OC6 Steering Basics

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1. STEERSPERSON RESPONSIBILITIES

A steersperson ("Steer") is the leader of the crew and is responsible for the safety of the crew while on the water. The Steer should exercise good judgement and not expose the crew to undue risk in the circumstances. The Steer is responsible for inspecting the canoe prior to practices and races to ensure it is properly rigged and equipped with safety gear (i.e. approved PFDs, bailing bucket, hand bailers, rope ladders, navigation lights). The Steer also leads in huli recoveries.

1.1 Qualities of a Steer

Ideally, a Steer should:

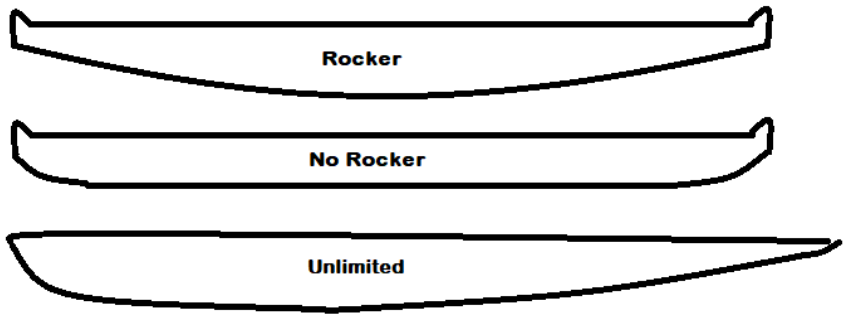
- be attentive, focussed and diligent with good eyesight (including at nighttime)
    - to control the canoe and be aware of wind, waves, tides, currents, buoys, other canoes and boat traffic at all times, including during practice breaks
    - be aware of drift when at rest, especially drifting into buoys and parked sailboats
- be a leader, good communicator and be comfortable taking charge and issuing commands
    - with a loud voice or have commands relayed to the front
    - to manage personalities in the crew, but not be a tyrant
    - to feed information to the crew to eliminate distractions (i.e. I see the log/buoy, power through the boat wake)
- be an experienced paddler with good judgment
    - to encourage and support the crew (i.e. managing workouts, assisting in coaching (if applicable), surfing calls)
    - to quickly recognize and troubleshoot issues (i.e. power imbalance, timing, responding to conditions with technique)
    - to recognize hazards (i.e. submerged rocks, boat wake, a brewing storm)
    - who knows their own limitations (i.e. if water conditions are too big)
- be a strong paddler
    - to quickly change sides and implement strokes for course corrections
    - with a good power to weight ratio
    - who won't add excessive load if conditions prevent the Steer from paddling (i.e. for a 150lb Steer in a 400lb Spec canoe, the load is 67lbs per paddler if all 6 paddle (400lbs/6), but 110lbs per paddler if the Steer is not paddling (550lbs/5))
- have a thick skin, as the Steer will be blamed for a myriad of things despite having the foregoing qualities (i.e. hulis, collisions, taking the 'wrong' line, missing a turn buoy, taking a turn too wide, taking a turn too tight, slowing the boat)

2. EQUIPMENT

2.1 The Canoe

There are several different models of canoe with different hull shapes and weights. There are 2 weight classifications of canoe – “Spec” (which has a minimum weight requirements of 400lbs) and “Unlimited” (which has a weight less than 400lbs). The shape of the canoe hull, the type of ama and how the canoe is rigged (shimmed, toed in, toed out, rigged light, rigged heavy) will all impact the behaviour of the canoe.

Most new Steers start on Spec canoes. The OC Connection Mirage and Bradley Lightnings which have “rocker”, which means that the hull is deeper in the middle of the canoe than at the ends and have a flat cross-section. These features allow the canoe to spin, pivot or swivel at its centre point in order to turn and surf waves, so they are more susceptible to influences on the canoe and do not track in a straight line. Canoes with rocker are harder to steer than those without rocker and can enter into a ‘death spiral’ if the spin is not properly managed.



Canoes without rocker track straighter and are easier to steer (allowing the Steer to paddle more often), but take wider turns and have more drag, because of a longer waterline. Examples are the Calmar and the Clipper Advantage.

The hulls of Unlimited canoes also differ from the Spec canoes. The ARE Matahina and the Puakea Malolo have a slight keel or “V” in the shape of their hulls. The Matahina has a more pronounced keel than the Malolo, so it seems to track straighter, but is quite difficult to turn (often requiring seats 1 and 2 to assist), while the Malolo has less keel, has some spin and is easier to turn than a Matahina, though not as easily as a Spec canoe with rocker.

A Steer must recognize the different models of canoe in a race, because of their inherent limitations (i.e. Matahinas, Malolos, Calmars and Advantages cannot make turns as tightly as a Mirage or Bradley, so give room or cut inside at buoy turns).

2.2 The Steering Paddle

The steering paddle differs from a regular outrigger paddle as the blade is sturdier, is set at a shallower angle from the shaft and has a longer and larger surface area. Larger steering blades are more effective in bigger water conditions, but harder to paddle with. When fully buried, the blade will extend well below the hull of the canoe. When choosing a steering paddle, select a length that 1” longer than your regular outrigger paddle, to account for the longer blade. Steering paddles will usually have strips of rubbery friction tape on the power face of the blade to facilitate adhesion to the hull.

Steering paddles can be designed with a flat power face or with a ridge (called ‘dihedral’) where the shaft connects with the blade. A steering blade with dihedral will automatically establish an angle when placed against the hull for greater effect (but more drag). A flat blade without dihedral will have less effect (allowing a lighter touch), and may require twisting the shaft of the paddle in bigger water conditions.

The T-grip of a steering paddle is not designed to withstand the torque of twisting and can fall off if used to twist the paddle. Only the shaft of the paddle should be grasped (often with two hands) when twisting the paddle, such as on a hard turn or in big water.

Choose a steering paddle that is suited to the conditions and comfortable in the hand, especially when changing sides and paddling. You may want to add grip tape to your steering paddle.

3. STEERING OVERVIEW

3.1 Primary Goal

The primary goal of steering is to **control the spin of the canoe** in order to track the desired course while **minimizing drag**.

3.2 Forces / Factors acting on the Canoe

A canoe will track a straight line if the forces acting on the hull are equal on both sides. If power is applied unequally on either side of the hull, the canoe will spin, pivot or turn to the side with the weaker forces acting on it (i.e. with less power or more drag).

An outrigger canoe is asymmetrical in design, so the canoe will inherently spin or turn to the left because the ama (customarily rigged on the left) will introduce drag on the left side.

The forces acting on the canoe can be external (environmental) or internal (from the crew).

- External forces / factors:
    - wind
        - the canoe will 'weathervane' or turn its nose into the wind
        - this is the most common external force acting on the canoe
    - waves (i.e. surface chop, ground swell and boat wake)
        - the nose of the canoe will be pushed to the side by waves and turn into the trough between waves
        - turning out of a trough is difficult
    - currents (i.e. river current, tides, eddies, shallows)
        - the canoe will slog against a current or in shallow water
        - river current will aid turns river current coincides with the direction of travel coming out of the turn (i.e. upstream to downstream)
        - river current will impede turns where the river current opposes the direction of travel coming out of the turn (i.e. downstream to upstream)
- Internal forces / factors:
    - design of the canoe
        - drag of the ama
        - shape of the hull affecting spin
    - power imbalance in the crew
        - ensure that seats 1, 3, 5 do not overpower or drag more than seats 2, 4 (the Steer can be on either side)
        - short changes can mitigate the effect of a power imbalance, or in extreme cases, have the crew paddle in pods to balance power (i.e. seats 1 and 2 same side, 3 and 4 same side)
    - actions by paddlers at the ends of the canoe
        - paddlers in seats 1, 2 or 5 can spin the canoe if they drag their blades or flare out on their exits
    - actions by the Steer
        - introducing drag to one side with the poke
        - adding power to one side by regular paddling
        - pulling or pushing the rear of the canoe to one side using Draw strokes or Pry strokes
        - introducing drag by ruddering

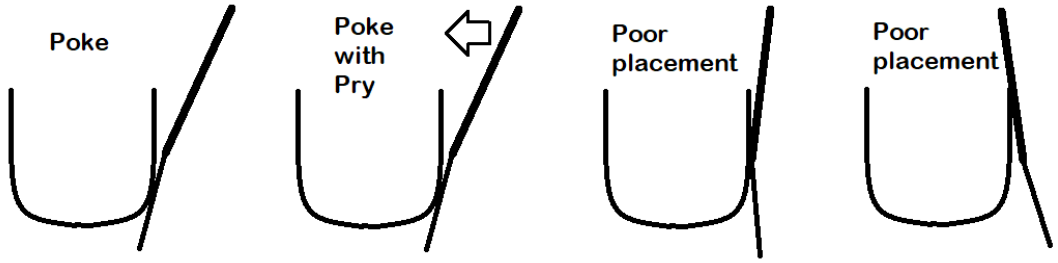
3.3 Steering Principles

- **Steer first, paddle second**. A Steer's primary task is to steer the desired course. Steers should focus on steering, not paddling, if they cannot track a straight line with paddling strokes. Zig-zagging kills glide, slows the canoe and is hard on the crew.
- You should anticipate the spin of the canoe and make corrections before the canoe veers. **Steering is anticipatory, not reactionary.** If you react after the canoe veers, it is too late and harder to correct since you will have to use apply more drag or use more force to counteract the momentum of the canoe. If you miss the correction, you may end up in a 'spin-out' or 'oversteering' in a zig-zag track.
- Ideally, you want to make **frequent small course corrections**. If you don't get the desired effect the first time, repeat the small correction.
- Pick a target on the horizon (such as a buoy, dolphin, freighter or tip of an island), keep your head up, focus on that target and make small course corrections to track a straight line to that target. **Do not veer more than 5 degrees to the left or the right** (except if surfing or maneuvering to avoid collisions or keep boats together during practices).
- When tracking your line **account for external forces acting on the canoe**. Do not allow external forces to push you off your line, however, in the case of currents, you may choose a line that uses the power of the current to assist boat speed, even if it is a longer route.
    - If you have a headwind coming from one side, the canoe will weathervane to that side, so aim farther to the other side than your actual target, so that you are using the wind to your advantage and not fighting it. (i.e. if the wind is coming from the left, aim to the right of your intended target.)
    - If you are aiming crosswind or across waves, do not allow the wind and waves to push you off your line, as you may end up ama-side exposed. (i.e. in English Bay, when returning from Jericho where wind and waves head towards Kits Beach, do not get blown into Kits Beach, as you'll end up ama-side exposed tracking around Kits Point. Aim diagonally to Kits Point, continually making small corrections to 'ferry' across to the left which will minimize ama-side exposure over the duration of the course.)
    - When rounding buoys and markers, account for wind and waves that may blow or push you towards or away from the buoys, markers or other canoes. Do not risk damaging the canoes.
    - When making a turn in strong winds or waves, where possible, turn so the ama is downwind, and not exposed to lifting by the wind or waves.
- **A canoe is the most stable when under power and moving quickly in a straight line**. In big water conditions, the Steer will need power / forward movement of the canoe to properly steer. The crew needs to double down in big water.
- **Use the spin or drift of the canoe to your advantage**. When rounding buoys or markers (in flat conditions), initiate the spin, remove your paddle from the water, allow the canoe to spin or drift around the buoy or marker, then execute a poke or draw stroke to stop the spin and come out of the turn. In bigger water conditions, account for wind and waves that may interfere with the spin of the canoe (i.e. a heavy poke).
- Eventually, with experience, you will learn to steer the canoe using paddling strokes, which is called '**paddle steering**'. But first you'll need to learn the behaviour of the canoe, and your limitations in executing each of the steering strokes, especially the draw stroke. Each crew, practice or race will be different depending on the weight of the crew, conditions and circumstances. **The fallback steering stroke is the poke.** If a draw stroke is ineffective, immediately execute a poke.

4. THE STEERING STROKES

4.1 The Poke

- The poke is the most basic and commonly used stroke when steering. The poke introduces drag on one side of the canoe to cause the canoe to veer to that side.
    - Poking on the left causes drag on the left, so the canoe veers left.
    - Poking on the right causes drag on the right, so the canoe veers right.
- The poke is only effective when the canoe is in motion. A fast moving canoe is easier to steer with pokes than a slow moving canoe, but requires a quick thinking and quick movements. When the canoe is moving slowly (such as coming into dock) or at rest, draw strokes are more effective.
- To execute a poke:
    - Insert/slide the blade of the steering paddle down along the hull of the canoe, with the shaft of the paddle angled away from the hull, so that the friction tape on the power face of the blade contacts the hull near the bottom of the gunwale. Don't allow a gap between the blade and the hull, as water will rush in and force the blade away from the hull. If the blade is forced away from the hull, exit and re-insert.
    - If properly placed, the blade will 'suction' to the hull, requiring very little effort to hold in place (under calm weather conditions). You should be able to hold the paddle in place with one hand using a thumbless grip, even just one finger. In wind and waves, a firmer grip with bodyweight on the paddle may be required to hold the paddle in place.
- Ideally, the blade should also be angled slightly forward and inserted forward of the Steer's knee at the same place where the Steer would plant their blade for a regular stroke. Once the Steer becomes more experienced and paddles while steering, this allows the Steer's body movements to mimic the crew and remain the same whether paddling or poking.
    - An exception is when you change sides for a poke. In order to quickly poke on the other side, you may swing your arm across your body instead of transferring the paddle from one hand to the other. Because of the sweep of your arm across your body, you'll end up poking further back. Some Steers always favour transferring the paddle from one hand to the other, but that may be slower.
    - Do what is most efficient for you as a quick response is often necessary. Depending on your dominant hand, you may transfer to your dominant hand in one direction and swing your dominant arm over in the other direction.
- The depth of the poke will change the effect. A deeper poke will have more effect, a shallower poke will have less effect.
- Pulling the shaft of the paddle towards the gunwale (with gentle pressure) in a pry will also increase the effectiveness of the poke. However, if poking on the right side (non-ama side) of the canoe, a pry may lift the ama and create a huli risk.



- When making small course corrections, short quick pokes are preferrable to long pokes. You are not guiding the canoe by ruddering, you are introducing drag to cause the canoe to veer. Make a poke, exit your paddle, gauge the effect, and make another or longer poke if necessary. Over time, you will become familiar with how long to poke for the conditions.
- When exiting your paddle, do not lift it straight out, flick your wrist back so that the blade exits to the rear as you would for a regular stroke. Once you become more experienced, that movement sets you up to take a regular stroke after poking.
- If you are making a sharp turn (90° or 180°) in a strong current or rough waters with strong wind and waves, you will have to make a hard poke farther back closer to your body with your bodyweight on the steersblade in order to lean onto the paddle for leverage and you will have to twist the paddle (like a vertical rudder). When twisting the paddle, do NOT use the T-grip, use two hands on the shaft of the paddle.
- When making a hard poke or in wind and waves, keep your weight in the canoe, especially when poking on the right side of the canoe.
- If you get trapped in a trough between waves on a turn, you will need to recruit seats 1 and 2 to draw in the appropriate direction.
- A hard poke on the right side (non-ama side) of the canoe, may lift the ama and create a huli risk. Ideally, you would execute a one-handed poke with your right hand and extend your left arm out towards the ama side of the canoe to shift your bodyweight to the ama. In wind or waves, you should instruct seat 5 to paddle on the left to keep weight on the ama-side of the canoe. In extreme cases, seat 5 may also perform a static draw on the left.
- To execute a sharp turn (90° or 180°)(not a sprint turn) in flat to moderate conditions:
    - perform a hard poke close to your body with a slight twist holding the shaft with two hands
    - exit your blade from the water (the canoe will spin faster after you remove your paddle from the water)
    - allow the rear of the canoe to ‘drift’ through the turn (once you become experienced you can do active draw strokes on the opposite side)
    - poke on the opposite side to stop the spin (beware of lifting the ama if poking on the right side (non-ama side)) and straighten out towards your desired direction.

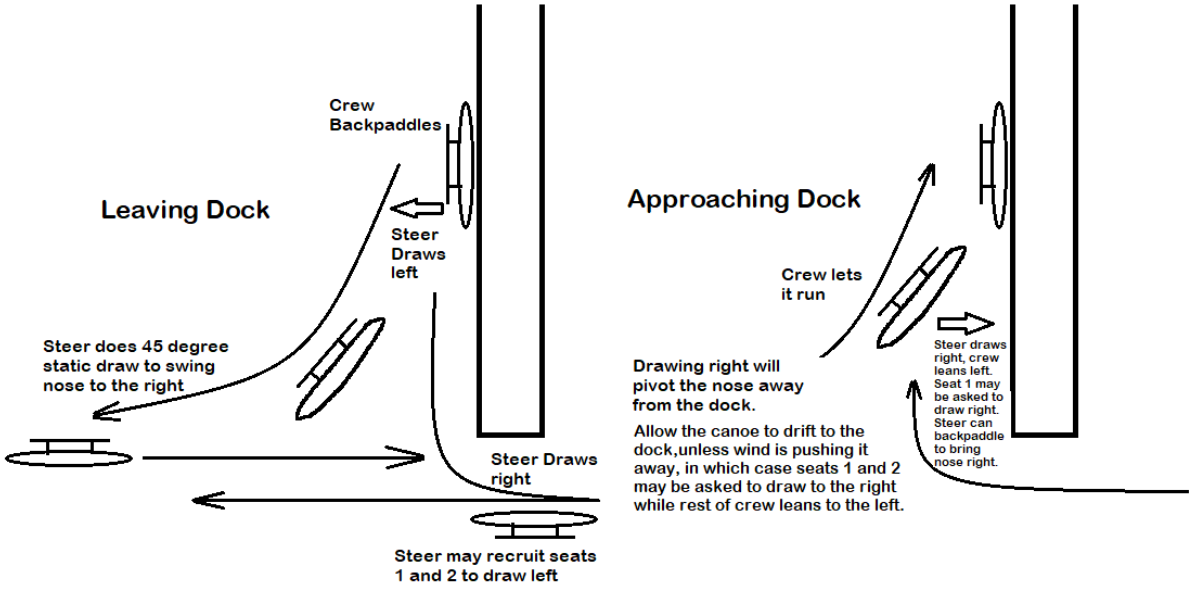
  Become familiar with the behaviour of the canoe through the turn, controlling the spin and how the canoe drifts.
- In a strong river current, the current will either assist the turn (i.e. when turning upstream to downstream) or impede the turn (i.e. when turning downstream to upstream). You will have to apply a harder poke when turning downstream to upstream.

4.2 Draw Strokes

- Draw strokes may be active draw strokes or static draw strokes (also called a 'post').
- In a **static draw stroke**, the blade of the steering paddle is fully buried and held in place away from the hull oriented parallel to the canoe. Top hand pressure is applied to keep the rear of the canoe in line.
- A static draw stroke is only effective when the canoe is moving quickly and is typically performed on the ama side of the canoe in lieu of a poke on the non-ama side of the canoe to reduce huli risk, usually when surfing or in rough conditions. A static draw is not usually performed on the non-ama side since a poke on the left side is more effective.
- When executing **active draw strokes**, <u>you will be pulling the rear of the canoe (and the weight of its occupants) towards your paddle</u>. Your ability to execute draw strokes will be highly dependent on the crew composition.
    - If you have a heavy person in seat 5, it will be difficult to execute active draw strokes since you will need to pull that person's weight towards your blade. Ideally, seat 5 should be a lighter person.
    - If you want to practice your steering skills using draw strokes, start off with seat 5 empty. You will notice the difference when seat 5 is occupied.
- In an active draw stroke, the blade of the steering paddle in fully buried and the canoe is pulled sideways (to varying degree) towards the buried blade.
    - <u>A draw stroke on the left pulls the rear to the left, so the canoe veers right.</u>
    - <u>A draw stroke on the right pulls the rear to the right, so the canoe veers left.</u>
- An active draw stroke can be at 90° (perpendicular) to the length of the canoe (when moving slowly or at rest), at 45° to the length of the canoe (when moving quickly), or at any other angle, as necessary to implement a correction.
- An active draw stroke is the most effective stroke when the canoe is moving slowly or at rest. If necessary, a Steer may recruit seats 1 and 2 and seat 5 to assist with draw strokes.
- Active draw strokes are necessary when leaving or approaching the dock or maintaining position during practice breaks or on a race start line.
- A fast moving canoe can be hard to steer with active draw strokes because the Steer will need to counteract the forward momentum of the canoe. In that case, pokes or static draw strokes should be used.
- <u>To execute a draw stroke</u>:
    - place your thumb along the T-grip, not under it, which allows you to control the angle of the blade
    - keep your top arm elbow below your shoulder, as that will recruit your upper pectoral muscle and reduce stress on your front deltoid muscle
    - bottom arm elbow can be bent
    - place your paddle-side hip against the gunwale
    - fully bury the blade at the desired angle maintaining a vertical shaft without overreaching (a foot away from the gunwale for a 90° (perpendicular) draw stroke is sufficient)
    - using your core, pull your hip (and gunwale) towards your buried blade (i.e. "**hip to catch**") while applying top hand downward pressure engaging your upper pec and front delt to anchor the paddle

- quickly exit to the side and repeat as necessary

- When executing a draw stroke on the right side (non-ama side) of the canoe, do not overreach and keep your bodyweight in the canoe to reduce huli risk.
- The following illustrates dock movements for a dock with land at one end (i.e. Vanier dock in Vancouver).



4.3 Pry Stroke

- A pry stroke is the opposite of an active draw stroke.
- In a pry stroke, the blade of the steering paddle in fully buried and the canoe is pushed sideways (to varying degree) away from buried blade.
  - A pry stroke on the left pushes the rear to the right, so the canoe veers left.
  - A pry stroke on the right pushes the rear to the left, so the canoe veers right.
- Pry strokes typically take the form of a flared exit on a regular paddling stroke while the canoe is in motion, performed at 45° to the length of the canoe, and can be effective in countering weathervaning due to a light wind.
- As noted above, a form of pry can also be incorporated into a poke.
- Do not execute pry strokes where the shaft of the steering paddle contacts and levers off the top edge of the gunwale, as that may stress and crack the shaft of the paddle.
- Where the canoe is moving slowly or at rest, an active draw stroke is more effective than a pry stroke (pulling water is more effective than pushing water).

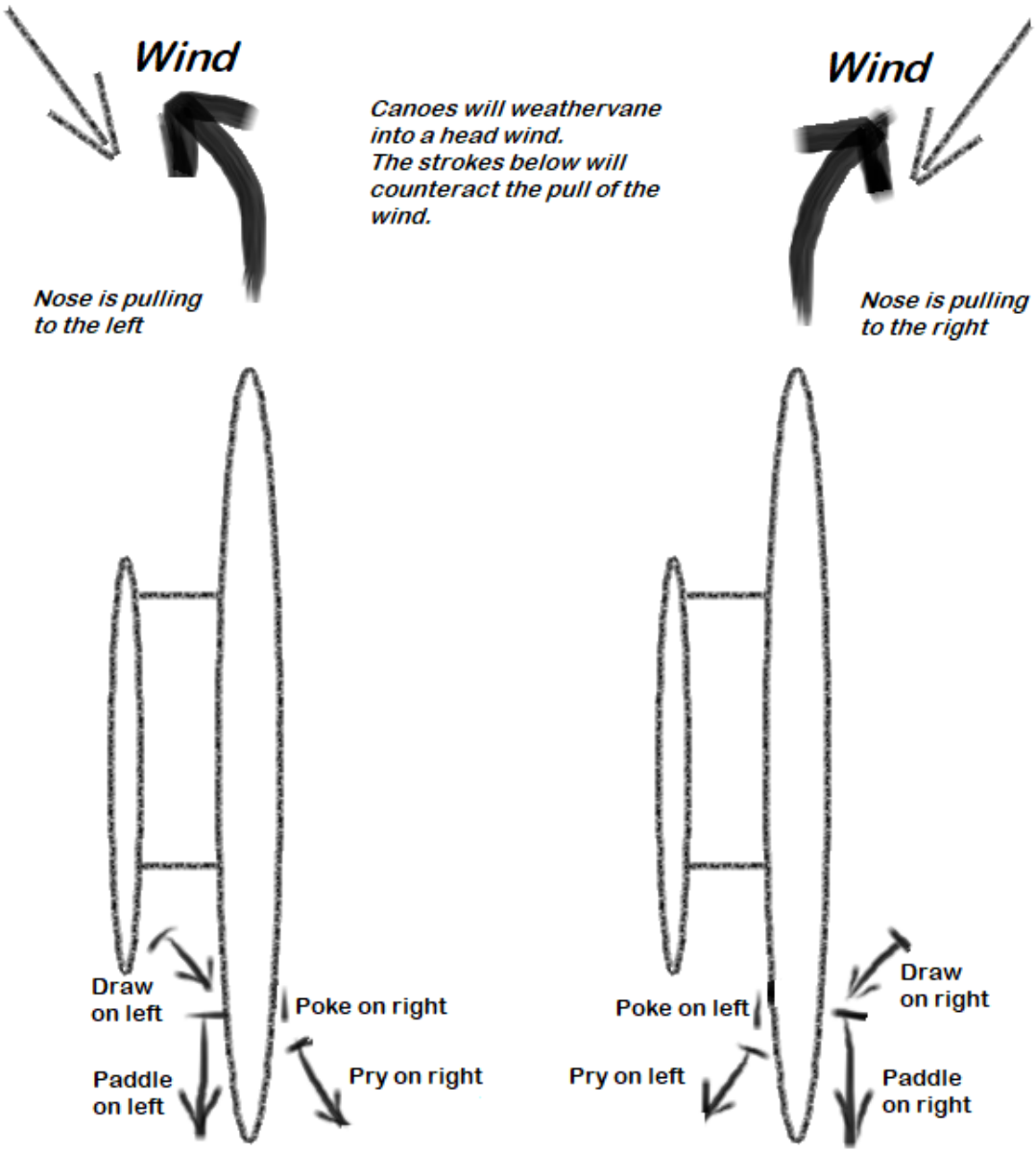
4.4 Regular Paddling Stroke

- A regular paddling stroke can be used to apply power to one side of the canoe to balance the power of the crew or counteract or hasten the spin of the canoe (i.e. on the inside of the turn counteracts the turn; on the outside of the turn hastens the turn).

4.5 Ruddering

- Ruddering is when the steering paddle is dragged behind the Steer at a shallow angle and remains in the water for extended periods. Ruddering is not as effective as the poke and may introduce unnecessary drag, but some steers have said that Matahina canoes are responsive to ruddering.

Summary Diagrams



Note: Arrows denote direction of paddle pulling movement.