STROKEARCS
The Newsletter of the Association of Rowing Coaches, South Africa

No 9 December 2006

TABLE OF CONTENTS

ENDURANCE TRAINING

HEART RATE MONITORS

If you've decided to engage in the popular practice of performing a race or workout at a particular heart rate (or fixed percentage of max heart rate), you've eliminated a big problem: you won't have to worry about estimating your actual cycling or running speed during your exertion or try to judge the overall quality of your effort by how you feel

Your effort - at least your cardiovascular effort - will be precisely defined by the reading on the face of your heart-rate receiver. If you have an upscale monitor, any excessive deviation from your desired pulse will trigger warning whoops from your receiver; with a low-end model, you'll simply need to glance at your receiver every minute or so to find out if you're doing the right thing. You'll be able to cruise through your whole race or workout at the exact heart rate you want, without worries about your actual velocity

Using a monitor can be pretty relaxing; during workouts, you can focus intently on your running form and how you feel, listen for the occasional communiques from your receiver, and just let the miles roll. With a monitor, there's no need to be concerned about whether you're exceeding a level of cardiovascular effort which you know you can handle. However, in spite of this ease, precision, and comfort, if you use a monitor to measure the intensity of your workout or race, you're probably headed for trouble

'Cardiac drift'
The trouble will come in a variety of ways, but a key source of difficulty will be something called 'cardiac drift'. This phrase simply refers to your heart's perverse tendency to avoid a constant rate of functioning. More specifically, cardiac drift means that your heart rate tends to rise slowly but steadily as you exercise, even when you're cruising along at a constant pace. And the magnitude of this drift is usually more than just a pesky beat or two: heart rates can rise by as much as 20 beats per minute during constant-velocity efforts lasting less than 30 minutes!

There's no need to worry about why cardiac drift occurs, although staying well hydrated before and during your effort can partially control - but not eliminate - your heart's tendency to beat faster and faster (if your exertion is going to last for about 40 to 45 minutes or more and you're going to be sweating fairly profusely, you should try to thwart drift by drinking 12 ounces of fluid before you start and taking in three to four swallows of liquid every 10 minutes thereafter)

If you monitor your efforts by using heart rate, you do need to consider what effect drift will have on your exertion. Basically, if you're locked into a particular heart rate for a race or long workout, drift will force you to run slower and slower as the effort proceeds, even though you have the ability to maintain your even pace. For example, if you're running, you might be cruising along fairly comfortably at seven-minute pace and a heart rate of 160, until drift sends your ticker up to 166. If you're too in love with your heart rate, you would ease off on your pace until you simmer your cardiac rate down to 160, and you would suddenly find yourself at 7:15 tempo, instead of the seven-minute effort which you actually could handle. In a race, that would leave you with a disappointing time; in a workout, you would spend less time practising your goal pace - and therefore develop less efficiency at that pace. Most of the time, it's better to just let heart rate rise slowly and steadily during your effort (as long as you're still feeling okay). Let fatigue - not the gadget on your wrist - be your guide to what you can do

A range of paces
Of course, another problem is that a specific heart rate - the one a coach has recommended for a race or workouts, or the one you've decided to use based on a recommendation in a newsletter or book - is going to produce a variety of different cycling speeds or running paces during your training. That's because heart rate is quite sensitive to environmental conditions - and your psychological state. Generally, your heart rate is going to be higher than usual when the weather is hotter or more humid - or when you're more tense and irritable

To see what can actually happen, let's say that you're a runner and you want to develop the ability to run a half-marathon at 90 per cent of your max heart rate - a laudable goal. And let's say that - in deference to the specificity of training principle - you've decided to run a variety of different workouts at that specific intensity. That sounds good in theory!
The first time out, on a fairly hot and humid day, you run for an hour at your desired heart rate - 90 per cent of maximal. Your average running pace for the whole workout turns out to be seven minutes per mile

The next time you train at 90 per cent, it's a perfect day for running - cool and dry. You zip along for an hour again at 90 per cent of max, but when you get through, you discover a startling fact: your pace was 6:45 per mile!
The third time out, it's hot and humid and windy. You're still stuck like glue on 90 per cent of max heart rate, though, and so your hour passes at a comparatively lethargic pace of 7:20 per mile (remember that when it's hot and humid, heart rate rises more quickly than usual, bringing you to a specific rate at a slower running pace; running against wind compounds the problem)

On your fourth encounter with 90 per cent of max heart rate, weather conditions are fine again, but you've just had a fight with your spouse. You're tense and excitable, sending your heart rate to higher-than-usual levels. So, you reach 90 per cent of max too easily. In fact, at 90 per cent, your running pace is only 7:30 per mile

Suddenly it's race day, and by golly you're pretty sure you can handle the half-marathon at 90 per cent of max heart rate. But when you finish the race, are people going to ask you, 'Hey, what heart rate did you have out there?' Or will they ask you about your time? And are you going to care more about your heart rate or your actual finishing time?

Heart versus legs
The point is that if you have even an ounce of competitive spirit, you're going to be more concerned about your overall performance time than the rate at which your heart was flapping during the race. Paradoxically, though, you've been training to run the race with a particular heart rate - not in a particular time. You're at the mercy of your heart - and that expensive strap you've got around your chest. Wouldn't it make more sense to choose a sensible goal pace for your half-marathon (say about 10 to 15 seconds slower per mile than 10K velocity), a pace which will bring you to the finish line in the time that you want, and then learn to handle that pace under a variety of different conditions during training? Practising that pace will give you the precise neuromuscular coordination and the exact leg-muscle functioning that you'll want on race day. Who cares if your heart strays above some pre-defined rate of ticking? Believe me, it will be none the worse for wear on the following day

Basically, you have to make a decision about your training. You know that environmental conditions and your psychological state are going to vary on different workout days. Higher temperatures and humidity will send your heart rate up, as will tension and anxiety; cool weather and calmness will bring it down. You can stick with a specific heart rate - and therefore let actual running pace wander all over the map. Or you can stick with a specific pace - and let heart rate vary enormously. Which is better? Obviously, sticking with a pace and letting heart rate vary is preferable. As mentioned, attaching yourself to a pace teaches your leg muscles and nervous system to function more effectively at that goal speed. The more you practise the pace, the better will be their coordination and efficiency - at that pace. The less you practise the pace, the lower will be coordination and economy

In contrast, the heart's coordination and economy do not vary. The heart doesn't need to practise beating away at 90 per cent of maximal to get good at it; it already has that down pat. It's just as efficient at 90 per cent of max as it is at 87 per cent of max - or at 93 per cent

Don't worry about your heart getting tired
Basically, your heart is pretty much along for the ride. It will do what your leg muscles tell it to do (within limits, of course; the legs can't tell the heart to beat faster than max heart rate, for example). If your heart's been whacking away at 93 per cent of max for a good deal of time, it will never shout down to the leg muscles, 'Hey chaps! You've been pedalling (or scampering) for long enough. I'm getting tired, so will you please slow down?'
In fact, your legs will become fatigued far faster than your heart does. The heart will slow down if the leg muscles slow down, not the other way around. That's why the focus of your training should be on your leg muscles - that is, on the pace created by the leg muscles. Your goal should be to develop greater fatigue resistance in those leg muscles at your desired running paces or cycling speeds. You don't have to worry about the heart getting fatigued: that old fellow can pound away at high rates for long periods of time. Your leg muscles are your weak link

And yet training based on heart rate makes the heart dominant and the leg muscles subordinate - just the opposite of what should occur! If you really want to run a race at a goal pace, practise that pace, not a heart rate. You can let your heart rates roll around a bit

After all, the heart is an imperfect indicator of what's happening to your leg muscles. An increase in heart rate might indicate increased stress in your leg muscles, or it might just represent tension, drift, or the fact that a little more blood has settled in the skin on a hot day. Don't enshrine an imperfect indicator as the absolute dictator of your training and racing

What is threshold heart rate?
While we're on the topic of heart rates, we should point out that there's an incredible amount of information floating around about how to train with a heart monitor, but - unfortunately - a lot of it is worthless. For example, you might read or hear that the best training intensity for raising lactate threshold - the key indicator of running performance - is 82 to 88 per cent of max heart rate. If someone tells you that, you've learned something important: never trust what they tell you about your training

That's because - first - there's no scientific evidence that this is true. In fact, the available research says that - for runners - running at 10-K pace (which is often around 90 to 93 per cent of max heart rate) is the most time-efficient way to boost threshold - and the method that produces the biggest increases. Second, while it's true that training at your threshold can probably raise it pretty well, too (that's why 'tempo workouts' are so darned good for you), threshold heart rate varies considerably between individuals. For example, for some athletes threshold occurs at 65 per cent of max heart rate. In others, it's at 75 per cent. Experienced, competitive athletes often check in at 85 to 88 per cent or so, and some of the elite Kenyan runners don't reach threshold until they get to 92 to 94 per cent of max

The bottom line? To lift threshold, you're better off forgetting about heart rate and training at 10-K pace or a little slower (if you're a runner, 10-minute intervals at 10-K pace represent a particularly good way to train). If you're a cyclist, swimmer, or cross-country skier, it's wise to carry out 10-minute intervals at an intensity you could sustain for no more than 30 to 35 minutes or so

Some coaches get really high-tech and measure heart rates at various blood-lactate levels. They then define workouts as 'easy' or 'aerobic' if they're at a heart rate below the rate which produces a lactate concentration of 2 mmol/L, and they say that 'threshold' workouts are at the heart rate which lifts lactate to 4 mmol/L, while 'hard' efforts are at heart rates associated with lactate above 4 mmol. Their role is then to merely find the right balance of easy, threshold, and hard efforts

That's great, except for three little things: (1) If training is going well, the paces associated with 2 and 4 mmol/L of lactate will increase steadily over time, so finger pricking for lactate detection will have to take place on a regular basis. (2) Threshold doesn't always occur at 4 mmol/L.

Some athletes reach threshold at 2 mmol, while others don't hit it until 7. For those individuals, training at 4 may be too heavy or too light to be a real threshold session. (3) Heart rate varies according to environment and mood, but threshold does NOT follow heart rate up and down. Threshold is a function of how hard the muscles are working - not how fast the heart is beating!

How hard are you training?
Another increasingly popular practice is to use a heart monitor to assess the overall intensity of a training 'cycle' (which often turns out to be about a week of training). There are various ways to do this, including the unique 'Banister Plan' developed by exercise physiologist Eric Banister at the University of British Columbia in Canada

To use the Banister system, you simply determine your average heart rate during each workout. From your average workout heart rate, you subtract your resting heart rate to obtain a number we'll call 'A'. The rest is quite easy. From your maximum heart rate, you subtract your resting heart rate to obtain a second number - 'B'. Finally, you divide A by B and multiply the result by the length (in minutes) of your workout

Here's a specific example: Let's say that Wilma rides her bicycle for 30 minutes at a heart rate of 150. Her resting heart rate is 50, so A = 150 - 50 = 100

Wilma's max heart rate is 200, so B = 200 - 50 = 150. A/B = 100/150 = .67, the relative intensity of her workout. .67 X 30 minutes = 20.1, the overall value of her training session

If you've been following along closely, you'll note what a logical way this is to determine your workout value. The number 'A' is simply a measure of how far you climb above your resting heart rate during a workout, and the number 'B' is an assessment of how far above the resting rate you could go if your workout were truly maximal. That means that dividing A by B automatically calculates the intensity of your workout, or - more specifically - how close you are to working full-tilt during your effort

If A and B are identical, it means that you're at maximal heart rate throughout your session - you're working as hard as you possibly can. On the other hand, if you barely climb above resting heart rate during your training session, A will be a very small number and the workout will have a low value - unless you train for many hours. Multiplying A/B by the number of minutes in your workout simply allows you to reckon the overall impact (value) of the session - and to compare one workout with another. In Wilma's case, for example, 23 minutes of cycling with a heart rate of 180 will have about the same value as 30 minutes at a heart rate of 150 (figure it out!)

A new system created by German scientists keeps track of training stress in a different way: their system simply counts the total number of heart beats in a 24-hour period. The thinking is that the quantity of beats indicates the total amount of stress an athlete is experiencing, including both the stress of physical training and stress from other sources. The Germans reckon that, at least with elite athletes, a hard day has more than 105,000 beats (they must be working with athletes with low pulse rates, because that's an average of just 73 beats per minute), a moderate day has around 85,000 beats, and an off day would feature just 72,000 ticks

Of course, those are somewhat arbitrary numbers; one can imagine that some 100,000-beat days might be pretty serene (you could get to 100,000 just by taking a long, rejuvenating walk at the beach, for example). Also, there will be a lot of variation from person to person; a given number of heart beats might be nothing for one athlete but a huge load for another

But a bigger problem is that the heart-rate counting systems - including both the Banister and German programmes - do not take into account the specificity of training needed for a particular event. For example, let's say that two runners, Joe and Joanne, have equal resting and max heart rates, can run the 5K in about 19 minutes, and hope to set new PBs of 18:36 (six-minute per mile pace) in the near future. However, Joe and Joanne develop completely different training plans. Believing that high mileage is the answer, Joe trains for 600 minutes per week at a modest average heart rate of 140 beats per minute. Convinced that high intensity will help her run faster 5Ks, Joanne cuts back on her volume of training but raises her average running speed, ending up with just 120 minutes of training per week at an average heart rate of 170. A large share of Joanne's mileage is completed at around six-minute per mile tempo - the exact velocity she'll need to set her PB, while the bulk of Joe's work consists of tortoise-like trotting

According to the Banister - or any - heartbeat-counting system, Joe is training 'better' (he is doing more total work, with 84,000 heart beats worth of training per week, versus just 20,400 beats for Joanne). However, Joanne is much more likely to run a faster 5K. She is focussing on the specific pace she needs for her new PB, while Joe's mega-mileage is not necessary for - nor specific to - 5-K racing

The key pitfall associated with using a heart monitor to classify the intensity of your workouts and assess the overall difficulty of your training is that it can place the heart on too high a pedestal. Learning to cycle or run at a goal velocity is often ignored. In addition, your heart rate during certain types of workouts - hill repetitions or high-speed, short-distance intervals, for example - is irrelevant, so you shouldn't even be worrying about it! Likewise, you don't need heart rate to plan VO2max-building workouts; you can simply use your current 5-K pace (or, for cyclists, 95 per cent of the velocity you could sustain for only 12 minutes). And, as mentioned above, utilising heart rate is a notoriously inaccurate way to try to lift lactate threshold, unless you have a lactate analyser and can determine precise blood-lactate concentrations at different heart rates. Even then, cardiac drift and changes in psychological state and environmental conditions will 'uncouple' lactate threshold from a chosen heart rate

What monitors are good for
I've been pretty hard on heart-rate monitors so far, but that doesn't mean I think they're worthless. In fact, one of my favourite training sessions, which I call a '171' workout, is

carried out with a heart monitor. In this session, which I use to build endurance after a layoff period (and which I utilise when I'm not preparing for a specific race), I simply try to exercise at 90 per cent of maximal heart rate for 60 minutes or so. Since my max heart rate is 191, this turns out to be 171 beats per minute (hence the name 171). Recognising cardiac drift, I let heart rate inch up to 178 or so without concern in the latter part of the session. I don't worry at all about actual speed of movement but just try to work hard and keep heart rate up. The lack of concern about velocity lets me really relax and focus on form, and when the 60 minutes are over, I've had a great workout. Other athletes successfully use monitors to prevent themselves from exercising too intensely during easy workouts, setting their upper limit at 70 to 75 per cent of maximum or so

I never bother to use a heart rate monitor when I engage in cross training (I know that my heart gets enough of a stimulus to improve from my usual running workouts, so I don't worry when I climb aboard a bike), but heart-monitor usage during alternative activities raises an interesting point: your max heart rate when you do something other than running will usually be lower than your maximal running heart rate. In fact, it's often 5 to 6 per cent lower. For me, that would mean that my max heart rate on the bike would be about 181, not 191, and a 90 per cent of max session would put me at 162, not 171. In fact, trying to get to 171 might actually induce quick, excessive fatigue and shorten the overall exertion

How to work out your max
If you want to actually reckon your max heart rate on the bike, it's easy: simply warm up with 10 to 15 minutes of easy pedalling, and then ride 'full-blast' at nearly maximal power output (while maintaining an optimal rpm of 90 to 95 or so) for two minutes. 'Spin' easily against little resistance for 60 to 75 seconds, and then pedal at maximal capacity for two more minutes. Your heart rate should almost 'top out' after this second two-minute surge (make sure you get your doctor's permission before you try this, however). To determine max heart rate while running, warm up and then run 800 metres nearly full-blast, jog easily for one minute, and then run 800 metres at top speed. You should reach max at the end of the second 800 (again, get your doctor's permission before trying)

The bottom line - or rather the bottom lines? If you can avoid the pitfalls associated with heart-monitor training, using a heart monitor can be enjoyable and helpful, but bear in mind that even if you use your heart monitor to classify all your workouts as hard, moderate, or easy - and even after your monitor has told you whether you've had a hard or easy day, week, or month, your monitor can never tell you how you should be training. Your monitor is only a device which collects data; it's not a programme planner

And the information your heart monitor collects refers specifically only to your heart; it doesn't tell you whether your leg muscles are really ready to handle the rigours of your goal speed: only training at a specific pace can do that.
Owen Anderson

ROWING TECHNIQUE

THE POCOCK GENERATION

When five members of the 1948 University of Washington jayvee became the Husky entry in the coxed-four event at the 1948 Olympic Trials, they had the unique opportunity to be coached by both George Pocock and Al Ulbrickson.

Coxswain Allen Morgan: "Al and George were of the same school. The two of them were in synch.

"During the year, Al would have George come out during practices, and with fresh eyes, George could pick up things that Al couldn't see, having stared at his crews for so long." [1]

Bob Martin, jayvee 7-man: "Washington crews always did their best when Al listened to George. He was able to pick out individuals who needed special attention.

FISA, 2004 Olympic DVD
2004 Australian Pair Olympic Champion
Drew Ginn
Near-perfect example of the **Pocock Stroke**

Life Magazine, June 20, 1949
Rod Johnson, considered an "ideal rower" by Al Ulbrickson, illustrated the **2nd Generation Conibear** early arm and back *motion* that varied subtly from the ideal Pocock Stroke.

"For instance, one day I came down to the boathouse to find that he had raised my seat ¾ of an inch. This was after rowing for 1½ years." [2]

As he already had for nearly 40 years, George Pocock set the tone and raised the level of oarsmanship for the 1948 Husky crews. It seemed that he had always been the soul of Washington rowing.

Jayvee 5-man Gus Giovanelli: "It was tough for Al coaching back then because most of us were returning World War II veterans, and he had to be really careful what he said, or we would tell him to go to hell.

"Charlie McCarthy stroked the '48 and '49 varsities after two years in the 3rd boat. I remember during practices, he and Al would have a running 'conversation,' he complaining and Al telling him to shut up, both screaming, and both using a wide-ranging, colorful vocabulary.

"But when you couldn't talk to Al, you could talk to George. He played a huge team role." [3]

www.huskycrew.com

Practicing at Lake Carnegie

After sweeping all three races at the IRA in 1948, a supremely confident Washington squad, the defending Olympic Champions from before the war in 1936, had headed straight to Princeton to prepare for the Olympic Trials.

Ulbrickson certainly recalled with bitterness the events of eight years earlier in 1940, when his varsity had been scheduled to race in the Olympic Trials for eights, and the stern four of the jayvee was slated to race in the Trials for coxed-fours.

"Four days before Poughkeepsie, they found out that the 1940 Olympics had been cancelled due to the war in Europe." [4]

This came four years after the University of Washington Olympic triumph in Berlin, and "it was a tremendous disappointment. Both crews went on to win the 1940 IRA, and both certainly would have been favored at the Trials." [5]


Bob Martin Scrapbook

1948 Washington Jayvees
IRA Champions
Stroke **Warren Westlund**, 7 **Bob Martin**, 6 **Bob Will**, 5 **Gus Giovanelli**, 4 Bob Fletcher, 3 Bill Lund, 2 Charles Brown, Bow Fred Mitchell, Coxswain **Al Morgan**

The first Olympics to be scheduled after World War II was London in 1948, and Ulbrickson again prepared to enter both the eight and the coxed-four Trials.

From his vantage point in the Cornell eight, Chuck von Wrangell remembers watching the Washington four practice at the Trials site on Lake Carnegie.

"Washington had brought along to Poughkeepsie a special four-oared shell named Clipper Too, built in 1936 as the sister to the Husky Clipper, which won the 1936 eights Gold Medal for them.

"As soon as all the teams arrived at Princeton for the Trials, the stern four from their IRA-Champion jayvee got into the boat and began rowing it for the first time.

"It was a sleek boat built by George Pocock, and on the day that I was watching, he appeared to coach them almost exclusively. Al Ulbrickson was wise enough to step back a bit and let George coach the four in the boat that he built.

"I remember at the moment they came by me, George was chewing them out for breaking their arms too early.

"Ulbrickson had coached his varsity and jayvee coxswains to call out, 'Stand and draw!' on practically every stroke. 'Stand,' of course, meant push those legs, and 'draw' meant pull with the arms, and like our Cornell crew, the Huskies were known for using their arms right from the catch.

"George wanted leg drive strong enough to hold those arms straight longer." [6]

Martin and jayvee 6-man Bob Will have no memory of there being any difference between the approaches of Al Ulbrickson and George Pocock.

Martin: "Their whole concept of rowing was that there were no singular movements. Everything started and finished at the same time. There was none of the legs going down first. Neither taught us that. In fact, we called that 'shooting your slide!'" [7]

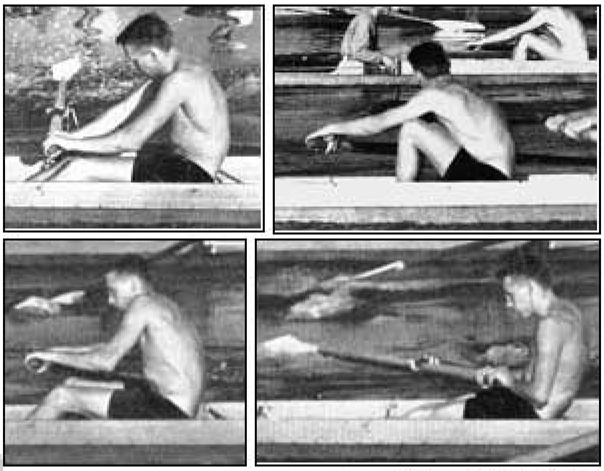
Well, as Stan Pocock has so sagely said, "Herein arises the cause of some confusion.

"One of the admonitions heard from Ulbrickson was to 'hang yourself on the oar' at the catch, in other words, really throw your back into it as you drove the blade into the water with the legs. Here again, the idea was to have everything trying to move the oar at the same time, while physical reality made it appear as though the legs were driving first, followed by the back, with the arms chiming in last of all." [8]

As was discussed earlier, even though both Ulbrickson and Pocock believed in the concurrent use of legs, back and arms, all working together starting at the catch, George's ideal stroke included a component not part of Ulbrickson's 2nd Generation Conibear Stroke, namely initial leg drive strong enough to initially immobilize the backs and arms.

This distinction between Ulbrickson's pure concurrent technique and Pocock's hybrid-concurrent technique with legs emphasized was subtle in the extreme, and Pocock was aware that even mentioning stronger leg drive ran the risk of losing the Schubschlag "one cut" feeling, encouraging slide shooting and/or a Kernschlag segmented pull-through, which George abhorred as much as Al.

The issue that George Pocock was addressing on the day that von Wrangell was listening in probably had a lot to do with the difficult transition from an eight to a four.

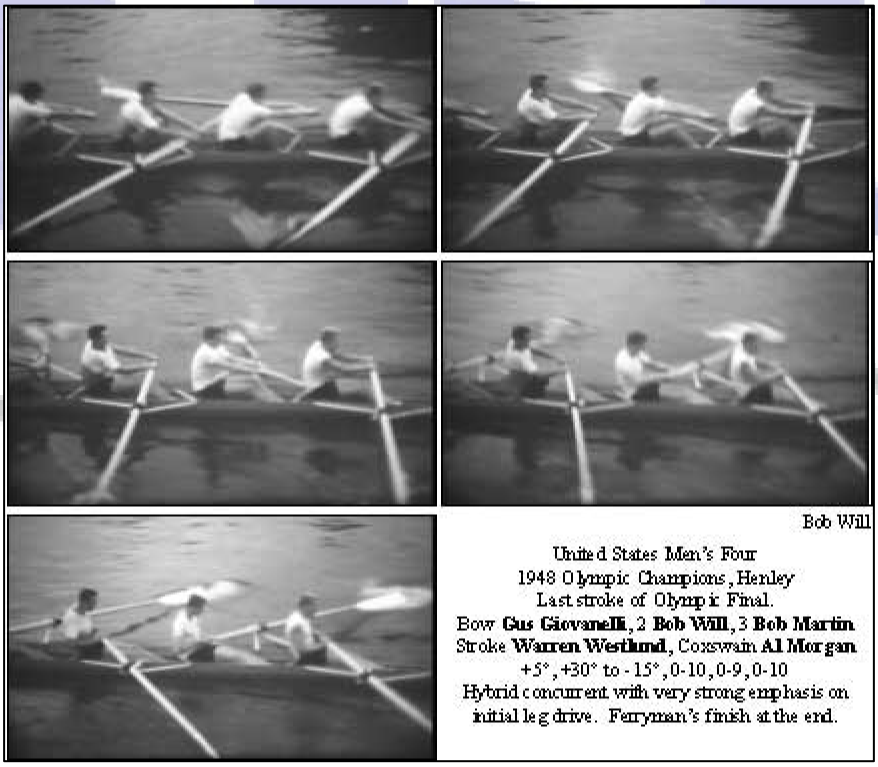


Life Magazine, June 20, 1949

Westlund's bent left arm is especially visible in the first and third photos. His early arm-break would have been well known to George Pocock by the time of the Trials. Stan Pocock: "Westlund's awful, hunkered-down style is very apparent in these photos, but his indomitable will and high spirit made up for it."

A four is inherently harder to set up than an eight. It would have been quite natural if the crew was initially a bit tentative in applying their legs as they were slowly getting used to their new event at Princeton.

Giovanelli: "Legs were always a strong point in Washington rowing. George emphasized drive with the legs even more with us because you have so much more weight to pick up in a four, and the legs are the most powerful muscles." [9]



Bob Will

United States Men's Four
1948 Olympic Champions, Henley
Last stroke of Olympic Final.
Bow **Gus Giovanelli**, 2 **Bob Will**, 3 **Bob Martin**
Stroke **Warren Westlund**, Coxswain **Al Morgan**
+5°, +30° to -15°, 0-10, 0-9, 0-10
Hybrid concurrent with very strong emphasis on initial leg drive. Ferryman's finish at the end.

There was also the issue of the unorthodox rowing technique jayvee stroke-man Warren Westlund. Wes, a sophomore, had stroked the 1947 IRA-winning Washington freshman crew, and that crew had won varsity letters by beating the varsity and jayvee in a time trial for the right to row in the 2,000 meter Lake Washington Regatta, which was won by Harvard with Yale second and the Husky freshmen third.

Rod Johnson was 1947 freshman 7-man behind Wes. He was the 1948 varsity 7-man and fraternity brother of varsity stroke Charlie McCarthy, of Wes and Bob Will of the jayvees and of 1947-grad Stan Pocock.

Johnson enjoyed rowing behind Westlund. "Al would say that Wes was hunkering down all the time, but because of that he got a lot of reach, more than you could if you sat upright." [10]

Giovanelli: "Wes had an old injury that prevented him from straightening his left arm all the way." [11] Perhaps as a consequence, Westlund's style appeared to be the antithesis of Johnson's ideal Ulbrickson stroke. Note the contrast in arms in the photograph of the two of them on this page, taken in September, 1948.

Wes stood out on the Washington squad like the proverbial sore thumb for precisely the issue that George was addressing with the four that afternoon in Princeton. His arms were definitely bent from the catch.

Bob Will: "We weren't the best-looking crew in the world. Wes also tended to wash out. Fortunately, there was nobody in front of him to get caught, but he was an easy man to row with. That's why he was a good stroke." [12]

Any subtle distinctions between the rowing techniques of Ulbrickson and Pocock, however, did nothing to compromise their mutual trust and support, and indeed were irrelevant to the four as they transitioned to their new boat.

Von Wrangell: "Those four jayvees listened, and their legs came down hard after the catch, with the back swing and arm-squeeze later." [13]

The Technique of the 1948 Washington Four

The Washington four was a very impressive and physical group for the period. Three of the four were returning World War II veterans.

They averaged 22 years old and more than 6'4" in height. Endless miles of rowing had left them extremely fit and lean, averaging 185 lb.

Bob Will: "We weren't students of what we were doing. We just tried to do what we were told, but the long, smooth, everything-together, low-speed rowing was our forté.

"When we rowed 32, man that was high speed!

Life Magazine, June 20, 1949
Westlund (problem) versus Johnson (ideal)

"All we did was row, because we didn't have to worry about ice in the winter. Back East they had to use tanks, and they rowed on machines. No weights, no ergometers back then.

"The only time we ever rowed 2,000 meters was for the Olympics, and so every Monday that's what we did. I remember because I hated it. It was a sprint but a damn long sprint, and we only did it when the Olympics were a year or two away." [14]

Lemmon, *The Log of Rowing*
1948 Olympic Trials, Semi-Final, Carnegie Lake
California 5:58.0, Washington 5:58.1

At the end of several weeks of work with George Pocock, the athletes sensed no change in their technique, but film of the crew discloses a subtle but significant evolution from the Ulbrickson standard.

Early in the pullthrough the legs were pressed down more aggressively, even though leg motion still extended right to the end of the stroke. The back swung from the catch, and the last few degrees of layback were exchanged for a more pronounced ferryman's finish. The result was +5°, +30° to -15°, 0-10, 0-9, 0-10, in contrast to Ulbrickson's +5°, +30° to -25°, 0-10, 0-9, 0-10 characterized by steadier leg drive, more layback and less ferryman's finish.

This change was sufficiently significant to be considered the birth of a 3rd Generation of the Conibear Stroke, which might also be called the Pocock Generation of the Conibear Legacy.

The 1948 Season

At Princeton, the Washington eight and four seldom worked out together, partly because they did not particularly get along.

Bob Martin remembers: "Our eventual four had started out as the stern four of the varsity, but one day in late April or early May, Ulbrickson had the boats pulled together out on the water and switched all five of us, including Al, our coxswain, into the jayvee.

"We were naturally very disappointed, but what was worse, the new varsity immediately looked down their noses at us.

"As a consequence, there was quite a rivalry between the boats." [15]

At some point on the trip to Poughkeepsie, there was a race between the jayvee and varsity, but the details seem lost now in the mists of time. Varsity 7-man Rod Johnson has no recollection of the race at all. Gus Giovanelli remembers it happening in Madison, Wisconsin. "We took the lead at the start, but eventually the other boat started creeping back. The second they had edged past us, Al stopped the race early because Al had gotten the result he was looking for." [16]

Bob Martin has a quite different recollection: "I'm pretty certain the last time trial was in Poughkeepsie. We started even, and when we started to pull ahead, Al stopped us, and that was the crowning blow.

"We really thought that Al might switch the boats, and that we'd become the varsity if we won. It had been done before, but he didn't do it. He didn't let us finish the race." [17]

---

1. Morgan, personal conversation, 2005
2. Martin, personal conversation, 2005
3. Giovanelli, personal conversation, 2005
4. www.huskycrews.com
5. www.huskycrews.com
6. von Wrangell, personal correspondence, 2005
7. Martin, personal correspondence, 2005
8. S. Pocock, personal correspondence, 2005
9. Martin, personal conversation, 2005
10. Johnson, personal conversation, 2005
11. Giovanelli, personal conversation, 2005
12. Will, personal conversation, 2005
13. von Wrangell, personal correspondence, 2005
14. Will, personal conversation, 2005
15. Martin, personal conversation, 2005
16. Giovanelli, personal conversation, 2005
17. Martin, personal conversation, 2005

NUTRITION

ENERGY DRINKS, SPORTS BARS & GELS

The use and selection of energy bars, sports drinks and gels has grown considerably over the past few years. For athletes, reasons for using these products are typically based on their convenience and potential performance-improving effects. Bars, drinks and gels provide a quick and easy means of supplying the body with calories and micronutrients (vitamins and minerals) when conventional foods are not available or feasible. Since swimmers typically workout and/or race in the morning when they may choose not to eat, and an overnight fast would force them to perform in a partially glycogen-depleted state, bars, drinks and gels may provide a compact, more tolerable "meal" substitution. In some cases, the addition of certain ingredients promises results.

Energy bars fall into 3 main categories, depending on their nutrient composition:

- High Carbohydrate Bars (>30 g carbohydrate)
- High Protein Bars (>12 g protein)
- Mixed Bars (usually >20 g carbohydrate, >10 g protein, 2.5-10 g fat).

High carbohydrate bars provide the fuel needed for tough endurance workouts. High protein bars are often promoted for post-workout recovery. Mixed bars make a healthy snack during the day when time is short and hunger is big.

Gels are typically high in carbohydrate (>30g) and low in fat (<1g) and protein (<12 g). They include mainly simple sugars, as opposed to complex carbohydrates. Since simple sugars reach the bloodstream faster than complex carbohydrates, which take longer to digest and be absorbed, gels are typically used in situations when carbohydrates are needed quickly. For swimmers, breaks between sets present an opportunity to provide the body with the energy (carbohydrate) it needs for long workouts.

Sports drinks have traditionally been comprised of carbohydrate and electrolytes in amounts that enhance fluid absorption and minimize gastrointestinal distress. Over the past 5 years, sports drinks have expanded to include those with added amino acids, herbal ingredients and herbal mental "boosters." Many products have been marketed to a consumer base that goes beyond the competitive athlete and into the realm of the recreational and leisure activity participants.

In addition to the convenience factor, many energy bars, sports drinks and gels have direct scientifically proven benefits both during and following exercise. The two basic reasons why researchers suggest that athletes turn to these types of fuels are:

1. Fluid replenishment (drinks).
2. Energy provision (bars, drinks, gels).

Maintaining Hydration During Exercise - The daily sweat loss for elite level athletes can range from 1 to 1.5 liters per hour. Depending on the intensity and duration of the workouts, the daily water requirement for these athletes ranges from two to six liters per day. In extreme cases, this requirement may be as high as 16 liters per day if the climate is hot. Failure to maintain a hydrated state can lead to detrimental changes in the cardiovascular response to exercise, over-heating of the body and decreases in both maximal power and work capacity. Just a 2% drop in body weight due to dehydration can have an overall negative impact on exercise performance.

The collection of research addressing sports drinks is extensive and has evolved quite dramatically over the years. Studies have indicated that the ingestion of a 6-8% carbohydrate beverage (ex. Gatorade, Powerade) during prolonged strenuous exercise can delay fatigue and improve performance. The theory is that the carbohydrate drink provides sugar (glucose) to the blood, which spares glycogen (the body's internal reserve of carbohydrate) during prolonged exercise. And we know that how well a fluid (sports drink or water) works depends on (1) how much is ingested (fluid ingestion), (2) how long it takes for that fluid to move from the stomach to the intestine (gastric emptying…the faster the better), (3) how long it takes to be absorbed from the intestine into the bloodstream (intestinal absorption) and (4) whether it weakens or enhances the body's utilization of carbohydrate as a fuel (fuel utilization).

Providing Energy During Exercise - In addition to staying hydrated, athletes are faced with the task of fueling their bodies for performance. For activities lasting less than one hour, this can usually be accomplished with the pre-exercise meal or snack.

For longer-duration activities, this usually means "eating on the run." Given the environment, swimmers face the added obstacle of the water. Conventional "dry" foods are not feasible, making products such as water, sports drinks, energy bars and gels their only options. This also leads to the questions of what, when, why and how much?

The use of bars, drinks and gels as fuel sources during exercise is based on their typically high carbohydrate content. Providing the body with carbohydrate during prolonged activity maintains blood sugar levels. The availability of this "fuel" during exercise allows the body to spare glycogen and can prolong the time an athlete can exercise before tiring. The well-researched sports drink (also called carbohydrate electrolyte drink) has traditionally been recommended for endurance events lasting more than 90 minutes. However, recent research suggests that sports drinks can improve high intensity and sprint-interval sessions lasting less than an hour. This suggests a benefit to using sports drinks for fuel during workouts to a broader segment of the athletic community, including sprinters.

Hydrating the Body at Rest – Quality workouts depend on replenishing fuel stores that were spent during previous sessions. This includes, but is not limited to, fluids. Failure to correct a fluid deficit incurred from one workout before the next workout puts the athlete at risk for a compromised performance. Starting a session in a dehydrated state may cause a faster rise in core body temperature, greater cardiovascular strain and an impaired ability to dissipate heat. These effects may be exaggerated if the workout takes place in a hot environment. Therefore, re-hydrating and maintaining a hydrated state outside of practice times is just as critical to the athlete as hydrating during workouts.

Be aware that thirst is not always an accurate indicator of when an athlete should begin hydrating. For most athletes, by the time they are thirsty, they are already dehydrated. This makes the intake of fluids, including sports drinks, an important part of the daily nutrition program, especially during the recovery phase. It has been suggested that fluids containing sodium are more efficient at hydrating than plain water alone. According to the American College of Sports Medicine, "one should consume adequate fluids during the 24-hour period before an event and drink about 500 ml (about 17 oz) of fluid about 2 hours before exercise to promote adequate hydration and allow time for excretion of excess ingested water."

Fueling the Body at Rest – As mentioned previously, quality workouts depend on replenishing fuel stores spent during previous sessions. Depending on the extent of depletion, it can take as long as 24 hours to fully replenish glycogen stores, but the first two hours post-workout are the most critical. Given the right fuel, glycogen synthesis during this time can occur as much as 2-3 times faster than normal (i.e. compared to if they were given no fuel at all). This is due to the increased sensitivity of muscle cells to the hormone insulin. It is well known that the ingestion of carbohydrate causes an insulin response (i.e. increasing glucose in blood increases insulin in the blood). The presence of insulin in the bloodstream promotes the uptake of glucose by the muscles. Once moved from blood to muscle, this glucose can then be converted to glycogen for storage. Certain proteins and amino acids have been shown to elicit an insulin response. When ingested with carbohydrate, they can create a "synergistic" effect. In other words, their combined effect is greater than the sum of their individual effects. Those found to have the greatest impact on insulin levels include protein hydrolysate mixtures, leucine, phenylalanine, and arginine.

In addition, insulin itself has been proposed as an important factor in muscle protein balance by increasing synthesis and decreasing degradation. Some researchers believe that when exercise acts as the stimulus and levels of circulating amino acids are high, a more anabolic (muscle-building) state is created. Unfortunately, research in this area is still limited, and questions still remain regarding how nutrition impacts resistance and intermittent activities. The general idea is to take advantage of the body's natural post-exercise sensitivity to insulin by providing it with food that will (1) raise insulin levels, (2) put glucose in the bloodstream quickly and (3) enhance the conversion of glucose to glycogen.

At rest, such as during the pre- and post-workout periods, the use of energy bars, drinks and gels varies with personal preference, time available to eat, etc. In addition, athletes are compelled to select these products based on claims made by the manufacturers about the addition of various ingredients and which products are "the best." Some of these claims are related to fat burning capabilities, the roles of electrolytes (sodium, potassium, chloride) and caffeine, and the addition of various carbohydrate/protein hydrolysate combinations. An important point to remember is that because most bars, drinks and gels are considered dietary supplements, they are subject to the less stringent regulation demonstrated within the supplement industry since the passing of the Dietary Supplements Health and Education Act of 1994

For this reason, it is worth the time for athletes and coaches to choose their bars, drinks and gels cautiously.

To address some of the issues mentioned above, I recently reviewed a collection of studies (Oliver & Tremblay, 2002; Kolkhorst, MacTaggart & Hansen, 1998; Haff, Kock, Potteiger, Kuphal, Magee, Green & Jakicic, 2000; Nassis, Williams & Chisnall, 1998; Brouns, Kovacs & Senden, 1998; Van Nieuwenhoven, Brummer & Brouns, 2000; Van Loon, Saris, Kruijshoop & Wagenmakers, 2000). The applications of this research are summarized below:

- Fifteen minutes may not be enough time to reap the benefits of ingesting carbohydrate prior to a workout.
- The claims made by the manufacturers of Sports Nutrition Bars are not always supported by science. An athlete may be better advised to choose a product that has KNOWN scientific benefits.
- Consuming Gatorlode or Gatorade before and during a workout may not enhance the amount lifted, force produced, or time to fatigue, but it can prevent muscle glycogen stores from declining.
- Maintaining this fuel source can have direct implications on a pool workout that closely follows a dryland/lifting session or vice versa. It allows the swimmers to come to workout with more "gas in the tank."
- There has been some debate on the extent (if any) to which caffeine intake enhances endurance performance. Regardless of the controversy, many manufacturers of sports drinks, energy bars and gels have taken the initiative to add caffeine to their lists of ingredients.
- When given the choice, many athletes will drink more of a sports drink than water because they prefer the taste.
- The inclusion of caffeine in sports drinks may not affect gastrointestinal variables, but using a drink like Coca Cola to rehydrate the body after a tough workout may have an adverse effect on electrolyte balance.
- Since caffeine appears to increase magnesium and calcium loss in urine, rehydration should be accomplished with 6-8% carbohydrate-electrolyte sports drinks that are caffeine-free, rather than any drinks that contain caffeine and/or do not include electrolytes.
- The enhanced insulin response caused by the addition of protein to the carbohydrate-only drink

can be achieved just as effectively by adding the same amount of extra carbohydrate.
- Consuming carbohydrate in the amount of 0.8 g/kg/hr (58 grams/hr for a 160 lb male) is not as effective in replenishing glycogen as consuming 1.2 g/kg/hr (87 grams/hr for a 160 lb male). In other words, 0.8 g/kg/hr (32 fl oz of Gatorade for a 160 lb male) is not enough to maximize the repletion process.

The Final Word

When it comes to choosing an energy bar, sports drink or gel, the most important things to know are: what is in it and how does it work? To help guide your athletes in their selection and use of bars, drinks and gels, offer these tips:

- Check for Effective Ingredients in Drinks. The post-exercise rehydration drink should contain Carbohydrate (30-80 g/L), Sodium (400-1000 mg/L), and Potassium, Chloride in small quantities. If a drink does not contain these ingredients, it may not be effective in providing energy and maintaining hydration.
- Drink Water with Bars. Drink at least 8-16oz (about 1 water bottle full) of water along with every energy bar you eat. For each packet of gel, take about 4oz of water. This helps keep your body hydrated while helping with the digestion of the product and the absorption of its contents.
- Experiment. Swimmers will differ in their preferences when it comes to flavor, texture, palatability (feel of food in the mouth) and digestive tolerance. Test energy bars and gels in real life settings. Avoid mixed bars immediately before and during workout, as the higher fat content may slow digestion and/or upset your stomach. The same applies for bars that are high in fiber, >5 g. Do not wait until meet day to take your first bite. In doing this, you risk experiencing adverse effects, which could include, among other possible side affects, nausea, cramping, and unanticipated bathroom visits!
- Beware of Extra "Stuff." Many manufacturers claim that the extra vitamins and minerals they have conveniently added to their product are critical for the energy boost. The fact is that the energy a swimmer gets from a sports bar or gel comes from the calories it provides. While the importance of vitamins and minerals for proper body functioning cannot be denied, adequate amounts of these nutrients can be obtained by consuming a variety of foods from all of the foods groups on a daily basis. In addition, many of the "extra" ingredients supplied in these products may not be ones a competitive athlete wants or needs to ingest. Be extra cautious of herbal ingredients.
- Read the Ingredients. This tip is simple, but it is extremely important! You must be aware of what you are eating. Pay particular attention to the ingredients list on every individual package, and avoid products that may contain substances that you know or even think may appear on the prohibited substance list. Sometimes fortified products contain even more than what actually appears on the list. It is possible. It does happen. It is your responsibility.
- Eat "Real Food." While bars, drinks and gels provide a convenient way to get the extra calories necessary to keep pace with the swimmer's lifestyle, it is critical to eat a variety of foods from all of the food groups every day. Use energy bars and gels only to compliment a well-balanced diet when energy demands are high and "real food" is not an option.

For additional information on issues related to this review, visit the following web links:
Laboratory Evaluation of Nutrition Bars:
http://www.consumerlab.com/results/nutbars.asp
Laboratory Evaluation of Powders and Drinks:
http://www.consumerlab.com/results/nutdrinks.asp

Recommended Reading

- American College of Sports Medicine. (1996). American College of Sports Medicine position stand: Exercise and fluid replacement. Medicine and Science in Sports Medicine 28(1):i-vii.
- Coombes, J.S. and K.L. Hamilton. (2000). The effectiveness of commercially available sports drinks. Sports Medicine 29(3):181-209.
- Cunningham, J.J. (1997). Is potassium needed in sports drinks for fluid replacement during exercise? International Journal of Sport Nutrition 7:154-159.
- Gleeson, M. and N.C. Bishop. (2000). Modification of immune responses to exercise by carbohydrate, glutamine and anti-oxidant supplements. Immunology and Cell Biology 78:554-561.
- Green, G.A., D. H. Catlin and B. Starcevic. (2001). Analysis of over-the-counter dietary supplements. Clinical Journal of Sport Medicine 11:254-259.
- Harvard University. (2000). Power in a bar or procey snack? Harvard Women's Health Watch July:6.
- Leiper, J.B. (1998). Intestinal water absorption – implications for the formulation of rehydration solutions. International Journal of Sports Medicine 19:S129-S132.
- Maughan, R.J. (1998). The sports drink as a functional food: formulations for successful performance. Proceedings of the Nutrition Society 57:15-23.
- Murray, R. (1998). Rehydration strategies – balancing substrate, fluid, and electrolyte provision. International Journal of Sports Medicine 19:S133-S135.
- Ryan, M. (1997). Sports drinks: research asks for reevaluation of current recommendations. Journal of the American Dietetics Association 97(suppl):S197- S198.
- Tufts University. (2001). Why most energy bars should not go home with most people. Tufts University Health and Nutrition Letter 19(5):6.

ADAPTIVE ROWING

SPECIFIC NEEDS, EQUIPMENT & METHODS

Adaptive Rowing, do you know it? Is rowing a Paralympic sport? How many countries have an adaptive rowing program? Which type of rowing boats do you use in your program? What sort of technical aids are required to adaptive rowing? How can we guide our technical approach? Do you need an adapted rowing technique? How can we manage water safety? Which type of disability will get the best help from rowing? Is rowing a way for people to integrate?

Profile Capacities	%
Aerobic Capacity	15
Muscular Endurance	15
Technical Skills	30
Psychological Factors	15
Know-how	9
Anaerobic Capacity	4
Mobility	4
Muscular Strength	4
Tactics	4

Table 1 – Rowing Performance Profile

No doubt, simple and difficult questions that will need an effort to answer if a person with a temporary or a life-long disability comes to a club to share the sport of rowing and the joy of being a rower. In Athens, 2004, the IPC (International Paralympics Committee) expects the participation of 150 countries in the Paralympics Games. Paralympics means attached to the Olympics and, today, the spirit of the Olympic Movement means two world events: the Olympics Games and the Paralympics Games.

Rowing has been an Olympic sport since 1896, but it is not a Paralympic sport. Sydney 2000 will welcome 18 sports with 5000 athletes introducing sailing and wheelchair rugby as official paralympics sports. Rowing is the third Olympic sport in terms of number of athletes (545 rowers) but is facing a global sport pressure to reduce the number of rowers mainly due to its lake of universality and popularity. The first and second Olympic sports are Athletics and Swimming. They joint Paralimpic Movement in 1960, the year of the first Paralympics Games in Rome, and they are the two only sports with events in all sport areas of disability: blind, wheelchair, cerebral palsy and mental disabilities. Rowing is almost 40 years behind and, beside universality, rowing is facing a strikingly weak image point inside sport and public international community, because if rowing is an ideal lifetime sport for everyone, numbers and facts speak against it.

Cyclic Movement
Seat Position
Opposite Direction
Team Sport
Water (land)

Table 2 – Rowing Technique Profile

Adaptive rowing started in the seventies in the Netherlands and in Great Britain by the hand of rowing people. Inside each country, rehabilitation aim was guiding the field action using mainly leisure boats. A similar approach, on a larger scale, was made in the USA with the 'freedom on the river' program and, for the first time, an adaptive boat (the 'omni-cat') was produce to make rowing possible for people with more severe disabilities. Australia had joined this way and, in 1985, an international regatta took place in the Netherlands.

Now, adaptive rowing takes place on all 5 Continents and is promoted by 14 countries.

As with the beginning of FISA a hundred years ago, each country has made it's own approach, using different types of boats, races and rowers' classification and, for that reason, international events are difficult due to the lake of boat and rule standardization. Besides the performance boats used by a small number of rowers, adaptive rowing is performed in many different types of boats, mainly leisure boats.

The boats used are made in plastic or wood with single or double hull with one, two or four rowers, for sweep or scull oars. These 14 types of different boats can be row with sliding seats or fix seats, with or without a coxswain. The boat weight has a wide range for these boats and for some of them, support pontoons in the riggers can be added. Some of these boats are very expensive and others are small cost boats with some potential to be spread worldwide. Some of the adaptive rowing programs are working with national standard boats but, at international level, this is still an open issue.

Besides boats and rowing tanks, the electronic rowing ergometers used worldwide by performance and fitness rowers create a new window for adaptive rowing. In fact, adaptive indoor rowing has made rowing possible for everyone, anywhere and has made adaptive rowing competition easy for almost all types of disabilities. With indoor rowing, adaptive rowing has raised a high potential for a global approach in the world of sport for people with disabilities or with special needs.

The analysis of rowing performance profile (by Thor Nielsen (FISA Development Program) shows that rowing is an endurance sport, a healthy sport for everyone. In rowing, the technical skills are an important aspect of success in top level performance. But, technique is not thinking as a complex motor pattern dependent of the action context but a dynamic movement to be improved in a permanent context, the boat and water system.

Factor	Indoor	Water
Tonicity	XX	X
Equilibrium	X	XX
Laterality		XX
Space/time structure	X	XX
Body Image	X	XX
Protopatic Praxis	X	XX
Epicritic Praxis		X

Table 4 – Rowing and Motor Development Factors

Suddenly, for people with disabilities, the chance of rowing is dependent on an adaptive factor: the equilibrium. Taking in consideration this adaptive factor, rowing is possible for many profiles of disability. The equipment may require some technical aids or more stable boats but all the training methods developed by performance rowing are the same methods to be used in adaptive rowing.

The analysis of rowing technique profile shows that an adapted technique of rowing is not required for people with disabilities. Rowing technique is a complex movement, but can be learnt by imitation. Propelling the boat is possible by the action of the arms and, for that, a sliding seat is not required. A fixed seat is a technical aid for adaptive rowing.

The seat position is an early posture. Before walking, people have to learn to sit. This achievement will be a very positive input to the learning rowing process. The structure of the movement requires a cyclic and symmetric body action. So, in indoor rowing, rowing is possible and will help people with a lower level of body coordination. But, in water, beside memory, safety will be connected to the level of body coordination and to the level of understanding the bodyboat system. The body output is opposite of the boat output and for some levels of disability, profile rowing still requires a high level of cognition and body coordination.

Rowing is a team sport and a team requires an organize group of behavior. This code of communication and cooperation needs to be understood by a flexible and multi-way process. This means a complex and learning stage process a bit outside of rowing tradition.

The analysis of rowing technique generates so many questions and problems. But, at the same time, this technical approach will help to master them.
The chart of adaptive rowing master problems will provide powerful insights for coaches who work with people with different types of disabilities. The basic idea is not learning an adapted technique but learning the correct rowing technique by the help of technical aids, single-team boats and indoor/water equipment. This will make possible adaptive rowing for a large group of disability profiles and people with special needs.

	Rowing Movement				
Disability type	Cyclic	Seat	Back	Team	Water
Spinal cord		X		X	
Amputees		X		X	
Mental			X		X
Autism			X	X	X
Deaf			X		
Visual					X
Cerebral Palsy	X	X		X	
Multi-disabilities	X	X	X	X	X
Solution	Technical aids			Single boats	Indoor rowing

Table 3 – Chart of Adaptive Rowing Problems

Some technical aids have already been developed for indoor and water adaptive rowing. They can be summarized by an adaptive foot stretcher with asymmetric regulation, holding gloves for the handle of the oar, weighted oars and double button oars, several types of fixed seat and riggers pontoons, coaching headsets, etc. Other helping systems connected to the water pontoons and inside the boathouse may help the integration of people with disabilities and without disabilities making rowing a more friendly sport.

The linkage between the expertise of high level rowing and adaptive rowing is crucial. The ability of a person to perform rowing technique is dependent of several factors of motor development. Everyone knows that a good indoor rower may not be a good water rower. But a good rower is an athlete with a good performance in the boat and in the rowing ergometer.

The first factor, tonicity, is the first of the scale. The last factor, epicritic praxis (connected to smooth coordination) is the more complex but is dependent on the development of
all the previous factors. For example, equilibrium control is needed for a proper differentiation of right and left side. But, rhythm is based on spacetime organization and is dependent of a good development of these previous factors.

Rowing require a good development of all these motor factors. By them, indoor and water rowing may be understand as a unit in terms of adaptive rowing. For some disabilities profiles, water rowing in stable boats is too demanding and the aim of rowing technique development stays, with the present knowledge, in the indoor rowing. So, indoor rowing is a less complex movement than water rowing and may reach a larger group of people.

Rowing in double hull boats is more demanding than the indoor rowing movement but less demanding than rowing in single hull boats. Taking in consideration this approach, an upgrading system may support the development of adaptive rowing. By indoor rowing, rowing will have a chance for introducing competitive large-scale events for people with and without disabilities. By developing an upgrade competitive system, rowing will strongly contribute to the integration of people with disabilities worldwide and will reinforce the values of rowing.

Last but not least, if rowing fulfills this commitment, the quota pressure on rowing at the Olympic Games will be reduced and rowing will really become a worldwide sport for everyone.

Acknowledgements:
Amateur Rowing Association, Development and Adaptive Rowing Program, Great Britain
Dutch Adaptive Rowing Foundation, Netherlands
Landesruderverband Berlin, Germany
Adaptive Rowing Program, Rowing Australia Inc, Australia
FISA Adaptive Working Group

Association of Rowing Coaches

Membership Application Form

First Name: ______________________________

Surname: ______________________________

Gender: ______________________________

Nationality: ______________________________

ID Number (RSA): ______________________________

DoB: ______________________________

Postal Address: ______________________________

____

Cell Phone: ______________________________

Email: ______________________________

Club/Institution: ______________________________

Volunteer/Half paid/Full Paid: _________________________

Coaching Qualification Level: _________________________

Representation: International/National/Provincial:_______________

This form must be completed and returned by fax to Jamie Croly (National Secretary) at 011 781 2987 or by Email at jcroly@stithian.com. You will be notified by email of the receipt and acceptance of the membership application.

Membership fee of R100.00 per year will be invoiced after membership has been accepted and processed.