the drill. Coaches who abhor the drill still acknowledge its attributes. Those who use it regularly know it can be dangerous if misused. The drill has helped David Plummer win two U.S. backstroke national titles and earn a silver medal in the 100 backstroke at the 2013 World Champion-

ships. Though it's not the only drill he uses to help improve his backstroke, Plummer says he uses it often, mostly as a warm-up for main sets.

"For overall tempo, spin drill is great," Plummer said, "but it has to do with getting the hips moving to get those arms rotating. Once you get that, it makes getting your tempo up a lot easier."

Plummer has one of the fastest stroke rates among elite backstrokers. His goal, he said, is a 1.0 stroke rate (1 complete stroke cycle per second), though he admitted that his stroke rate can get as low at 1.4 by the end of a 100 backstroke race.

Eddie Reese has been a fervent supporter of backstroke spin drill since he landed the job as head coach at Auburn University in the 1970s. He had seen athletes do some version of the spin drill for a few strokes before starting a backstroke race, and thought about expanding it into his training repertoire.

"We were probably the first team to use it," said Reese, now head coach at the University of Texas. "I tried to come up with drills that would make people put their hands in (the water) at the right place."

Reese recalled a set of 5×200 spin drill that he gave his Auburn backstrokers in the mid-1970s. On a three-minute interval, the only requirement for the set was not to do the drill inside the flags. Three of his backstrokers saw immediate improvement in the 1974-75 season, slicing two to four seconds off their 100 yard backstroke times.

Reese doesn't give his current squad that much spin drill at one time, reducing the distance to as much as 75 yards. The focus is on hand entry and speed more than pulling water, which would explain why he sets the time goal at one minute for the 75s.

As with any drill, Reese knows there are dangers to overdoing it, and he said that if an athlete experiences discomfort with the spin drill, "we'll stop doing it, go back to the beginning and see what will work.

"This is the best thing you can do for any one stroke," he said, "but you have to be careful about it."

Mike Murray, head coach at Victor Swim Club, has mixed feelings about spin drill. He said it's great for college-age athletes and professional swimmers, but not for the teenage and preteen athletes he primarily works with in Northern New York. He said he stopped using spin drill three years ago because it can adversely put too much pressure on muscle development in preteens and teenagers.

"Think about the force required on those developing muscles, going from a dead stop to high-velocity, over-cycling speeds," Murray said. The FINIS Tempo Trainer, he said, is a more accurate way to train high arm speeds for younger swimmers.

Erik Wiken, the head coach at Heartland Aquatics, also said he stopped using spin drill in favor of supplying his athletes with the FINIS Tempo Trainer as a way to teach not only proper backstroke arm speed but the correct pull form.

"I believe kids would be better served spending more time developing an earlier, wider catch (and) feasible stroke rates on several repeats of 15-meter to 25-yard swims with a tempo trainer or underwater kicking," he said.

Others who spoke against the spin drill commented that the unorthodox body position doesn't teach proper muscle memory, especially for young athletes who are beginning to learn the stroke or are having difficulty working on hand speed.

Spencer Hawkins was a backstroker at UC-Berkeley and now works as an assistant coach at Orinda Aquatics. He said his constant shoulder injuries as a swimmer made performing the spin drill risky "if I wasn't super-careful." Now as a coach, he prefers the Tempo Trainer for working on arm speed. A set that he likes to give athletes is a set of 25s where athletes start with a .78 rate per arm stroke and work up to .60.

"Some swimmers can get down to .55!" he said.

As one of the many ways to teach proper form and execution, the backstroke spin drill is likely the trickiest teaching tool available. Plummer described it best for those looking to add it to their programs or are questioning the physical merits of the drill: "If you're doing it right, you're probably going to be all right." ◄

WO COLLEGE BOOT CAMP

Getting in shape and staying in shape is paramount during preseason practices when preparing for college swimming.

by MICHAEL J. STOTT

Like it or not, swimming in college is a contractual arrangement.

"When swimmers sign on the dotted line, that's a letter of commitment, and you have to honor your commitment to go to a school in the best possible shape," says Poseidon Swimming (Va.) head coach Ted Sallade.

It is incumbent upon all coaches to encourage athletes to be consistent about their training," says University of Florida coach Gregg Troy. "It isn't just summer training—it is a matter of swimmer responsibility. Incoming freshmen owe it to their future programs to come in as the best athletes they can be," he says. "It is also important that they continue to be leaders and good role models in their club situations as well."

Follow The Rules

Once on campus, freshmen, returning athletes and coaches are bound by NCAA rules that govern out-of-season practices. Because of the NCAA "safety exception," swimmers are allowed to do more than athletes from other sports. "However, it's essential to follow all the rules, and we run everything by Compliance before we lay out our expectations for the team," says Texas women's coach Carol Capitani.

"Preseason is a tremendous challenge in Division III," says Jack Fabian, women's and men's coach at Keene State College (N.H.). "A number of coaches—myself included—would like to see many of the restrictions removed so that we could continue to keep Division III quality as an attractive option for accomplished swimmers.

"My first day of practice is determined by working with our NCAA compliance officer around the date of our conference meet. Once established, we have a 19-week season that we count back from the date of the competition, usually the second or third week in September," he says.

Former 13-time Kenyon All-American Abby Brethauer coaches the women and men at the University of Mary Washington (Va.). The Eagles normally train daily during rec swim hours in their three-to-four-week preseason.

[photo courtesy: SUSAN SPENCER UNIVERSITY OF MARY WASHINGTON]

"In the fall, the majority of the team is looking forward to the season, so there isn't much issue with team members not being around the pool or strength and conditioning room, and they always show up on Day 1 of official practice ready to go." — Abby Brethauer, women's and men's coach, University of Mary Washington

"Our senior leadership sends out a schedule of open swim hours, encouraging everyone to come to the pool both to train and start to integrate first-year swimmers into the program," she says.

"Seniors recommend that teammates be in the pool at least once a day five to six days a week. Some will do more, some will do less. In the fall, the majority of the team is looking forward to the season, so there isn't much issue with team members not being around the pool or strength and conditioning room, and they always show up on Day 1 of official practice ready to go," she says.

Who's The Boss

Without a coach on deck, the question becomes, "Who's the boss?" Most preseason practices anywhere are run by the captains.


[photo courtesy: GUSTAVUS SPORTS INFORMATION]

"My main goal is to establish a positive peer group for the first-year swimmers and divers. We don't start until Oct. 1. The sooner bonds are established between the first-years and the rest of the team, the better the chance they will show up the first day, excited to swim with their new teammates." — Jon Carlson, women's coach, Gustavus Adolphus College

"Completely," says Jon Carlson, whose Gustavus Adolphus College (Minn.) women finished seventh at 2014 D-III NCAAs. "My main goal is to establish a positive peer group for the first-year swimmers and divers. We don't start until Oct. 1. The sooner bonds are established between the first-years and the rest of the team, the better the chance they will show up the first day, excited to swim with their new teammates.

"With us, all seniors are captains. They are creative and rotate as hosts for practices," he says. "We also elect one male and one female junior captain, so we have a lot of hosts."

Captains usually provide three different workouts with three different levels of work. Carlson has a workout book as a resource, but he reports that captains usually write their own. On Thursdays, athletes normally head outside for Ultimate Frisbee and then appear for light swimming—"mainly to cool off," he says. "I think it is so important to establish practice as a place the first-years want to be. A happy swimmer is a faster swimmer. We don't want them to go in another direction, make different friends and then not come out for swimming."

Conditioning Circuits

When the athletes arrive on the Keene State campus in August, most participate in agility and conditioning circuits three days a week that are run by strength and conditioning interns. The sessions are voluntary and, by rule, are open to any student on campus.

"The sessions are a great way to develop athletic skills and general fitness," says Fabian. "Our captains design and run one-hour afternoon swim practices three times a week, with the women's and men's team working separately to keep pool congestion to a minimum. I am not allowed to observe the practices nor take attendance," he says.

Fabian notes that most of his international swimmers and those with NCAA aspirations do additional practices on their own. "Some get some workouts from their former coaches, but mostly they work together during open pool hours to get the volume they need. This year, they focused on some very large aerobic sets and did a lot more kicking than in the past," he says.

Great Expectations

In high-powered D-I programs, athletes naturally have high expectations, which is why Capitani relays those expectations to incoming freshmen and their parents.

"I understand that some want the time (for) a complete physical and/or mental break. While a select few may need it, to arrive on campus out of shape and lethargic and then expect to assimilate into a very challenging and brand new routine of school, swimming and freedom usually doesn't work out well," she says.

"We have been fortunate enough to have a culture of highly motivated kids who believe it's easier to stay in relative shape during the breaks. There is always a group going on easy runs, staying active or getting in to swim on their own—while getting a tan.

"Before our 144-day season, we offer a few practices that are 'voluntary.' To date, we have not had a problem with motivation or attendance. These practices are more on the fun side and are designed to get to know the kids—and let the team get to know each other—instead of challenging them. I am fascinated by the dynamics of a team when we first begin a season, and this time together is valuable in terms of insight and communication," says Capitani.

Higher expectations also drive motivation at D-III juggernauts. Brethauer swam at Kenyon when the Lady Lords were in the midst of their 17–year reign as NCAA champs. "In the fall, we all swam. We didn't necessarily go 10 times a week, but I always felt like I was letting my teammates down if I wasn't there at least once a day. Generally, the rest of the team attended, so *continued on 28*

continued from 27 it was fun. We would do little sets and, for the most part, we all really enjoyed swimming, so it never seemed hard to be there. In the spring, the majority of us were working out and still holding each other accountable," she says.

"These days, the seniors at UMW write the preseason workout," says Brethauer. "After three years, they have a pretty good feel for the program, goals and coach expectations. I am a huge fan of breath control and kicking early in the season, and that is reflected in what they are doing. We also encourage and incorporate a lot of core work."

Spring Training

Come spring, the beat goes on. "Then we have a little bit different approach," says Brethauer. Following the season, I meet with all of the junior class, and we talk about their academic, athletic and team goals for senior year. I cannot require anything, and I do not allow the team to make anything mandatory—just suggested.

"We are very understanding of people's out-of-season needs as they affect spring training plans. Often times, we have events away from the pool (e.g., the swim team has an awesome co-ed intramural soccer team, Pink Splash), and they do a lot of community outreach, so they are still coming together as a team even if they are not in the pool.

"I am not on deck out of season, and I trust the swimmers to make beneficial choices. By my not checking on them, they seem to enjoy swimming more because it is a choice and not a 'mandatory optional' event. The best spring days are those in which I walk in to find 90 percent of my kids in the pool doing a workout and having a great time," says Brethauer. ◄

Michael J. Stott is an ASCA Level 5 coach whose Collegiate School (Richmond, Va.) teams have won eight state high school championships.

GET THIS THROUGH YOUR SCULL

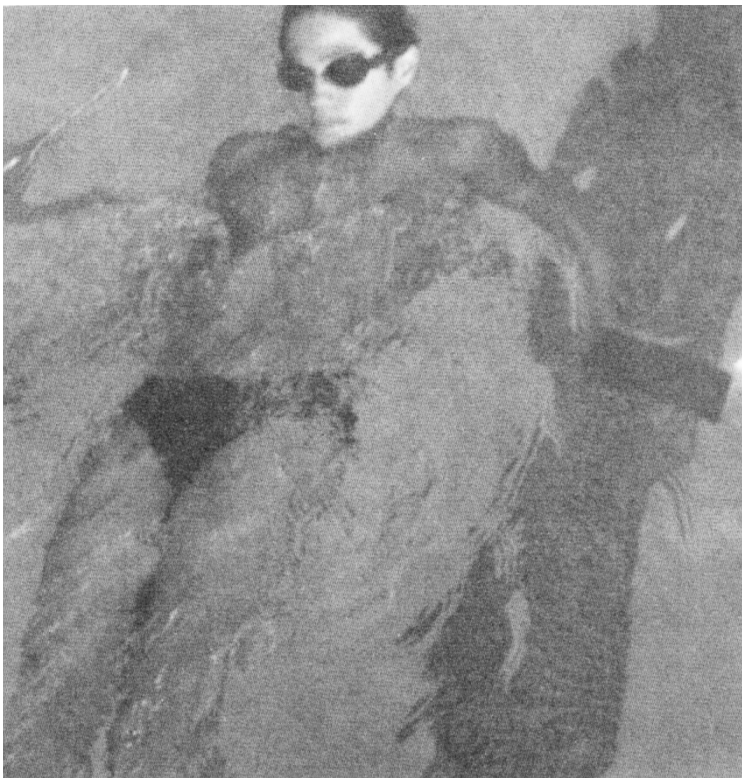
SCULLING DRILLS FROM DON WATKINDS FOR UNCONVENTIONAL TRAINING IN A 25-YARD POOL

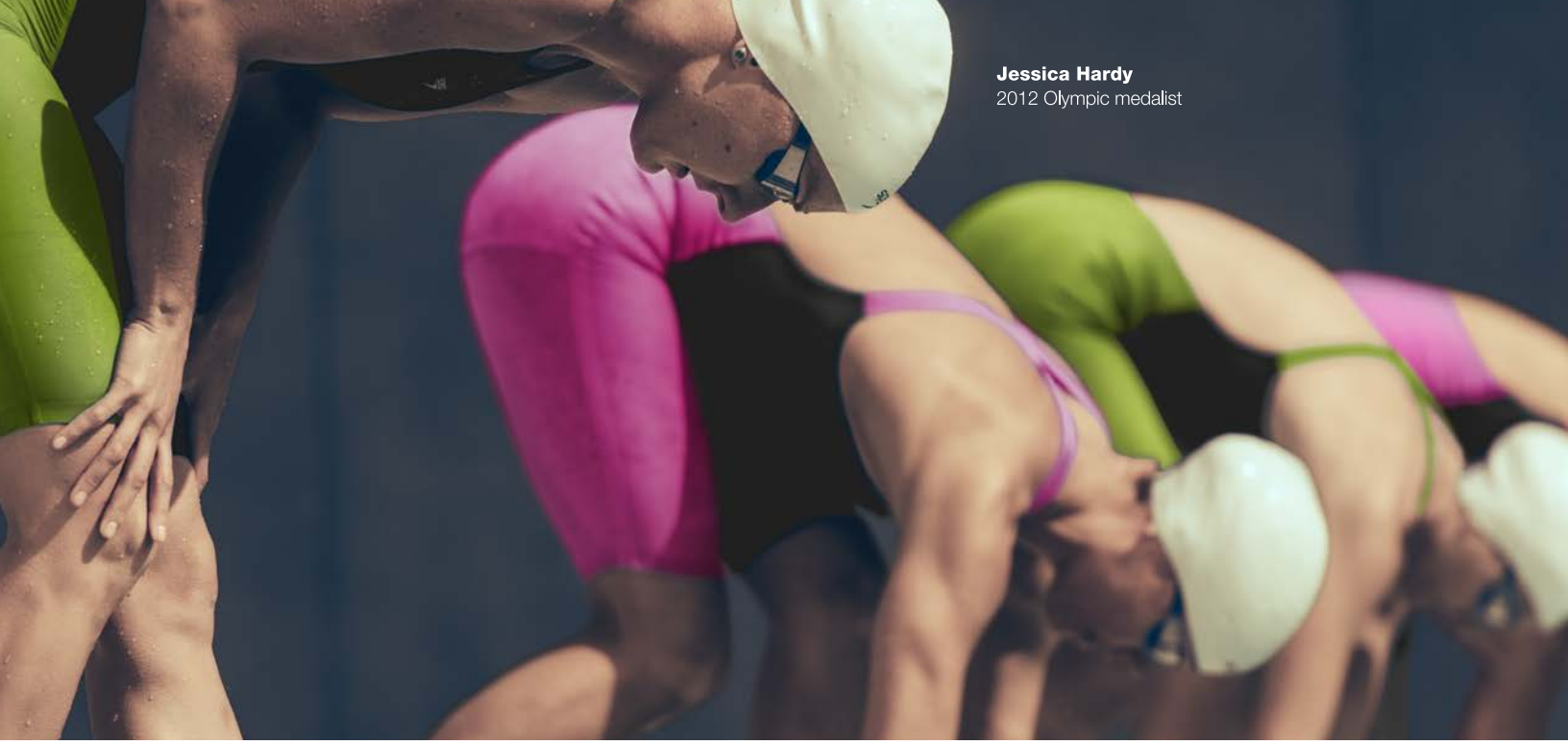
by BRENT T. RUTEMILLER | Photo by BUDD SYMES

Drill For Teaching Feel For Lift And Propulsion

Purpose: *To teach the feel of the water by letting swimmers realize that they control the direction of their movement by simply changing the sculling direction and pitch of their hands.*

Execution of Drill: *The swimmer should scull a total of 50 to 250 yards. The first six yards should be straight ahead, feet first on his/her back. The second six yards, the swimmer should scull at a 45-degree angle from the wall. The second 25 yards should be sculled in a similar manner until the swimmer has sculled a total of 360 degrees for 50 yards. Various degree changes can be used to keep the drill from getting stale.* ◄





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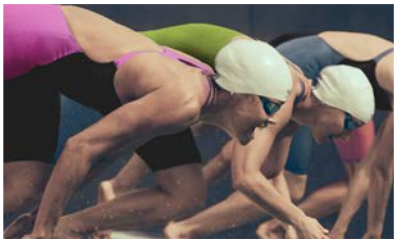


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TECHNIQUE TIME MACHINE

USA Olympian Josh Davis shows off his gold-medal freestyle technique in this photo from the SWIMMING TECHNIQUE archives.

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