



Training Manual

Glossary of 'Dragon Boat' Terms

<i>"All Down"</i>	Command from drummer/steersperson to stop paddling and rest with paddles on laps.
<i>"All-up"</i>	Command from drummer/steersperson to ensure everyone begins to paddle in unison. Paddles are paused in the catch position until command to start paddling is given.
<i>"Attention, please"</i>	Command given by race starter to prepare crews for departure, the start gun will follow in approximately 3-5 seconds.
<i>Back Paddling</i>	The stroke used to bring the boat backward into or away from a dock or a race start.
<i>Catch</i>	The point where the paddle first comes into contact with the water
<i>Check</i>	"Check the boat" or stopping the boat's momentum whether in a forward or backward position. If moving forward a 'check' would be accomplished by back paddling.
<i>Draw Stroke or Draw</i>	Stroke used most often by front or back paddlers to line a boat up straight at the start of the race or to turn the boat around. The paddle is placed perpendicular to the side of the boat and 'drawn' towards the boat.
<i>Drummer</i>	The person who sets the crew's timing by rhythmically pounding a drum or calling stroke rates. The drummer sits in the bow and is usually lightweight.
<i>Engine Room</i>	Refers to the larger paddlers in the middle to the back of the boat.
<i>Exit</i>	The point in a dragon boat stroke in which the paddle leaves the water cleanly and quickly midway between the paddler's hip and knee.
<i>Finish</i>	The point near the end of the race (in 500m race usually the last 100m mark) when a team's drummer/steersperson calls for an increase in power and rate
<i>Hitting the catch</i>	Driving the paddle forcefully into the water at maximum reach position
<i>Ignition</i>	Refers to the paddlers at the front of the boat who set the pace.
<i>"Let it run"</i>	Stop paddling and let the boat coast with blades out of the water
<i>Pull</i>	The phrase of the stroke in which the paddle is fully buried in the water and the paddler pulls the paddle back directly parallel with the boat
<i>Reach/extension</i>	The phrase of the stroke in which the paddler maximizes the length of their stroke before hitting the catch

<i>“Ready, ready”</i>	Command used by steer person/drummer to prepare crew for race Start - paddles buried in water at beginning of stroke phase
<i>Recovery</i>	The final phase of the stroke in which the paddle, following the exit, is snapped forward to catch the position.
<i>Rotation</i>	The stroke phrase that involves rotation trunk rotation in order to maximize reach.
<i>Rushing</i>	Occurs when a paddlers timing is ahead of sync with the rest of the crew
<i>Steersperson</i>	The person located at the stern of the boat who is responsible for steering and giving the crew commands. Preferably someone with previous sailing or boating experience. A minimum of two-dragon boat practice sessions is required to acquire the skills necessary to steer the boat
<i>Stroke</i>	Refers to one cycle of the paddling motion
<i>Stroke rate</i>	The paddling pace, the number of times the paddle goes through the water in a minute. Rates can vary from 40 to over 80 depending on the intensity of effort. The crew’s optimum rate for racing is determined by the coach
<i>Swinging</i>	The bad habit of dropping the top into the boat on recovery phrase thus causing the blade to swing out over the water. This inefficient technique prevents the achievement of higher stroke rates necessary for racing
<i>Take it away</i>	Command given by drummer/steersperson to begin paddling, usually flows command of ‘all up’
<i>Top Arm Drive</i>	To maximize the catch, the top arm is driven down aggressively burying the paddle. The top arm continues to push down until the end of the stroke
<i>Turbo</i>	Refers to paddlers at back of the boat. Paddlers in the back seats must catch the water very aggressively because the water is moving faster and harder to get a good hold
<i>Set</i>	Command to place paddles in a position across laps with blades out over the water in preparation for the ‘all-up’ command
<i>Six-Sixteen</i>	A command race start technique consisting of six hard strokes followed by sixteen faster strokes
<i>Series</i>	Race strategy whereby crew pulls harder for a group of 10-20 Strokes

THE TRAINING PROGRAMME

The number of factors to be considered in developing a Dragon Boat Training Programme is immense. Obviously the more time a team spends practicing, the greater the difference in performance. The amount of training an athlete must undergo within a season depends greatly on the goals and objectives set out early on in the year. For example, to obtain high performance challenging world record achievements, an athlete today must expect to commit 1000-1500 hours of training time a year (that's 3-4 hours a day!); at a national level one could expect 600-800 hours (1 1/2 - 2 hours per day); while at a local level one should realize that a minimum of 300-400 hours of training is required if you want to be successful competitively, which translates to 1 1/2 - 2 hours 3 to 4 times a week, year round.

The formula for high performance, however, demands *quality time* and the winning team is not always the one which practices the most. Training time must be carefully managed in a 'Training Programme' to facilitate development of the different aspects of an athletes' physical potential, such as Strength, Endurance, Technique and Speed which all have quite different training requirements. The ideal programme will maximize an athletes output from a minimum amount of training that focuses these specific aspects, and allows an adequate time for his/her body to adapt and recover from the stress brought on by exertion. The independent variables of training programme, therefore, are VOLUME, INTENSITY and DENSITY.

Training VOLUME (the amount of work time) is certainly adjustable, though it is effected by the INTENSITY of work (how hard you work) and the DENSITY of practices (the number of practice sessions related to rest periods within a given time). To put it simply, for a low INTENSITY work-out such as a long trip in an outrigger, the VOLUME of work can increase, which is good for aerobic Endurance training, though you need a long time to recover so that the DENSITY of a work-out schedule must be kept low.

On the other hand, a high INTENSITY workout such as sprint interval training is good for Speed and Strength development, though the VOLUME of work must be low since our bodies cannot handle extreme exertion for long or without greater rest periods between each piece of work. DENSITY, however, can be increased by adding more practices of shorter duration throughout the week.

The key to an effective training programme is to find the right balance of VOLUME, INTENSITY and DENSITY which best suits the goals and time commitments of a team. A training season should begin with a large VOLUME of work at low INTENSITY and gradually increase the INTENSITY of practice sessions closer to the target competition date, decreasing the VOLUME. It is important to understand that by varying the degree of VOLUME and INTENSITY an athlete changes different aspects of his/her metabolism and physical structure to ultimately result in higher performance.

Our paddling season has been further broken down into separate phases to allow for progressive development and transition from one level of performance to the next. The type and intensity of work we do changes as our bodies adapt to progressively increasing demands. Macro-cycles refer to the largest organizational block grouping work of similar nature. Micro-cycles refer to the weekly pattern of activities which support the objectives of the macro-cycle.

The basic concept is that a weekly micro-cycle varies intensity from one day to the next allowing us to balance hard work with recovery time. Macro-cycles prescribe increasing levels of intensity week to week in order to achieve specific performance goals within a 4-8 week period. Our bodies tend to respond best when stressed and then are allowed to heal. The healing process is what makes us perform better in the next cycle.

The three main Macro-cycles are:

- General Fitness Preparation
- Strength and Endurance Development
- Speed Development and Race Preparation

General Fitness Preparation (4-8 weeks)

The objective of this Macro-cycle is to create a performance base. Development is to be more general allowing for a broad range of distances and variety in exercises during this phase. Work should nevertheless be more specific than in the off-season and focus of paddling related activity to build up local muscle endurance ie. the muscle groups which will be used for racing.

a) General Aerobic Conditioning

Work in the boat will focus on low intensity, larger volume exercises such as steady state intensive paddling sessions mixed with longer extensive sessions if training seeks to develop marathon abilities. Work should be comfortable but strong earlier in the cycle but should progress to uncomfortable and fast paddling. The cycle will end with a level of intensity which borders in painful ie. Maximal Aerobic work.

There are two objectives for this Cycle. To improve our the general cardio-vascular potential such as cardiac stroke volume, VO₂ max. etc. and to increase capillary density in our paddling muscles. This will provide the staying power for races even as short as 500m.

Alternative sessions to the boat would be running, swimming, kayaking or rowing (boat or ergometer) as long as it's working to the same level of intensity and duration. Effort should be made to raise anaerobic threshold levels and to achieve maximum aerobic functioning.

b) Base Strength Development

Muscle mass should increase (hypertrophy) and base strength should be developed in the gym for all muscle groups (see section 2.2 for dryland strength development - Hypertrophy Phase). Even a simple routine of push-ups, sit-ups, pull-ups and dips at home can go a long way in developing a base strength that can contribute to better paddling performance.

A small amount of resistance training in the boat is good at this stage as long as the resistance level is also low eg. dragging a tire or having 1/2 of the boat paddling for 50-60 strokes.

Strength and Endurance Development (2 cycles @ 4 weeks each)

This Cycle seeks to make improvements to paddling strength and specific race endurance. Neuromuscular recruitment is important, so effort both in the boat and during dryland training should be intense striving to 'feel' for maximum resistance during a paddle stroke. Speed work should begin in the later stages of the cycle.

The Paddling Programme includes two Strength and Endurance Macro-cycles allowing for a period of transition. The second Cycle starts from a lower level of intensity builds to a higher level much faster than the first Cycle. The purpose for this is achieve a better balance between aerobic and anaerobic conditioning exercises which are taken to greater extremes in the second Cycle.

a) Aerobic/Anaerobic Endurance Training

The range of work should begin with Anaerobic Threshold training and advance to Lactic Tolerance training later in the Cycle. The emphasis is on intense interval sessions at least once a week alternating with intensive steady state paddling on other days in the week. Close attention should be paid to heart rates during activity to ensure that work is targeting the appropriate intensity. This is air-sucking, heart-pounding, rubber-leg kind of work, so don't expect improvement if your going for an easy jog.

b) Maximal Strength Development

The initial Cycle should accompany the dryland Strength Phase (see section 2.2) and the latter Cycle should correspond to the Maximum Strength Phase of the Dryland Weight Training Programme. The level of resistance in the boat should also be increased during resistance training sessions. Care should be taken to avoid back to back strength training sessions ensuring that proper recovery time is allocated.

Race Preparation (4 weeks)

This is the Cycle where speed becomes the main feature, converting the strength gains which were made in the earlier Cycles to power. Maximal intensities will be stressed with a duration of work which is closer to the actual race. Race rehearsals will be conducted where all of the trained aspects will be put together for a specific target performance.

Smoothing out the transitions from utilization of one energy system to the next is the goal in discovering the optimum racing pace.

a) Race Specific Aerobic/Anaerobic Conditioning

Maintenance of aerobic conditioning is important in this Cycle both in the boat and on land. Longer distance steady state paddling sessions will provide recovery activity for extreme lactic tolerance training. Specific endurance for the sprint race distances is the goal to the extent that there may be some decrease in long distance endurance.

Interval training on land should continue to stress improvement to VO₂ max. and anaerobic thresholds.

b) Development of Power

Strength work should focus on converting absolute strength to power. Fast contractions and less load should replace maximum loads early in the Cycle (see section 2.2 - Power Phase). Acceleration drills and maximum speed exercises will be carried out in the boat the stress maximum application of power throughout the race distance. Endurance of strength is important and is best to be improved in the boat, paddling.

The Taper

Critical to top performance is tapering down activity to limit damage to muscles and let our bodies recovery for a race event. It does not mean that work stops all together, particularly for sprint races. Generally the density of practices is reduced, but is replaced by extremely high intensity work for short duration to maintain speed. Alactic activity is stressed, limiting extreme work to 15-20 seconds in order to prevent accumulation of toxins. Low volume is also a must to avoid over-stressing central energy stores.

The duration of the Taper Cycle is difficult to determine. Where the density of training is high ie. 10 to 12 sessions per week then typically the taper is longer, perhaps 2 - 3 weeks. For a lower density training of 3-4 sessions per week, the taper probably needs only 1 week.

Combined with proper nutritional preparation, the end result is a performance peak.

PADDLING TECHNIQUE

In Hong Kong, a tremendous amount of controversy revolves around the optimum paddling 'style', which is often couched in as much mystery as that of the winged keel. The rudiments of dragon boat technique, however, are common to most forms of paddling, such as kayaking, marathon canoeing, outrigger or even rowing for that matter. Dragonboating or outrigger canoeing are most closely related to C1 canoeing which involves a very similar pattern of movement and is a useful comparison due to the large amount of research data is available on this particular stroke.

The basis of a good paddling technique is the emphasis on 'the forward stroke' ie. applying power in the water in front of your body. Many good paddlers keep it to basics and will tell you to 'just get the paddle in deep and clean and pull like hell with lots of length, as many times as possible'. Though this may sound simple enough, there are a complex series of movements required to execute 'the forward stroke' efficiently and effectively. Understanding the components of stroke technique is vital to accurate analysis of an individuals paddling style.

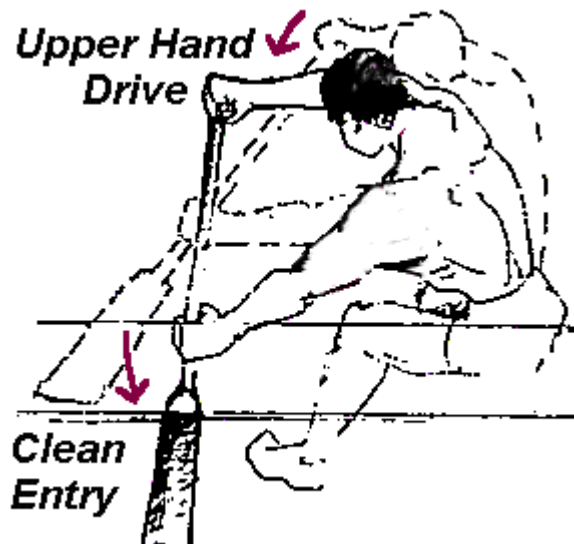
The four critical phases in the forward stroke are the CATCH (anchoring the blade), COMPRESSION (the power phase), the FINISH (getting out of the water) and the RECOVERY (getting forward to a ready position). The characteristics of different 'styles' may be due to variations in one or perhaps in every phase of the stroke, though the principles behind each phase are universal. We must accept that style may also vary from person to person depending on body size and stature which can work to the advantage of the team due to the different physical constraints of each seat position.

Equally important, we must recognize that 'style' changes as stroke rating increases and the stroke length is decreased. Many paddlers experience difficulties in attempting to apply the characteristics of a longer, slower technique to a faster rating.

A smooth running of the boat results from paddlers not only going into the water at the same time, but moving through each phase of the stroke in perfect unity. The complete stroke must also be seen as a cooperative product of its parts, executed in one unified motion, not as a series of independent movements.

Individual paddlers should create a mental image of each stroke phase both on the water and off, understanding its components intimately and how they effect performance. Analysis of technique can be made easier by isolating the disposition of the paddle in relation to the boat and by tracking key reference points on the body, namely the wrist, the elbow and the shoulder. It is useful for paddlers to know the position of these points relative to their own stroke and in relation to an ideal model.

PADDLE TECHNIQUE - The Catch



Few sounds on the water generate as much satisfaction as 20 paddles plunging into the water in time and without splash; except maybe that sound a high platform diver makes when they cut the water surface with nothing more than a ruffle of bubbles.

Burying the blade in the water is called the 'CATCH' and it should be well in front of your body critical to initiate a powerful stroke. This is where most novice paddlers are the weakest and it is the point at which even veteran paddlers fail when they start losing power due to lack of conditioning. The most common problem is to lose length by catching the water too far back by not reaching far enough forward in the RECOVERY or start smacking the water with a misguided sense of aggression.

A good CATCH requires a deliberate and powerful drive downward by your top arm, which is made more effective when the wrist and elbow of your upper arm are above the inside shoulder making your forearm parallel to the water surface. Some teams utilize very high upper hands to emphasize a forceful drive into the water, though good control as the blade enters the water is important to avoid splash.

Good paddle entry is executed in either a vertical 'spearing' of the water or can be combined with a slightly diagonal 'slice' as the blade carves into the water. The slice is found to be very effective by locking the blade in fast and deep with less of a vertical lunge, though requires a greater participation from the bottom hand in combination with the upper arm drive. Your bottom arm must be fully extended forward, but not locked at the elbow to help ANCHOR the paddle in the water quickly and cleanly to its full depth and correct location relative to the side of the boat, without any splash or horizontal movement.

A common problem is that 'work' is often applied too late after the CATCH as a paddler may

be well into the first part of the STROKE phase before full power is exerted (wasted potential is a paddling sin). A good CATCH technique must transmit power into the STROKE phase within a fraction of a second. This is also important to unify CATCH in the boat in order to maximize POWER with each paddler transmitting power into the STROKE at the same time, which is not always apparent. Getting into the water at the same time is one thing; beginning to pull together is another and is vital to a fast boat.

Excess splash or cavitation in the water (trapped air and disturbed water) is an indication that you are applying power with the momentum of the vertical drive, before the paddle is fully buried (lost energy is another paddling sin). The paddle blade at entry should be moving forward at the same speed as the boat in order to avoid such splashing. Smacking the water too aggressively can result in broken paddles and can lead to tension when your teammate behind you receives an unwanted face full of water. This type of problem is often created by a misapplication of aggression and is usually an indication that a paddler is getting tired or is unable to keep up with the pace. The CATCH is not a power phase, it's how you get into the water. Keep it fast and keep it clean.

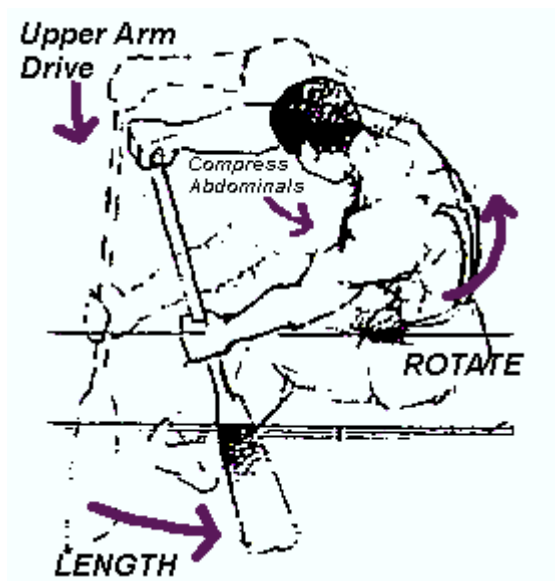
Another common mistake is to lunge too far forward with your upper body or to bend excessively at the waist which starts the boat bobbing up and down.

You want to run a quiet boat. You want a smooth running boat. Every time the boat wiggles left or right or bobs up and down, you lose a little. This can play havoc with your speed and efficiency - be fast.

Remember that the length of 'the forward stroke' is controlled by a fully extended bottom arm and a rotated torso. You only need to bend far enough forward to bury the blade to its full depth at the CATCH.

Remember also, a powerful CATCH comes from a strong upper arm drive into the water at a forward position which is sharp, clean and instantly transmits power into the STROKE. Once the stroke rating increases to 90 plus, emphasis on the CATCH becomes more important in order to deliver power quickly.

PADDLE TECHNIQUE – Compression



Many paddlers think that they are pulling water past their bodies to make the boat move forward; but this doesn't make any sense at all. In fact, the paddle, once its in the water, moves very little in relation to a fixed point in space and that the boat is actually pulled up to this fixed point during the COMPRESSION phase.

This is the power phase and it is a full body endeavor which must coordinate arm, leg and torso muscles into a singular and controlled movement, transmitting power into a linear forward direction. Keeping the paddle relatively vertical and anchored in the water with the arms a paddler must use his/her torso to pull the boat forward. If too much enthusiasm results in pulling the paddle back through the water then energy is lost and a great turgid froth without much forward motion usually results. Much depends on a good solid CATCH, and the rest depends on solid control of power expenditure that accelerates the boat forward. It helps to imagine that you are hurtling your body up and over the CATCH position by pressing the paddle vertically down. This requires a smooth and continuous motion compressing shoulders downward by crunching your abdominal muscles, at the same time rotating the torso at the waist utilizing the large back muscles ie. Lats. and Erectors. The upper arm must continue to be held high and drive down with the shoulders to keep the blade locked into its position in the water as the stroke develops. A minor forward push of the upper arm will transmit additional power into the paddle with your Deltoids and Pectorals, however you must keep the fulcrum point of the paddle high, about six inches below the upper hand 'T' piece.

The bottom arm must be strong to keep the blade on a straight track and transmit the power from the torso into the paddle, and will only bend slightly to push the FINISH of the stroke with your Biceps.

Following this motion, the paddle works as a third class level, with the upper hand remaining relatively fixed with the vertical drive of the shoulders and rotation of the torso providing force. Very often, paddlers get into the habit of pushing their upper arm over and downwards at the CATCH, thereby lowering the paddle fulcrum point to the location of their lower hand.

The upper hand during this phase should not drop below your shoulders and your forearm should remain parallel to the water surface.

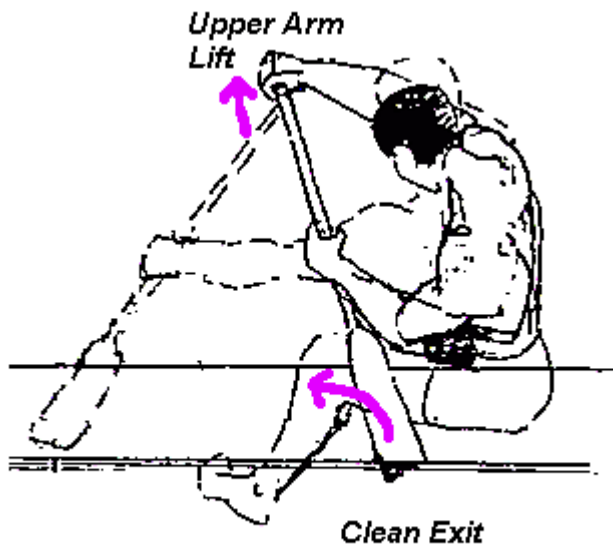
Another problem is that the paddle blade is often not deep enough to maximize the resistance area, particularly at the front end of the COMPRESSION phase. The paddler must bend forward to keep the blade buried right up to the shaft. Very often paddlers will also begin to lift their blades gradually out of the water towards the FINISH, which can be seen as their bottom hands rise in relation to the gunwale, starting midway through the stroke. Focusing on a good top arm drive and curling the torso over with your Abdominals to keep the paddle in the water will help.

Adding power to the end of the compression phase relies on a deliberate push just before the FINISH. The paddle must be kept as vertical as possible with forceful upper arm drive downward, as if you were attempting to plant the paddle straight into the ocean bed. This takes tremendous focus to do it well and do it consistently. Efforts must be made to train the deltoids and pectorals to deliver power at this part of the stroke.

Keep the paddle vertical during the power phase. The paddle should be in line with the keel line of the (boat). Too often, paddlers tend to follow the side of the (boat) with their paddle. Bow persons' paddle should enter the water away from the sides of the boat and come in so the paddle nearly touches the boat at recovery. Stern paddlers do just the opposite, planting the paddle right beside the boat and coming straight back.

The legs play a much more critical role than one would think as they are used to push the boat forward and lock the body into your seat. They must anchor the body into the boat to the point that your knees can suffer severe strain. Ideally all paddlers should align their outside legs against the gunwale and outside foot rest (or seat in front) so that a continuous line of force is directed into the boat. The inside leg should be tucked under the seat with the knee braced against the inside spine of the boat, which helps lock the body in and assist in an easier rotation. Sitting slightly forward to hang over the front edge of the seat will also help to lock in and provide resistance to the forward motion of the recovery.

PADDLE TECHNIQUE – Finish



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The power stroke is brought to an end when the elbow of the lower arm is aligned with body and the shoulders are parallel to the seat i.e. *the neutral position*, with the blade still fully in the water. Any power applied after this point, which is certainly possible, results from over-rotating the torso and more often will create a lifting force due to the angle of the paddle that will pull the boat down into the water and/or will ship water into the boat. This is an important point since the body is capable of exerting force beyond the neutral position, however, it is not an energy expenditure which will contribute effectively to the forward motion of the boat.

The paddle should be slipped diagonally up and out of the water leading with the upper hand as quickly and cleanly as possible with minimum resistance or splash (Deltoids). Many teams emphasize lifting the paddle high with the upper hand to keep the paddle as vertical as possible. This is good in flat water conditions and in boats with close seat spacing as it allows a paddler to reach up and around the paddler in front.

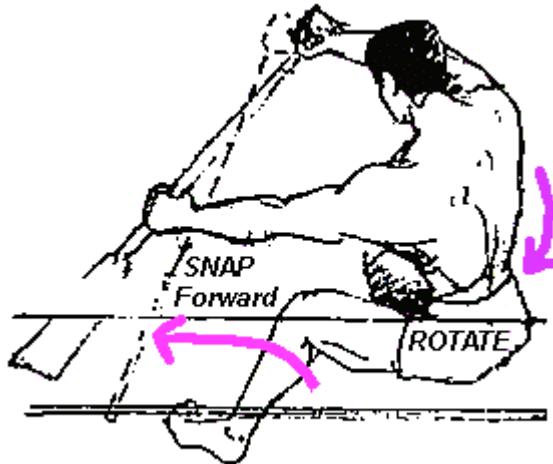
A common problem is that the FINISH is either initiated too early particularly when the stroke rating is high, or lacks any clear definition as the paddler begins to lift his blade out of the water half way through the COMPRESSION phase. It is imperative that the paddler focuses on keeping the blade deep in the water and applying full power to the stroke right through to the FINISH position. Think of the vertical upper arm drive!

It's worthwhile to focus on a 'power punch' at the FINISH to provide a kick at the end of the stroke similar to the aggressive CATCH at the beginning. To achieve this, the outside elbow should be kept close to the body and the paddle blade should be feathered out with a powerful kick from the forearms and biceps. The paddle should be brought out fast and high to avoid drag and to initiate a speedy RECOVERY. This will also help to push water away from the

boat as the blade exits.

The FINISH should be executed with the same aggression and precision as the CATCH, and with the same timing throughout the boat.

PADDLE TECHNIQUE – Recovery



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The RECOVERY is the key to the forward stroke technique as it sets up the CATCH well forward of the torso.

The most efficient RECOVERY is achieved by rotating the torso to push the outside shoulder straight forward while the inside shoulder is pulled to the back ie. in reverse of the STROKE. The lower arm must punch forward to create a long 'reach' while the upper arm is pulled the opposite direction and thrown back over the head to open up the chest.

This must be a quick and snappy motion since it is effectively 'down time' - when energy is not spent moving the boat forward; ie. the less time it takes 'get up front' the more time a paddler can spend pulling the boat. A fast recovery must be trained since it makes great demands on the Abdominal muscles, Deltoids and Traps, different from the efforts needed in the COMPRESSION phase. The key to a higher rating is a faster RECOVERY which allows stroke length to be maintained.

Precise timing in the boat is controlled by a coordinated RECOVERY where each paddler must execute a sharp and deliberate snap forward with the lower arm pushed from the shoulder.

Don't keep your recovery the same speed as the power phase of the stroke. Watch the good paddlers - their recoveries are fast. The time your paddle spends swinging through the air isn't helping you at all. To go fast, you have to get that paddle back in the water where it will do some good. To increase your stroke rate, do it making quicker recoveries.

Remember, a clean recovery is executed in a snap forward motion and is not achieved

very well if the outside arm is carving great circles in the air. It is a relatively straight linear movement forward aligning with all other paddles in the team with outside elbows and paddle blades kept close to the gunwale.

A slight pause before the CATCH phase will mark both the end of the full stroke cycle and will help to synchronize the timing of the team; though at a high rating the 'pause' is more of a mental punctuation mark than any noticeable lapse in time

Though the movement forward should be kept 'bright and crisp' the paddle should be held lightly to relax forearm muscles. Very often paddlers exert too much power getting forward. The RECOVERY should be fast but light. Over time it will become effortless movement, but it takes a lot of work to achieve speed and should not be neglected as part of a training regime.

Boat speed in the RECOVERY phase will slow down obviously due to the break in paddling, though the rate of deceleration known as the Check can vary from team to team as a result of different technique. As paddlers move forward, their centre of gravity (CG) can also move forward causing the boat to decelerate more. Strangely enough the boat will actually accelerate slightly on its own at the end of the RECOVERY phase once the paddler's forward movement ceases. In this respect, you should focus on minimal movement of the CG in the RECOVERY, and confine that movement to a forward and backward line, not up and down or side to side.

One common problem is that the upper arm is allowed to drop too much resulting in a horizontal RECOVERY. In a tight boat, this will be problematic and will also begin to hamper efforts to increase rating.

Bending the upper arm also leads to excessive movement which will limit performance at a higher rating and can cause the boat to jump around a lot. Neither the upper or lower arm needs to flex very much in the RECOVERY, or for any phase for that matter.

VARIATIONS in STROKE TECHNIQUE

As previously mentioned, stroke technique will vary slightly from person to person due in a large part to differences in physiology and training background, and should be tolerated to a certain degree, particularly at a local race level. While it is important to have everyone paddling the same technique, it is more important to ensure that each paddler is contributing to his or her highest potential. Even the best teams in the world show a variation in individual technique yet they all pull a lot of water and win.

The critical issue is that each paddler hits each phase of the stroke with precise timing and that the movement front to back and side to side are consistent throughout the boat to maintain balance and smooth running. Even though paddlers may have slight differences in form, ie. some rotating more or others with a slightly higher blade on recovery, if everyone is executing each phase correctly and in time, it is doubtful that efforts spent on minor adjustments for the sake of consistency make any significant difference in boat speed.

It is more important to focus on the smooth transition of power from one phase of the stroke to the next and that the delivery of power is timed perfectly for each paddler at every point in the stroke.

The basics of technique that establish consistency among team members are recapped as follows:

- the consistent location of the CATCH and FINISH
- minimal splash or lifting of water
- uniform speed of RECOVERY and STROKE (some people move faster than others)
- uniform depth of paddle in the water
- uniform angle of the paddle as it moves through each phase
- the precise timing at which each phase is initiated
- the alignment of paddles with the direction of travel
- the elimination of excessive movement (bobbing your head up and down or side to side will not improve performance and only waste energy)
- fluid and unbroken movement through each phase
- uniform breathing pattern

The nature of the boat can also effect the characteristic of stroke technique due to shorter seat spacing, higher gunwales, the weigh of the boat or the size of the paddles. It is imperative to 'test' out a race boat by varying stroke length and rating to find the most effective combination to make the particular craft move the fastest. For example, an eight man colour boat responds much better to a longer stroke with a greater emphasis on a drawn out kicked finish, compared to a quicker dragonboat stroke.

Natural elements such as tide, wind or water conditions will impact on technique. Racing with a tailwind for instance should increase boat speed and allow for an increased stroke rating, whereas rating should decrease and a greater stroke length should be implemented when heading into a wind.

In choppy water it is important to have paddle blades higher on the recovery and to emphasize greater depth in the water to avoid going in too 'short' when a wave trough is encountered. Choppy water will also slow the boat down so it is important to be able to adjust stroke rating in order to suit the abilities of the crew to the particular conditions experience.

STROKE RATING

One of the most immediate features of stroke technique that can be readily adjusted is the RATING and finding the 'right' rating is the greatest difficulty many teams face. There is a delicate balance between boat speed and rating which is effected by the conditioning and strength of a crew and the duration of the workload.

Basically, the faster the boat moves, the higher the possible rating. Conversely, however, a higher rating will not necessarily translate into a faster boat speed unless the crew is fit enough or well prepared to respond to the demand. CONTROL and POWER must take priority over RATING and even if one paddler fails to keep up to the pace set by the rest of the crew, then the boat will not run at its optimum speed. Ideally, a team should strive to maintain the length of stroke yet at as high a rating as possible.

Demands on rating depend very much on the calibre of competition. For example, the top Dragonboat teams in International level competition rate between 85 to 96 strokes a minutes with rating surges that top out between 98 to 120 (Nam Hoi bursts out of the start with a blistering 130). Rating at 75 to 80 will not allow a crew competitive in an International class regardless of how much power they can muster. On the other hand, at a local, competition, the more effective teams rarely go beyond 80, and very often teams that attempt to sustain ratings of 85 plus, fade quickly due to the lack of conditioning required to maintain such a pace.

A large problem is that a crew will not physically be aware that their rating is too high until they are well into a race and they start to fail due to lactic acid poisoning. A critical part of training a crew is to develop the discipline to maintain control over the natural desire to exceed their limitations in the heat of a race; a crew must learn to push the rating as high as they can, but only as far as it contributes to a faster boat.

Changes in rating play an important role in the development of a race strategy and a crew must be well versed in the technical differences and varying degrees of endurance that are associated with different stroke rates. Generally a slower rating will be accompanied by a longer stroke length with a greater emphasis on torso rotation and pull with the lower back muscles.

Consistency and maximum use of power through the COMPRESSION phase is the critical aspect of a lower rating which allows a paddler to function at a level of intensity just below his or her anaerobic threshold.

At a higher rating of 95 plus the characteristics of the stroke technique changes dramatically with a reduced length of stroke and less movement of the lower torso.

Powerful propulsion comes more from the CATCH and FINISH since the COMPRESSION power phase is reduced in length. The CATCH location should change very little and only the FINISH position is moved forward, requiring the paddler to lock the angle of his torso forward and to derive power from the rotation of his upper shoulders and arms.

Being able to shift easily from the long to middle to short stroke technique is vital and improper training will lead to a paddler becoming overly taxed and frustrated at attempting to apply a long stroke technique to a high rating or trying to apply a high rating to a boat which is just not moving very fast.