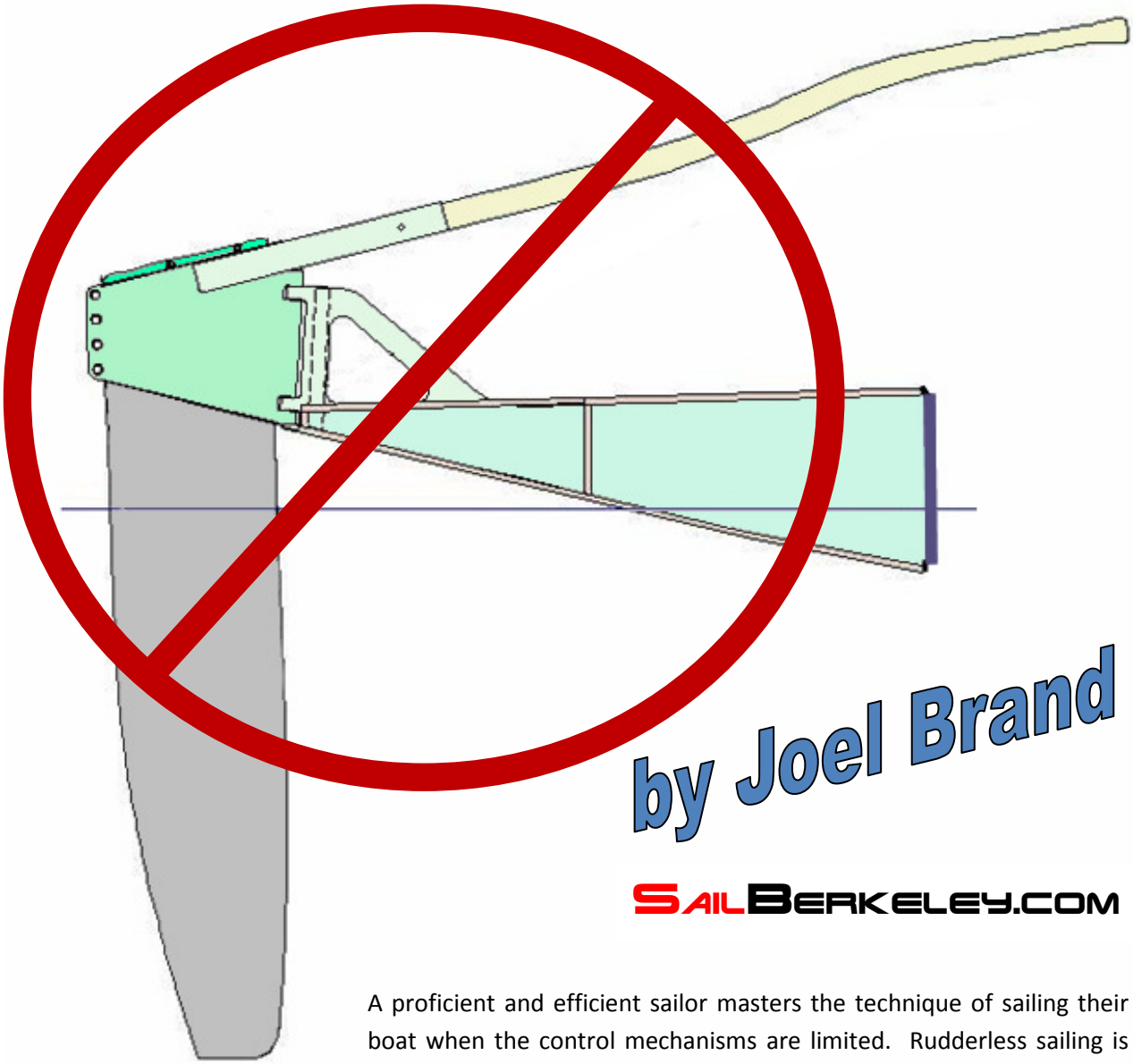
Rudderless Sailing



by Joel Brand

SailBerkeley.com

A proficient and efficient sailor masters the technique of sailing their boat when the control mechanisms are limited. Rudderless sailing is using weight distribution and sail trim, as opposed to the rudder, to control the boat. Understanding rudderless sailing allows you to sail faster, make quicker turns, handle rudder failure emergencies, and is - simply put - very impressive to watch. This eBook thoroughly covers the motivations, physics, sail trim techniques, weight distribution concepts, and a practical step-by-step guide to learning to sail rudderless. After reading this eBook you will be able to effectively understand, implement, and teach rudderless sailing.

ISBN 978-0-557-90313-9 90000
9 780557 903139

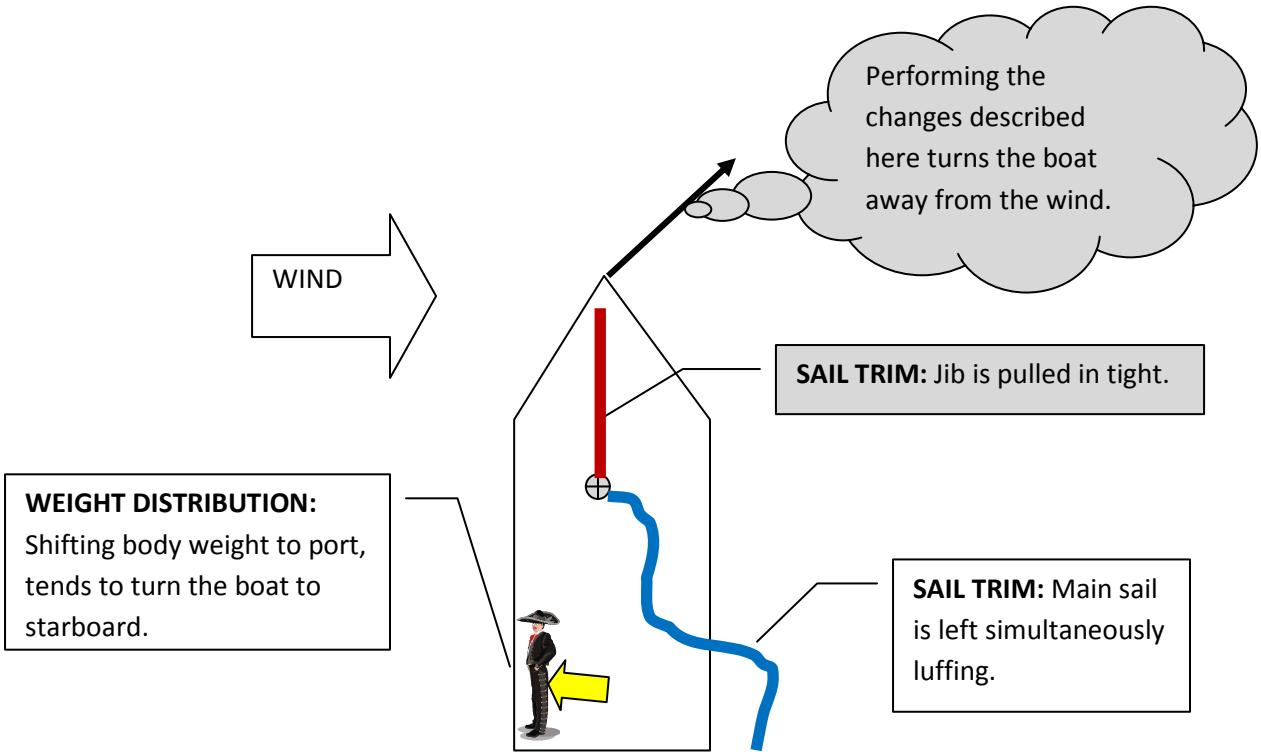
ISBN #978-0-557-90313-9 Content ID: 9775608 eBook: Rudderless Sailing

What is rudderless sailing?

Rudderless sailing is using adjustable factors such as weight distribution and sail trim, as opposed to the rudder, to control a boat. For the purposes of this document we will simplify this down to the two general concepts of weight distribution and sail trim:

Weight distribution is adjusted by moving your body to port or starboard.

Sail trim is manipulated by loosening the jibe and tightening the main, or vice versa.



In actuality, there are many more ways to influence these factors. For example, in adjusting weight distribution you can move weight forward and aft on the boat as well. Another example involving sail trim - you can manipulate the twist of the main sail via the boom vang. Or you could adjust the rake of the mast using the forestay or backstay. Each of these adjustments could also be lumped into the categories of rudderless sailing, however, for this introductory guide we are only going to concentrate on the two "gross" manipulations listed above: weight distribution and sail trim.

And while we are making simplifying assumptions, please keep in mind that there are many types of boats out there. This guide will focus on two-sail approximately 15' dinghies, most of which have a centerboard instead of a keel, planning hulls as opposed to displacement hulls, and two sails where the jib has a smaller sail area than the main.

Why learn rudderless sailing?

1. **Increased Speed**

Most important reason to learn rudderless sailing: it will make you a more efficient sailor. When sailing on a reach, ever notice that when the wind is high and you're hiked out while the boat is heeling that there is a significant force pulling the tiller away from you? This is called weather helm. A little bit of weather helm is a good thing. Too much weather helm means that the rudder is creating drag and disrupting the flow of water underneath the boat. If you're having to put a significant amount of strain to pull the tiller to maintain your course, the pressure on the tiller (via the rudder) is translating that to a significant amount of drag on the forward movement of the boat. We can use rudderless sailing techniques to reduce weather helm which reduces that drag and allows us to sail more efficiently, and thus faster, in straight line.

2. **Faster Turns**

The rudder, when used exclusively to turn the boat, has a significant braking action to it. Yes - it's very convenient that the tiller makes the boat turn with only the simple movement of your hand pushing on the tiller, but in doing so it also slows you down significantly. The rudder, while it is effective at moving the stern laterally in relation to the boat's forward movement, creates drag against the water flowing underneath the boat as it operates during the turn. In effect, the angled rudder creates resistance to your forward movement. If you exploit rudderless sailing techniques to coordinate the weight distribution and sail trim to turn the boat, you will need less movement of the rudder to make each turn, and thus have less braking action in the water flow under the boat. This will make your turns more efficient and facilitate a turn that has a higher exit speed.

3. **Tighter Turns**

Rudderless sailing techniques can be exploited to shrink your boat's turn radius. If you are doing circles in a dinghy, your goal should be to get the circles to be within one boat length. This can be accomplished much easier if rudderless techniques are used in conjunction to the conventional rudder techniques.

4. Rudder Failures

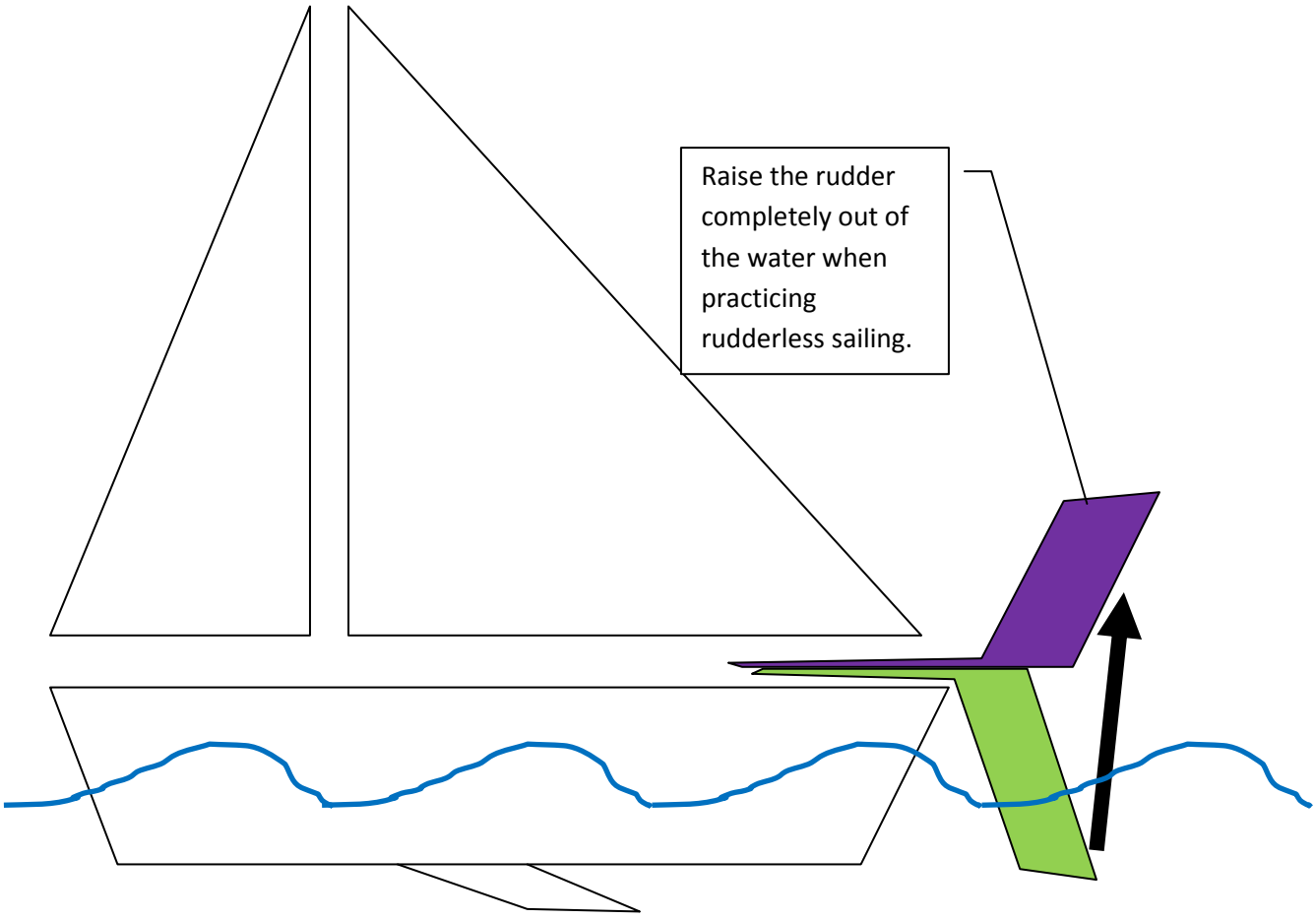
It's important to be able to manage an emergency situation in which you lose rudder control. Like any other component of a boat the rudder (or the tiller connected to it) can break. Generally speaking rudder failures are rare, but they can happen. If we master the techniques of rudderless sailing, we can make it home (or at least to a safe place) without creating a situation in which we have completely lost directional control.

5. Impress Your Friends

It just looks cool. Once you get the knack for rudderless sailing you will be able to do wonderful rudderless circles and figure-8s while gracefully shifting your weight in what looks to the untrained eye to be a magical dance on the boat. Onlookers will be in awe, as at no point during your majestic rudderless figure-8's will you ever touch the tiller.

How do I Practice Rudderless Sailing on a Boat with a Rudder?

Just raise the rudder completely out of the water and lash it in the upright position. Most dinghy boats have an "uphaul" for the rudder that allows you to pull the rudder completely out of the water. The primary purpose of this uphaul is to stow the rudder so the boat can be transported, but during rudderless sailing raising the rudder out of the water is useful because it completely eliminates the influence of the rudder. Also, if we get into trouble while practicing (ie. near the rocks, near other boats, etc.) we can simply release the uphaul to quickly drop the rudder back into the water. If it doesn't have an uphaul, find some way of lashing the rudder so it is completely out of the water.



Center of Effort and Center of Lateral Resistance

While a boat is sailing on a reach, there are various forces interacting on the boat. There is gravity, buoyancy, the sails pulling the boat through the air, the water creating resistance to the boats forward movement, etc. Too many forces to list in the simple analysis we are going to do here. So for this section we will only examine two such forces. These are the forces acting laterally on the boat (ie. from port to starboard or starboard to port). They are opposing forces called Center of Effort (COE) and Center of Lateral Resistance (CLR).

1. **Center of Effort (COE)**

   The wind pressure on the side of the sails causes the boat to heel - this is the lateral force on the boat pushing from the windward to the leeward side. The center of effort is the center point of all such "heeling forces". Since our boat has a larger main than jib, the combined center of effort is typically a little bit behind the mast.

2. **Center of Lateral Resistance (CLR)**

   The hull and centerboard push against the water below the boat as a result of the lateral forces described in the center of effort description above. These lateral forces work in opposition to the windward-to-leeward forces described above for the COE. They are essentially pushing from leeward-to-windward. The resistance of the hull and centerboard in pushing back against this force also has a "center". The geometric center point to sum up this lateral resistance force depends on the shape, size and position of the hull and centerboard. This theoretical center point on the boat is known as the center of lateral resistance. It is typically near the centerboard area. And also typically slightly ahead of the center of effort - this is what creates the weather helm. Naval architects deliberately design their hull plans and sail plans such that the CLR is a little ahead of the COE so there design will have some inherent weather helm.

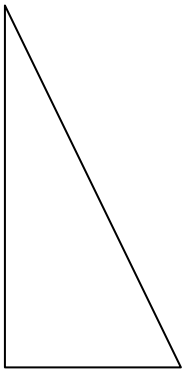
   However, rudderless sailing is much easier to learn if we have neutral helm. Neutral helm is the complete absence of either weather helm or lee helm. So how can we quickly move the CLR back toward the COE?

   Move the centerboard up! On a boat with a center board, as you raise it - it typically sweeps back. As we learn rudderless sailing, this is useful because it allows us to move the center of lateral resistance back. If we move it back far enough it will be right on top of the COE, we will have a neutral helm (i.e. no weather helm and no lee-helm). You typically can't get it back that far, but raising the centerboard definitely helps in that direction.

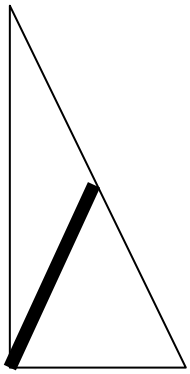
Finding the Center of Effort

Find the center of effort for a sail, requires a smidge of geometry.

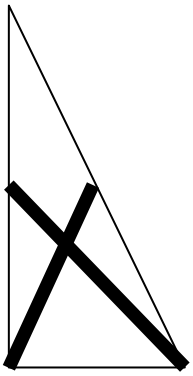
This is your typical general sail shape:



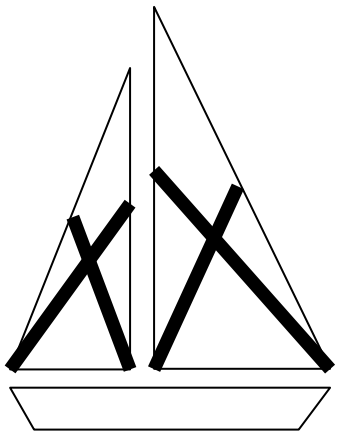
Take that sail and draw a line from any corner to the center of the opposing edge.



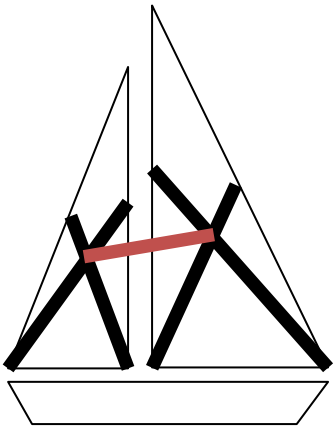
Do this again from any other corner:



Where the lines intersect is the center of effort for a given sail. Since we are using dinghies that have two sails, we need to do this twice. Once for each sail. Depicted below is a typical sail plan for a dinghy:



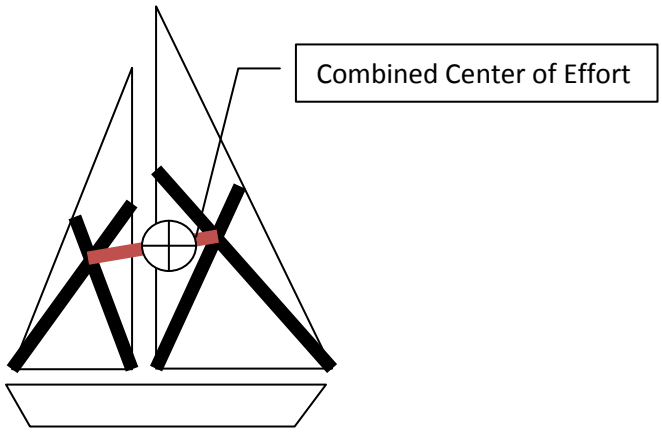
Next we draw a line that intersects both COE's:



The "combined" center of effort for these sails is on this line. Where is it on that line? To figure that out, we need to look at the proportionate relationship between the two sails. Its proximity to the intersection for a given sail is the same as that sails size in relation to the total sail area for the boat.

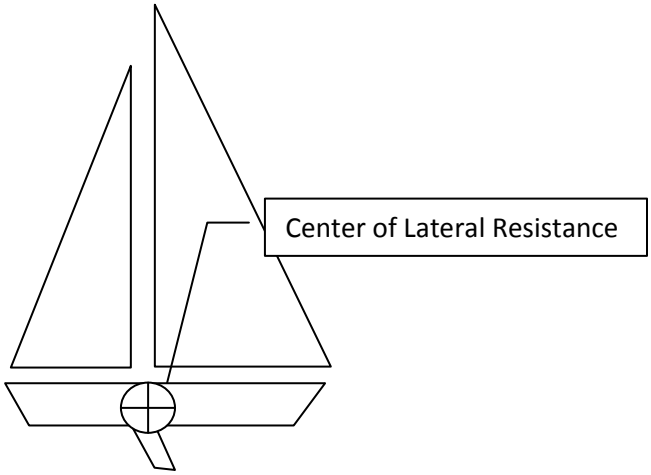
If both sails are the same size, it is exactly in the middle of the line connecting the COE's of each independent sail.

If one sail is double the sail area of the other, it is 2/3 of the way down the line.

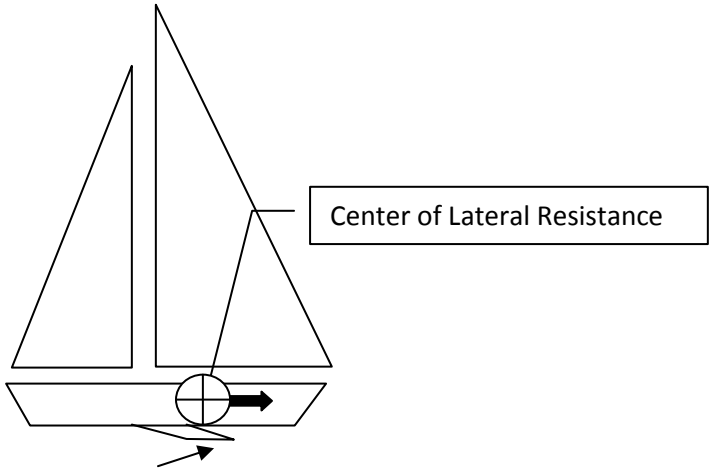


Finding the Center of Lateral Resistance

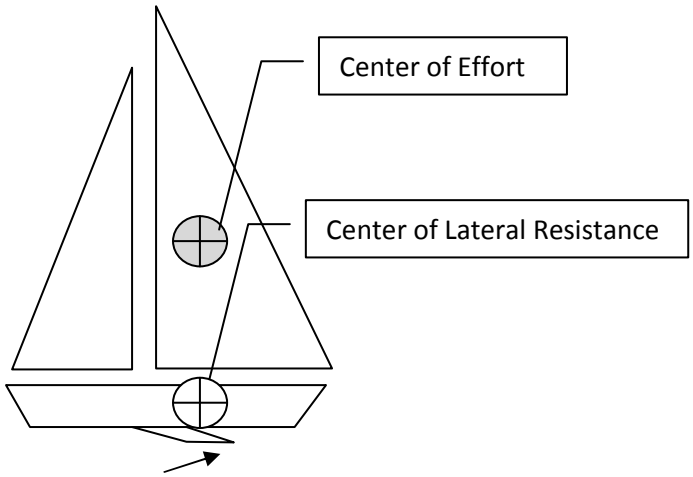
The center of lateral resistance is the geometric center of the underwater profile of the hull laterally against the surrounding water. Lateral resistance keeps our boat going forward and stops it from moving sideways (a.k.a. leeway) as it does. Its force is influenced by the hull shape, keels, centerboards, etc.



Raising the center board moves the center of lateral resistance back on the boat:



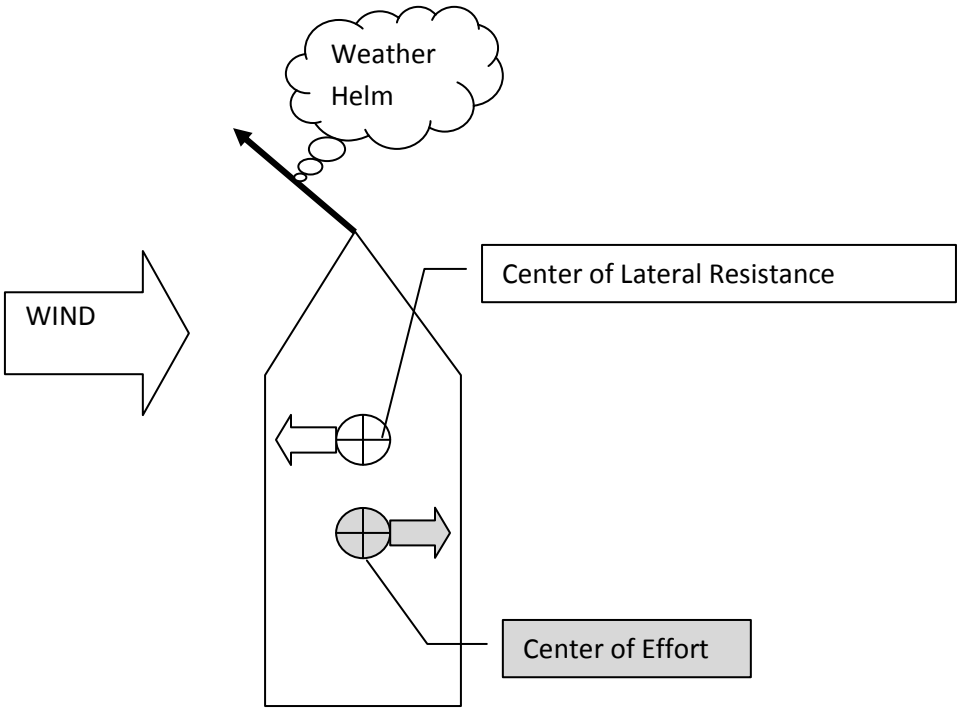
Now it is nearly at the same spot as the COE that we calculated earlier from the sail plan:



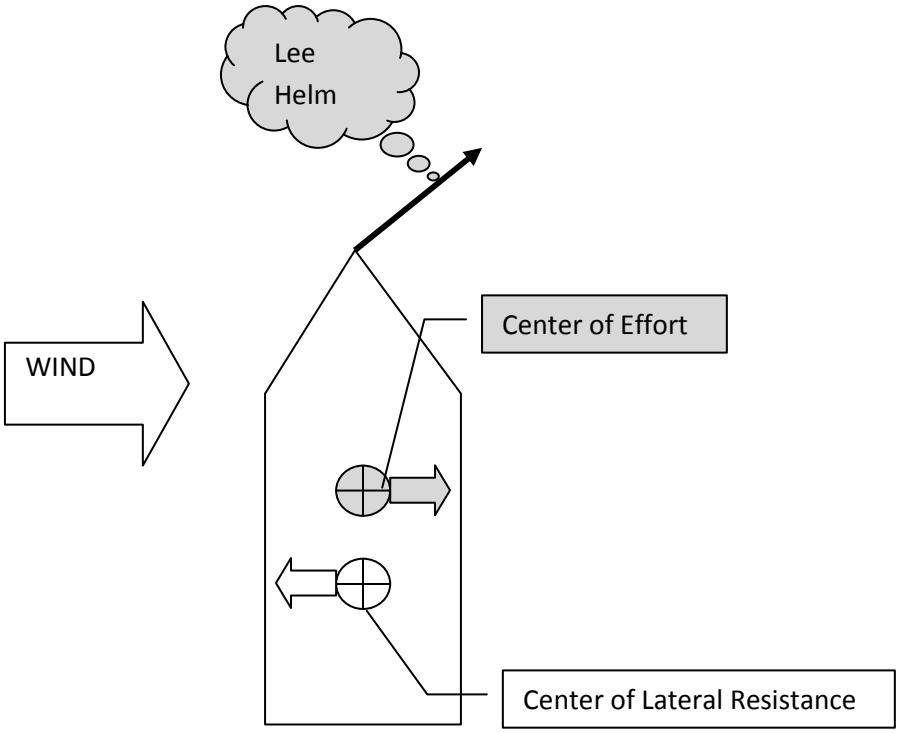
The moral of the story: raise the centerboard when you do rudderless sailing. It will prevent some of the natural weather helm in the boat's design and make it easier to find an equilibrium that will let you sail in a straight line.

Weather Helm vs. Lee Helm

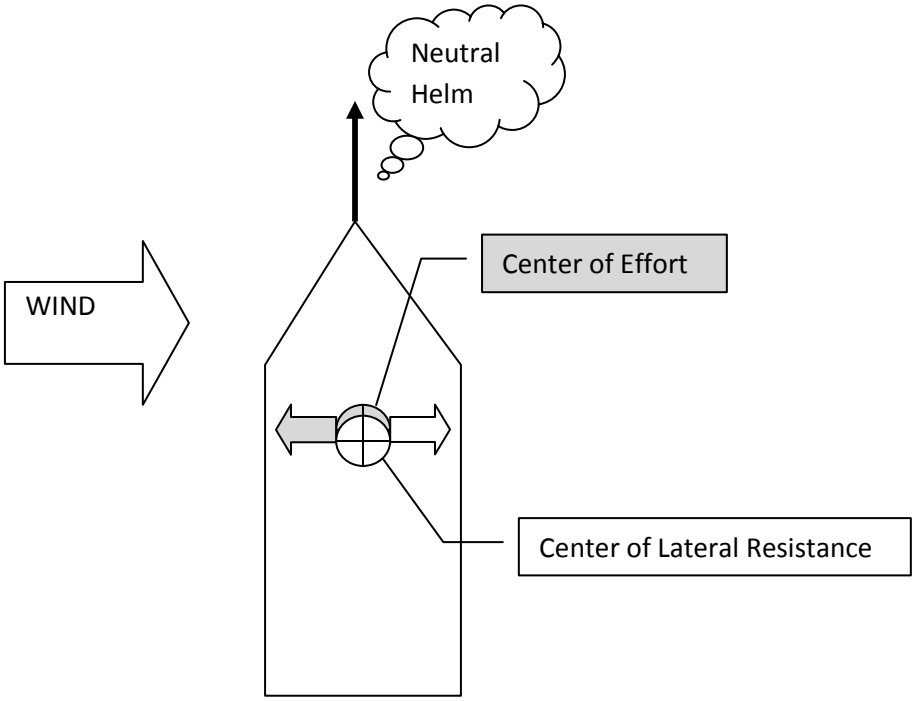
If the CLR is ahead of the COE, then we have what's called **weather helm**. Most boat designs deliberately create this condition. This is what it looks like from above:



If the CLR is behind the COE then we have **lee helm**:



If the CLR is on top of the COE then we have **neutral helm**:



When sailing rudderless in a straight line, we try to keep the COE on top of the CLR.

Why is a little bit of weather helm a good thing?

1. **It's a safety mechanism.** If the tiller man for whatever reason loses control of the tiller (i.e. they fall off the boat, the tiller slips out of their hand, they are for some reason incapacitated, etc.) the boat will naturally turn toward the wind if there is weather helm present. As it turns into the wind the boat slows and eventually will stall out directly into the wind. Weather helm is essentially a "dead man switch". If the boat had lee helm instead, this would be very dangerous. The bow of the boat would naturally turn downwind, exposing a progressively larger amount of sail area to the wind as it does - healing more and eventually accidently jib or capsize.

2. **Higher Angle into the Wind.** A small amount of weather helm allows you to head slightly higher upwind than you would otherwise. In racing this is particularly important, as the ability to head as far into the wind as possible is often critical in finding the quickest path to the next turn marker which is inevitably upwind. A little weather helm mean that you are pulling the tiller a little toward the wind to maintain your course and there is the normal amount of drag pulling the rudder back (i.e. drag) but also it implies that there is a small amount of force pulling the rudder to windward. Bernoulli's law doesn't just apply to wind around the sail. It also applies just as well to the water around the rudder. With a small amount of weather helm we have created a small amount of "lift" toward the wind by making the water move faster past the rudder on the windward side. This will pull the boat to windward and in some sailing circles is known as the "Weather Helm Advantage". You can head a degree or two higher into the wind as a result. Don't overdo it though - the advantage is quickly diminished by the additional drag if you move the rudder too far against the water flow. In the world of Bernoulli's law you could describe it as creating "turbulent" water flow in the vicinity of the rudder if it is angled too far against the general water flow.

3. **Feedback through feel.** When there is a small amount of weather helm, you get feedback on the forces acting on the rudder. As you hold the rudder there will be small increases in the force on the tiller to windward and small decreases to leeward. If you have a little weather helm, it allows you to "feel" these changes as you hold the tiller in your hand. For example, the feedback that you feel through the tiller can indicate a beneficial wind shift, such as lift, that would tell the helmsman that he can head farther into the wind. Once you get used to getting this force feedback on the tiller, you will miss it if it's not there. When there is neutral helm, the tiller feels "soft" and "lifeless". That's because you are no longer getting the feedback that you are used to.

Ways of Accentuating Weather Helm

We can accentuate weather helm, or **turn the bow toward the wind**, in a multitude of ways. Here are some examples:

- Shift weight to leeward
- Shift weight forward on boat (this effect is very subtle on a 15' dinghy with a planning hull)
- Tighten the main sheet
- Loosen the jib sheet
- Increase the boat's heel angle
- Rake the mast backward

Ways of Accentuating Lee Helm

We can accentuate lee helm, or **turn the bow away from the wind**, in a multitude of ways. Here are some examples:

- Shift weight to windward
- Shift weight back on boat (this effect is very subtle on a 15' dinghy with a planning hull)
- Loosen the main sheet
- Tighten the jib sheet
- Decrease the boat's heel angle
- Rake the mast foreward

When Practicing Rudderless, Start with Neutral Helm

Neutral helm is the absence of either weather or lee helm. With a rudder present and in the water while the boat is moving forward, if you have neutral helm you can literally take your hand off the tiller and the tiller will remain in a straight position. There is no force acting to push the nose of the boat either into or against the wind.

When practicing rudderless sailing we want to start off by finding a neutral helm (or as close to it as possible).

Most boats are designed with the CLR ahead of the COE, so to mitigate this inherent weather helm we need to raise the center board a bit. This is done by naval architects deliberately as a little bit of weather helm is generally considered desirable.

As a result, generally speaking you should just leave the **centerboard about 75% of the way up** when practicing rudderless sailing. This provides for a more neutral CLR/COE relationship. It makes it easier to subtly influence that relationship with a little bit of helm and get the boat to either turn toward windward or leeward.

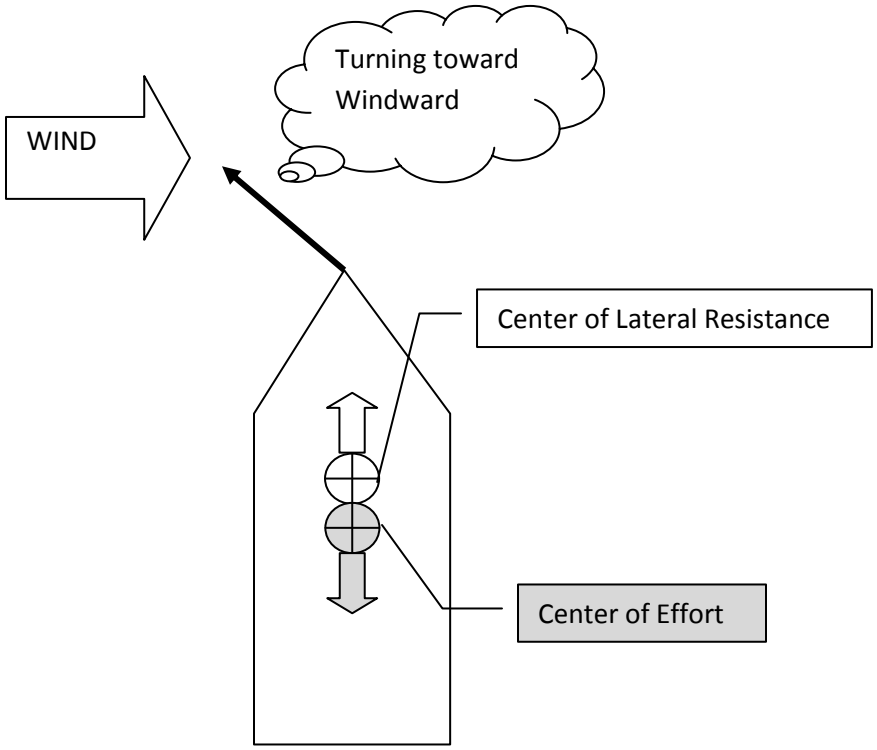
After adjusting the centerboard, adjust the sail trim and weight distribution in the boat to try to get the boat to go straight. This is the first step in rudderless maneuvering.

Using CLR/COE to Help Turn to Windward

To turn toward windward, we change the CLR/COE relationship such that we create a small amount of **weather helm**.

When we want to turn toward windward (perhaps to tack), we can do an action that moves the COE backward or the CLR forward.

Or we can do a series of action that combine to do both.



Moving the COE backward can be accomplished easiest by simply:

a) increasing the sail area aft on the boat by trimming in the main sheet
- and/or-
b) decreasing the sail area forward on the boat by loosening the jib sheet

Moving the CLR forward can be accomplished easiest by simply:

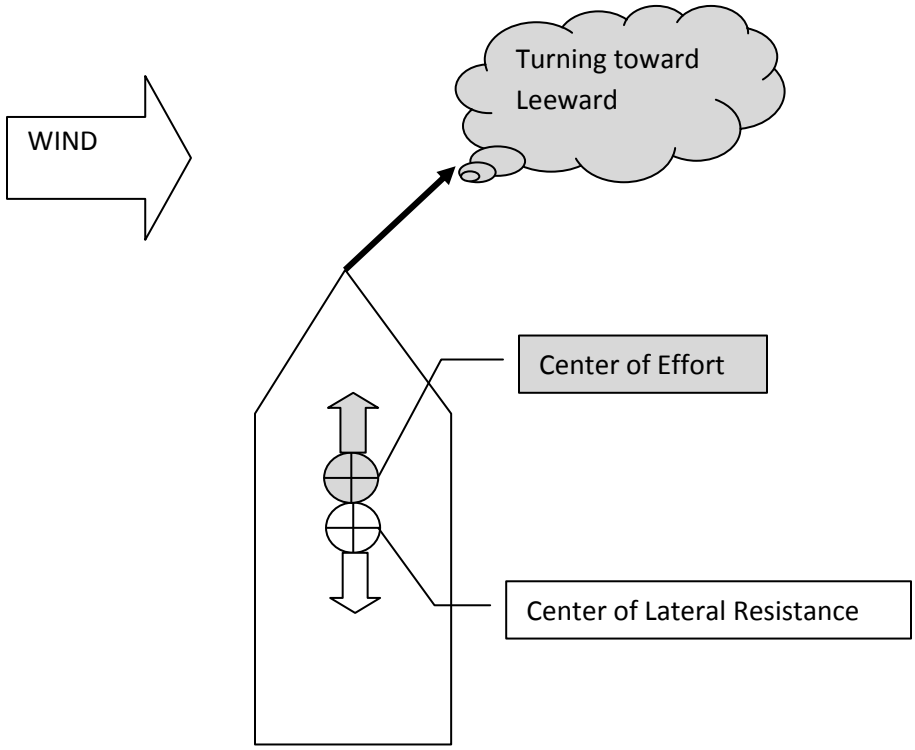
a) moving weight forward on the boat which causes a larger area of the hull in the forward section of the boat to be exposed to the water.

Using CLR/COE to Help Turn to Leeward

To turn toward leeward, we change the CLR/COE relationship such that we create a small amount of **lee helm**.

When we want to turn toward leeward (perhaps to jibe), we can do an action that moves the COE forward or the CLR backward.

Or we can do a series of action that combine to do both.



Moving the COE forward can be accomplished easiest by:

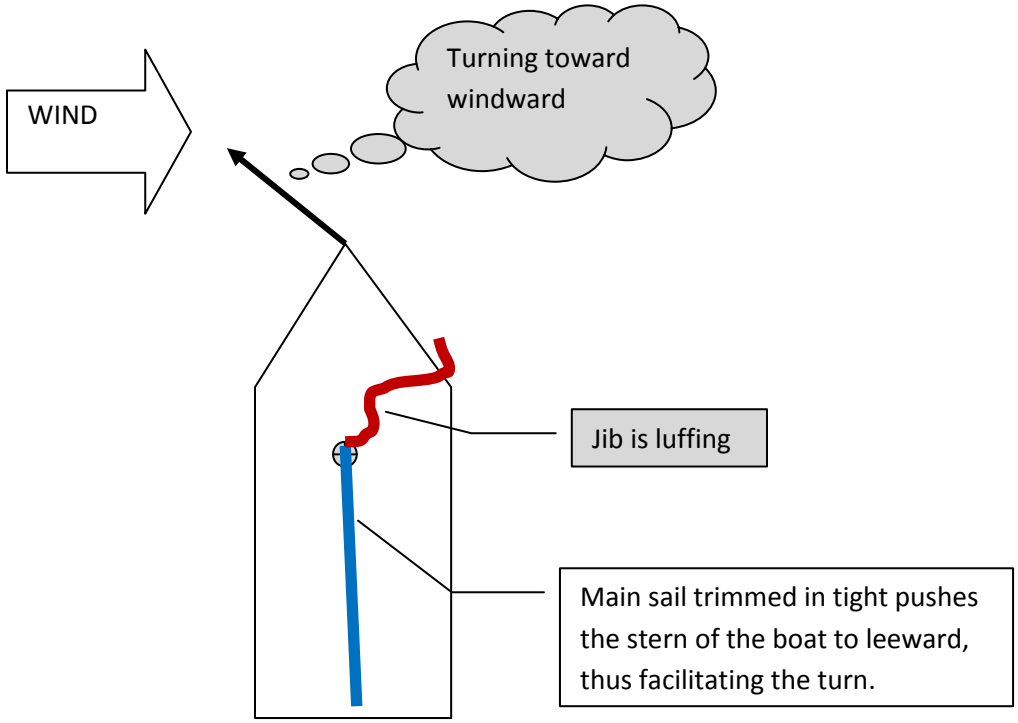
a) increasing the sail area in front of the mast by loosening the main sheet
- and/or-
b) tightening the jib sheets.

Moving the CLR backward can be accomplished easiest by:

a) moving weight on aft on the boat. This causes a larger area of the hull in the rear section of the boat to be exposed to the water.

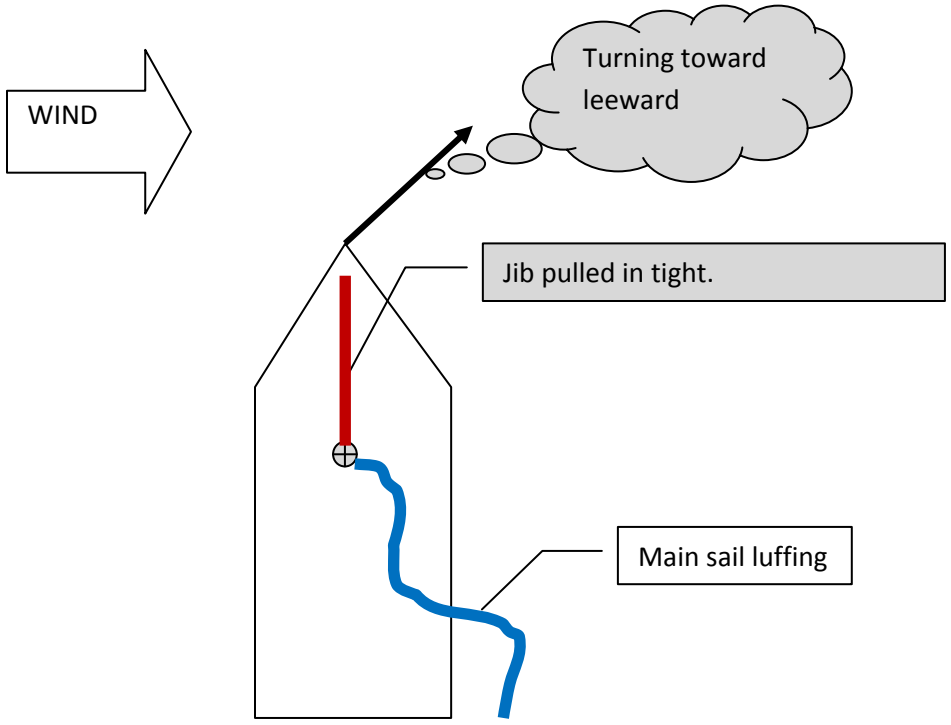
Sail Trim

Sail trim is a key component to rudderless sailing. Imagine the boat pivots around its mast. Tightening the main and loosening the jib sheets will tend to make the boat head toward windward. We can tighten the main by pulling the main sheet in all the way, or better yet, just grabbing the boom and physically moving it by hand. When doing a maneuver such as the this jib sheets should be loosened until the jib is completely luffing.

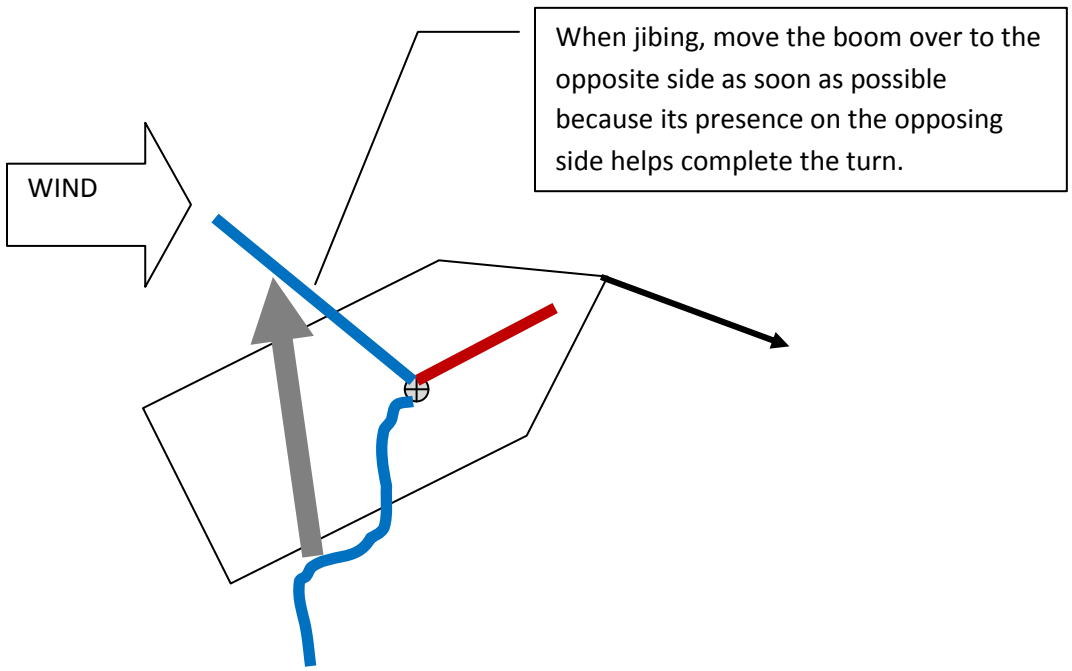


To complete a full turn to windward (ie. a tack), we simply maintain this sail trim until the bow of the boat is beyond the "point of no return" through the wind. Once the bow is beyond the point of no return, pull the jib in tight which will force the nose of the boat further downwind. This completes the turn.

To do a turn away from the wind (i.e. a jibe), we simply do the exact opposite. The jib sheets are pulled in tight and the main sheet is loosened to where the main luffs:



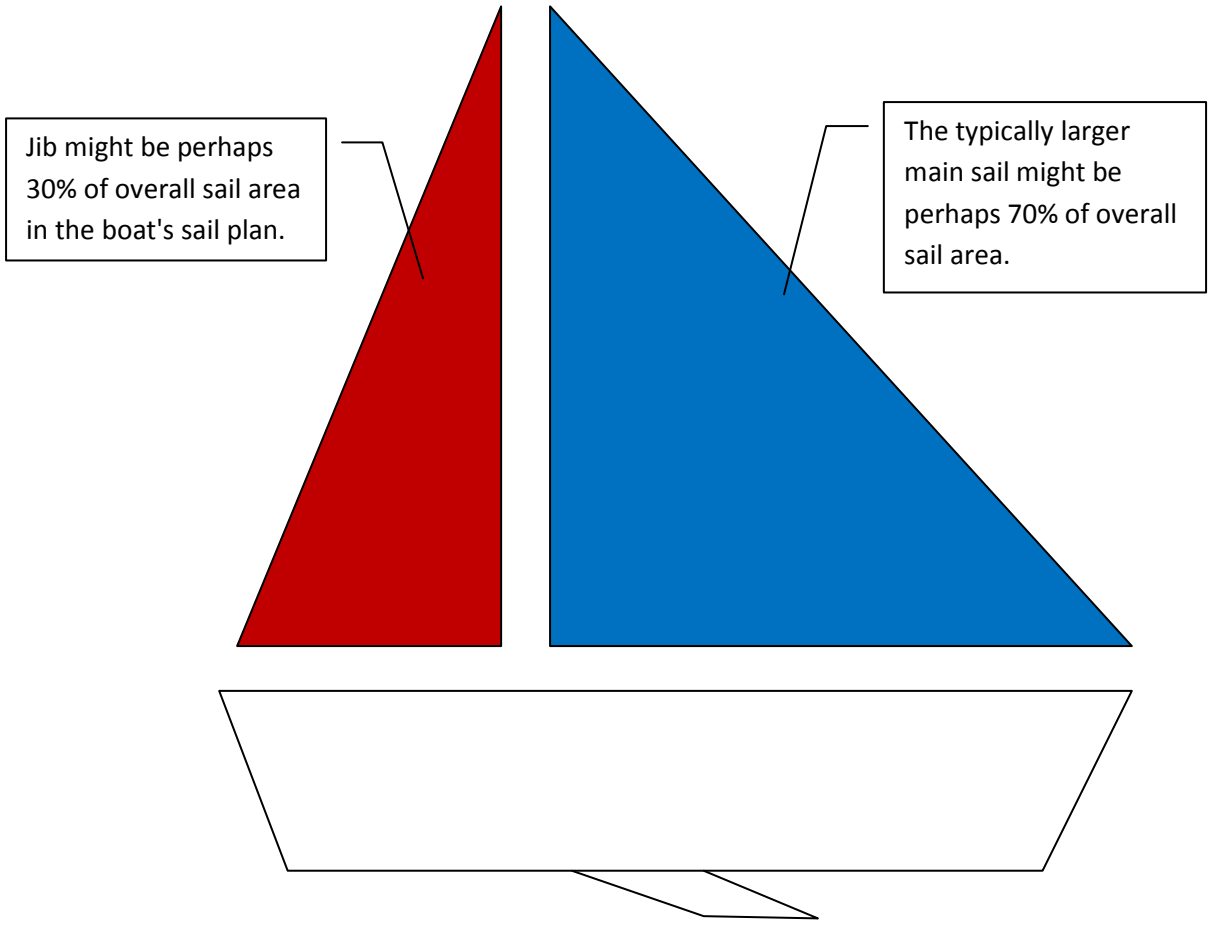
If attempting to complete a jibe, it's helpful to pull the boom across to the opposing side of the boat early because its presence on the opposing side will help complete the turn:



Why is a tack easier than a jibe when sailing rudderless?

This is caused by the difference in sail area ahead of the mast versus behind it. In a tack we are turning the nose of the boat upwind, so in rudderless sailing we use the main sail as a large component for our turn. The main has a larger sail area so its effect is strong and noticeable.

Now with a jibe we are turning the bow of the boat away from the wind. We do this by relaxing the main sail and tighten the jib to get the nose of the boat to point progressively further down wind. Since the jib is our work horse for the jibe, and it has a smaller relative sail area to the main - it has less power in making this turn. You will find that your tacks are much tighter in turning radius to your jibes as a result of this. I compensate for this by making my weight shifts much more dramatic when jibing. And also, just being a little more patient. The boat is turning progressively, just slower.



How do I slow down the boat?

While rudderless sailing we have various ways we can slow the boat down:

1. Let both **sails luff**.

2. **Move weight toward the bow** of the boat. This is very useful when "perpendicular docking" while single-handing a dingy. I am using the phrase "perpendicular docking" to describe when you very slowly drive the nose of the boat softly up to the dock such that the boat is at a perpendicular angle to the dock. When docking like this single handed you create some slow forward momentum immediately before reaching the dock and have to race to the front of the boat to jump off the bow onto the dock. When approaching the dock, I always need a smidge *more* speed than I would have otherwise expected while doing this maneuver. The reason is that the action of me racing to the front of the boat shifts the weight dramatically toward the bow. My weight on the bow causes the bow to sink relative to the stern. The waterline around the hull becomes skewed deeper at the nose. Having the bow "plow" through the water with the nose deeper like this is very inefficient in terms of the water flow around and under the hull. It creates a braking action that slows forward movement of the boat down. (One caveat is moving weight forward can also create a small amount of weather helm as well, which would tend to turn the boat toward windward.)

3. Head into the wind, stand up and **push the boom out** as far as it will go forward. You basically stand in the centerboard area of the boat and push the boom with your arms such that the sail is now nearly perpendicular to the wind. This creates a braking action against the wind. (One caveat is that it will also tend to rather modestly push the bow of the boat to turn toward the side on which the boom is being pushed.)

Body Position

When practicing rudderless sailing you should **stand** in the boat directly behind the main cleat. This is typically about 1/3 of the boat length up from the stern.

One hand should be holding the mains where they connect to the boom, or the boom itself if there is no such connection in the middle of the boom (on some booms the main sheet connects in the rear of the boom). Your other hand should be holding **both** jib sheets.

As you tack and jib the boom will need to swing to the other side of the boat. If you've left the boom vang or gnav loose, you can simply lift the boom over your head when it needs to go past your standing body. Or you can simply crouch down and let the boom swing over.

> **SIDE NOTE:** Commercial airplane pilots pride themselves on how SOFT their landings are. As a sailor, you should pride yourself on how SOFT your boom swings to the other side when you jibe. This softening action is done by controlling the boom fully with your hand on the mains or boom itself as it swings to the other side. **Pride yourself on how softly the boom lands on the other side.**

The hand that holds the jib sheets will need to pass the jib sheets around the main sheet each time the boat tacks or jibs. You simply do a hand switch from the one that was previously manipulating the mains to the one that was holding the jib sheets. Pass them in front the mains as you switch.

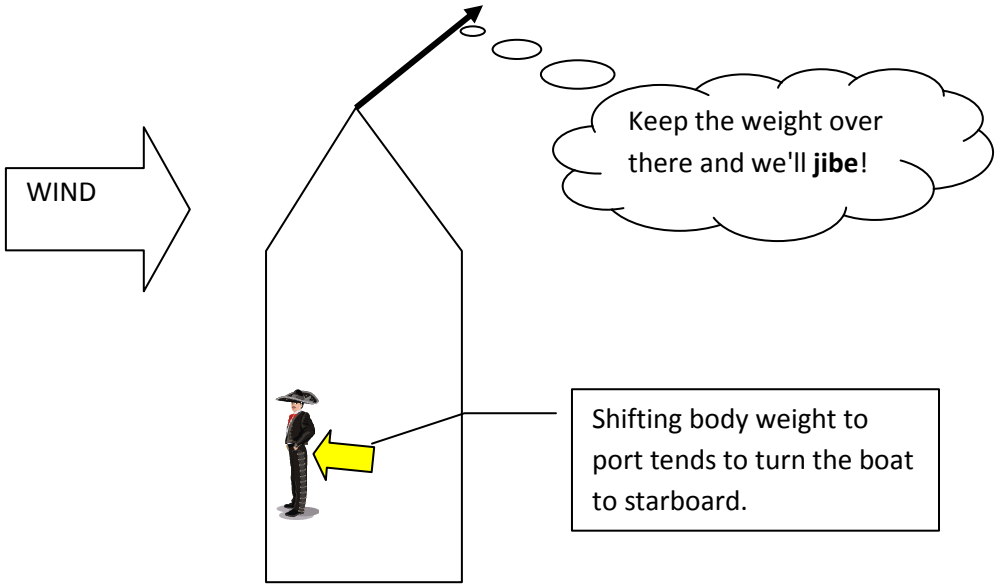
With a little practice you'll find that you can hold both jib lines in a single hand and keep one tensioned while the other is loose. You'll even find that you can allow the tensioned jib to go out by loosening your grip.

One of the advantages of standing is that moving the weight distribution in the boat is as simple as moving where you are standing. I recommend focusing on lateral (port to starboard, starboard to port) weight shifts first. These have a more dramatic effect than bow to stern weight shifts. They can also be easily done from the standing position behind the main cleat. You simply move your feet so you're standing on the right side of the hull, the center, or the left.

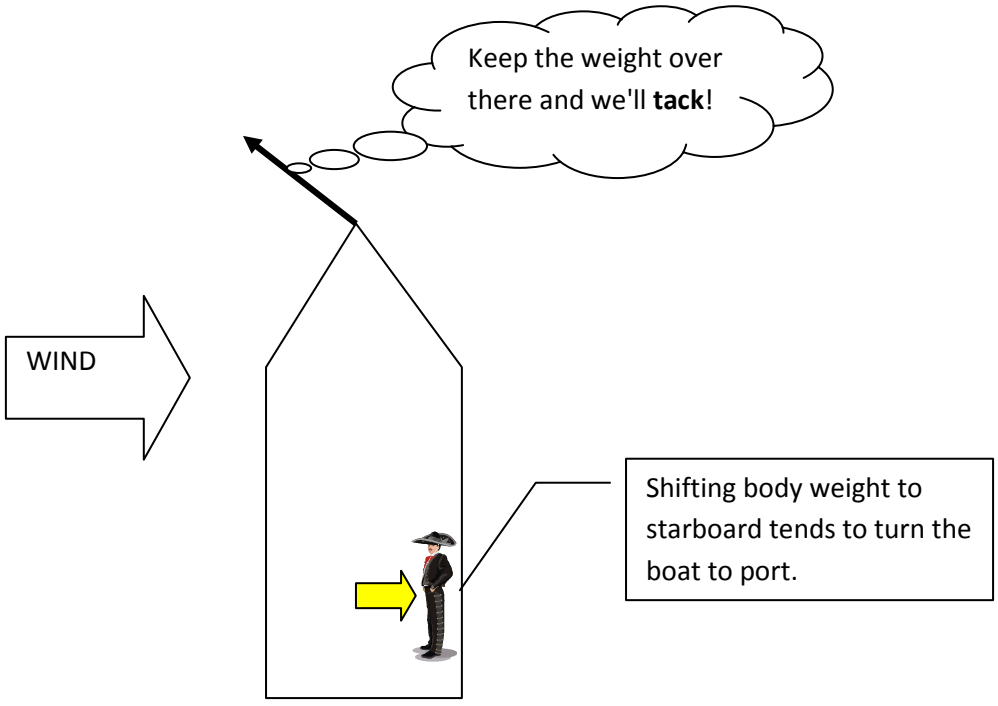
You will find that sometimes you will need to stand on the rail of the hull to get your weight as far out as possible. This is all part of the beauty of the "dance" you need to do to shift your weight appropriately. Standing this far out is particularly helpful during jibing while rudderless.

Lateral Weight Shifts

Shifting your weight to port will tend to make the boat turn toward starboard. Exploit this fact to do a turn.



Similarly, shifting your weight to starboard will tend to make the boat turn toward port. Exploit this fact to do a turn in the opposite direction.

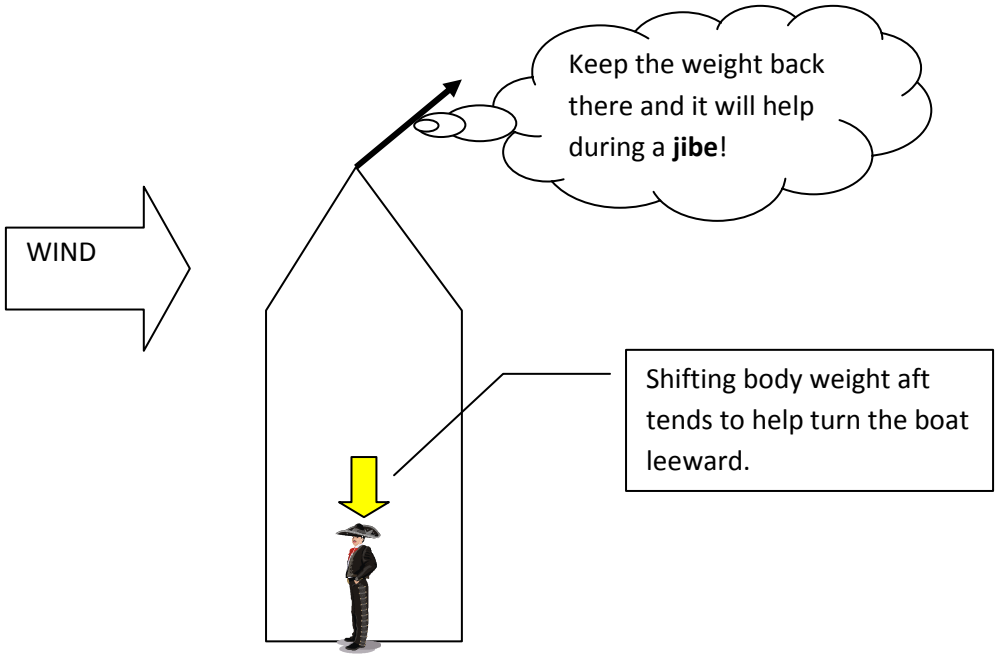


Forward/Aft Weight Shifts

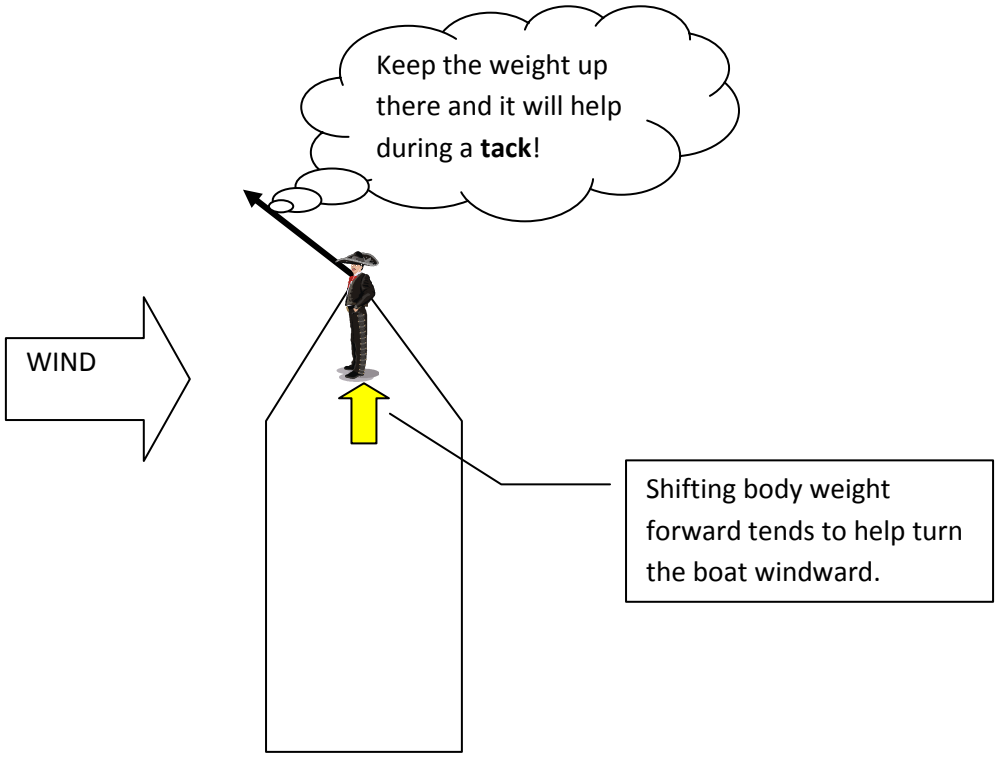
Though smaller in effect than lateral weight shifts, there are some benefits to moving your weight forward or aft in the boat while sailing rudderless

Since forward/aft weight shifts are more subtle, exploit these concepts to help facilitate (but not fully influence) a rudderless turn.

Shifting your weight to aft will tend to make the boat turn toward leeward:



Similarly, shifting your weight to the bow will tend to make the boat turn toward windward:



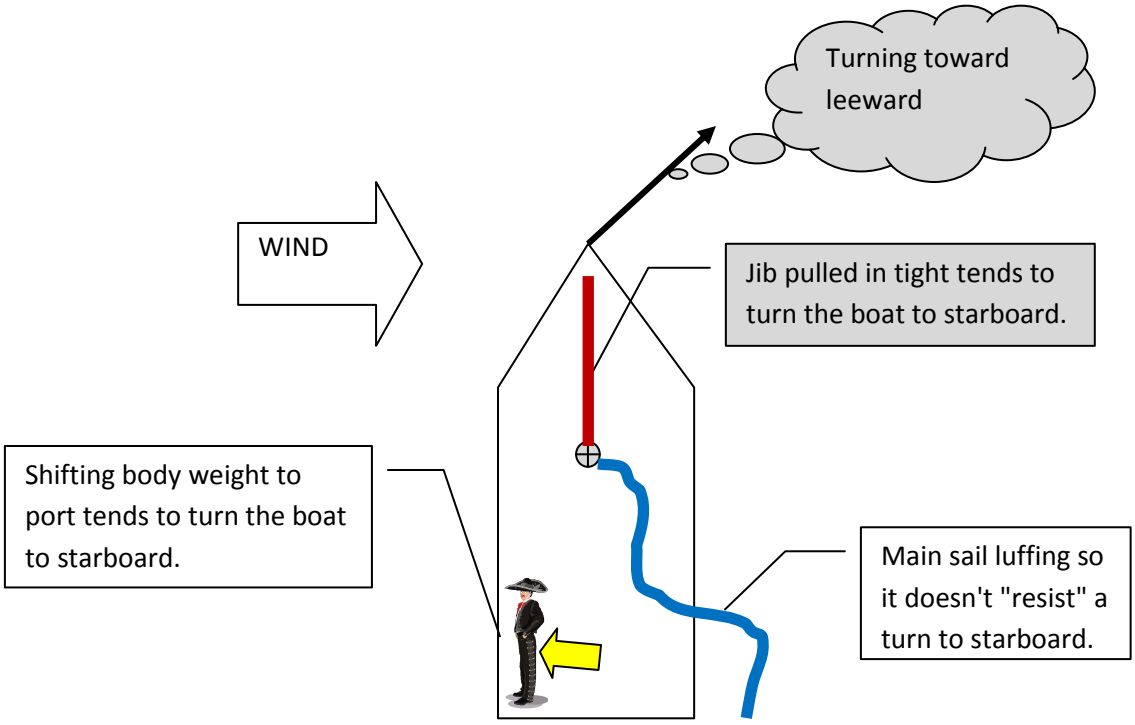
Since these forward/aft weight shifts are smaller, I recommend focusing on lateral weight shifts first while learning rudderless sailing.

Putting it All Together

As you practice the techniques of weight shifting and sail trimming above, you will find that you need to do a combination of these techniques to complete a turn.

For example, to turn toward windward you will find that you need to put your weight significantly to leeward, loosen the jib sheets and trim in the main.

Inversely, to turn toward leeward you will find that you need to put your weight significantly to windward, tighten the jib sheets and trim out the main:



Just to sail straight, you will need to make continual minor adjustments in weight and sail trim. Sailing straight requires finding and maintaining an equilibrium where the boat has neutral helm. Due to the changing influences of the environment (i.e. wind, current, waves, etc.) you need to constantly adjust your weight and sail trim just to sail straight. This is what makes sailing rudderless challenging and skillful.

General Tips for Practicing Rudderless Sailing

1. Learn to **single hand** the boat you wish to practice on first.

2. **Reef** the main sail. The reason why jibing is so much harder than tacking when rudderless is the relative difference in sail areas between the jib and the main sail. Though it doesn't completely mitigate the effects of this differential, reefing the main slightly reduces the difference and make it a little easier.

3. **Raise the centerboard** approximately 80% up. This moves the center of lateral resistance farther aft on the boat. Since these boats naturally have weather helm and for rudderless sailing we want to find the equilibrium of neutral helm, raising the centerboard shifts the helm more neutrally in relation to the center of effort.

4. While learning rudderless sailing practice in **moderate winds**. We need enough wind to exaggerate the effects of your changes in weight distribution and sail trim. While learning this very useful because it shows very dramatically the end effect of each change that the sailor makes. In low wind, these effects are definitely still present but much more subtle so low wind can be frustrating to learn in.

5. Initially **practice alone**. No one else should be in the boat. The weight shifting variables are complex enough with one person on the boat. Having two people on the boat, even if you tell one person to stay still, makes the weight distributions much more complex to anticipate while learning. It's better to just single-hand a boat while learning rudderless sailing.

6. Leave the boom vang or **gnav completely loose**. If you are standing on the boat this gives you the ability to lift the boom over your head if you need to pass it to the other side of the boat and not have to crouch down too far while doing so. It also depowers the main slightly.

7. Leave the **main sheet all the way out** and uncleated. If you need to move around the main sail do so by grabbing the main sheets right under the boom with your hand. You can also just grab the boom itself.

8. **Stand up**. When you are standing its must easier to do large weight shifts and you are also very capable of doing small weight shifts as well (ie. maybe moving your foot an inch to the right).

9. While learning, just **move weight laterally** only on the boat (i.e. port to starboard, or starboard to port). Stand directly behind the main sheet and only move from left to right. Ignore the variable of weight shifting foreward or aft. Don't move up in the centerboard area or back to the stern. The foreward and aft movements to create or invert weather helm are much more subtle than the effect of lateral weight movements.

Steps to Learning Rudderless Sailing

Step #1: Practice Jibless Sailing with the Rudder

Go out sailing with only the main sail. Leave the jib furled or down. Be sure to practice tacks, jibes, circles, and docking while jibless. Notice that tacking is VERY easy but jibing is much harder. Try doing some tight figure eights while jibless. Then trying to do circles while jibless. Keep the circle as tight as possible (ideally just one boatlength in diameter). Be sure to practice and master docking jibless. This will prove that you have control over the movement of the boat without the jib.

Step #2: Practice Jib-only Sailing with the Rudder

Go out sailing with only the jib. Leave the mainsail rolled up and lashed tightly to the boom. Be sure to practice tacks, jibes, circles, and docking when you are only using the jib. Notice that jibing is easy but tacking is super difficult. Notice also that we are going much much slower than with only the main. This is due to the significantly smaller sail area of the jib relative to the main sail.

Step #3: Get Comfortable with Large Amounts of Heel with the Rudder

You need to get really comfortable with large amounts of heel and dramatic weight "hike-outs" before you can master rudderless. Be sure to take your dinghy out and push it to the absolute limits of its heeling. This will inevitably require capsizing a few times to discover the true limits, but the key learning from this is that you can heel the dinghy VERY far and still recover from it by shifting your weight dramatically opposite of the heel. Often times it requires you to hang off of the boat, with your body hiked as far out from the hull as possible. People are usually surprised how large an amount of heel can be recovered from by simply doing this. In rudderless sailing we do very dramatic weight shifts that often create large amounts of heel, so you should get comfortable with lots of heel before proceeding.

Step #4: Single-hand with the Rudder

Practice sailing alone (aka "single-handing"). The weight shifting variables are complex enough with one person on the boat. Having two people on the boat, even if you tell one to stay still, makes the weight distributions much more complex to anticipate while learning. It's better to just single-hand a boat while practicing rudderless sailing.

Step #5: Practice Going Straight WITHOUT the Rudder

This is our true first rudderless maneuver to learn. Always do this step first when beginning rudderless maneuvering practice. We need to find the "equilibrium" for the boat. This is the weight distribution and sail trim such that there is no weather helm or lee helm. Finding this equilibrium should always be your first step. The rudderless maneuvers below result from subtle changes made to weight distribution or trim off of neutral. So to perform them, you first need to establish a stable equilibrium and get the rudderless boat sailing straight. It turns out that going in a straight line is actually one of the more challenging aspects of rudderless sailing. It requires lots of balance and you really have to be in tune with the boat. In rudderless sailing the boat often has a natural tendency to head up or down wind, so finding the equilibrium where you are able to go perfectly straight requires some skill. Start off on a beam reach.

Step #6: Learn to Tack WITHOUT the Rudder

Here are the steps to perform a rudderless tack:

a) Put weight on leeward side of boat by moving your footing over to the leeward side.
b) Loosen jib significantly (while learning feel free to let it luff a bit, but keep your hand on the jib sheets while its luffing)
c) Trim in the main sail with your other hand.
d) Wait while the bow slowly moves toward the wind.
e) Once past the "point of no return" in the turn, pull the jib in tight and release the main. The wind blowing on the tight jib will push the nose of the boat downwind to complete the turn.

Step #7: Learn to Jibe WITHOUT Rudder

Here are the steps to perform a rudderless jibe:

a) Aggressively shift weight to windward side of boat. Stand on the rail if needed.
b) Loosen main sheet significantly (while learning feel free to let it luff a bit, but keep your hand on the main sheets while its luffing)
c) Trim in the jib sheet tight with your other hand.
d) Wait while the bow slowly moves away from the wind.
e) Once past the "point of no return" in the turn, pull the boom across the boat to the other side. When jibing, move the boom over to the opposite side like this **as soon as possible** because its presence on the opposing side helps complete the turn.
f) The wind blowing on opposing side of the main sail will push the nose of the boat upwind to complete the turn.

Step #8: Practice Circles (ie. Tack, Jibe, Tack, Jibe...) WITHOUT Rudder

Repeatedly do the steps for tack and jibe above. Do this maneuver as tight and fast as possible. The diameter of your circle should be about 1 boat length.

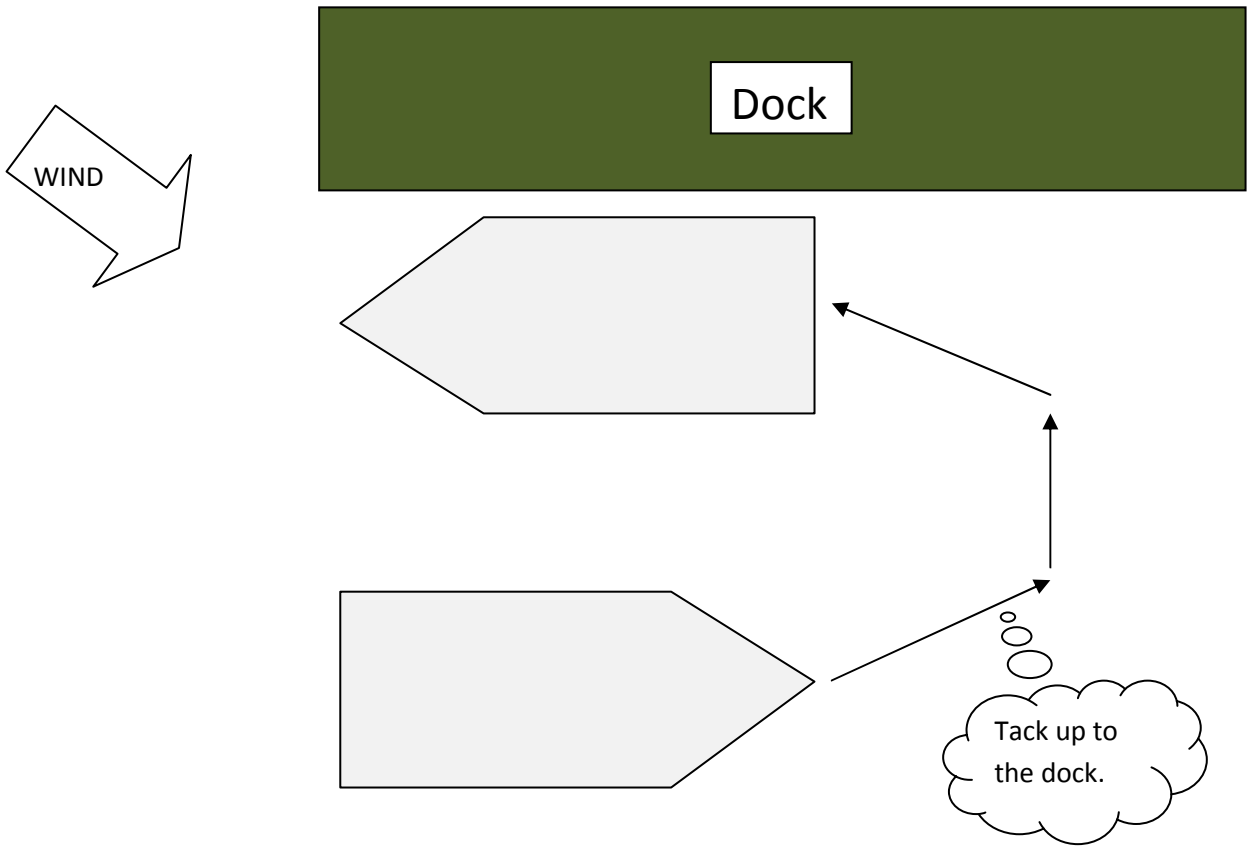
Step #9: Practice Figure-8's WITHOUT Rudder

Repeatedly do the steps for tack and Jibe above in this order: tack, tack, jibe, jibe, then repeat. This will lead the boat to do a figure-8 pattern in the water. Try to get your figure-8's as tight as possible.

Step #10: Practice Docking WITHOUT Rudder

In close vicinity to the dock, we only want to do tacks. This is a good general rule even with a rudder, but especially rudderless we need to avoid jibing near the dock. If you have done the steps above you will quickly learn that rudderless you can do a tack much quicker and easier than a jibe. This relates to the larger relative sail area of the main, which sits behind the mast, and thus its manipulation makes it easy to turn the area of the boat forward of the mast (ie. the bow) into the wind. Jibes are slower and have a much larger turn radius, and thus can cause big problems in the tight areas surrounding a dock.

When docking rudderless I usually approach the dock such that I am parallel to it about two boat lengths away. Then do a quick 180 degree tack which dramatically slows the boat and leaves me right next to the dock and parallel to it, just facing the opposite direction.



Copyright, Legal Notice and Disclaimer

Keywords: rudderless sailing, optimist, dinghy, dinghies, single handed sailing, one design, sunfish, racing dinghies, high school sailing, sail trim, laser bahia, yacht racing, weather helm, lee helm, sail plan, beam reach, close hauled, center of effort

Description: A proficient and efficient sailor masters the techniques of sailing their boat when the control mechanisms are limited. Rudderless sailing is using weight distribution and sail trim, as opposed to the rudder, to control the boat. Understanding rudderless sailing allows you to sail faster, make quicker turns, handle rudder failure emergencies, and is - simply put - very impressive to watch. This eBook thoroughly covers the motivations, physics, sail trim techniques, weight distribution concepts, and a practical step-by-step guide to learning to sail rudderless. After reading this eBook you will be able to effectively understand, implement, and teach rudderless sailing.

Published by: Lulu Books, Inc.
3101 Hillsborough Street
Raleigh, NC 27607-5436

Title: Rudderless Sailing
ISBN: 978-0-557-90313-9
Content ID: 9775608