

Winning On Lakes – What are the Priorities?

The #1 Priority for
Winning on Lakes -

Consistently Finding and Using
Wind Shifts

Why Finding & Using Wind Shifts Is Usually The #1 Priority On Lakes -

- There are lots of them!!
- They can be very large compared to those found on larger bodies of water.
- Even a single small shifts can make a big difference in the distance you have to sail.

Objective: Use shifts to shorten distance sailed to mark-

- Upwind – Sail on the lifted tack, tack when you get a header.
- Downwind – Sail on the headed tack, jibe when you get a lift.

How much does a Lightning lose while sailing upwind if it misses a single 10 degree shift that lasts only 30 seconds?

Distance Sailed Upwind In 30 Seconds In 10 kt. Wind, ft.	236
Distance Made Good To Windward On 10 Deg. Lift, ft.	194
Distance Made Good To Windward On 10 Deg. Header, ft.	136
Difference In Upwind Distance Made Good, ft.	58
Actual Sailing Distance Lost, ft	82
Boatlengths Lost	4.3

How much does a Lightning lose over the course of a typical lake race if it does not take advantage of shifts?

Conditions:

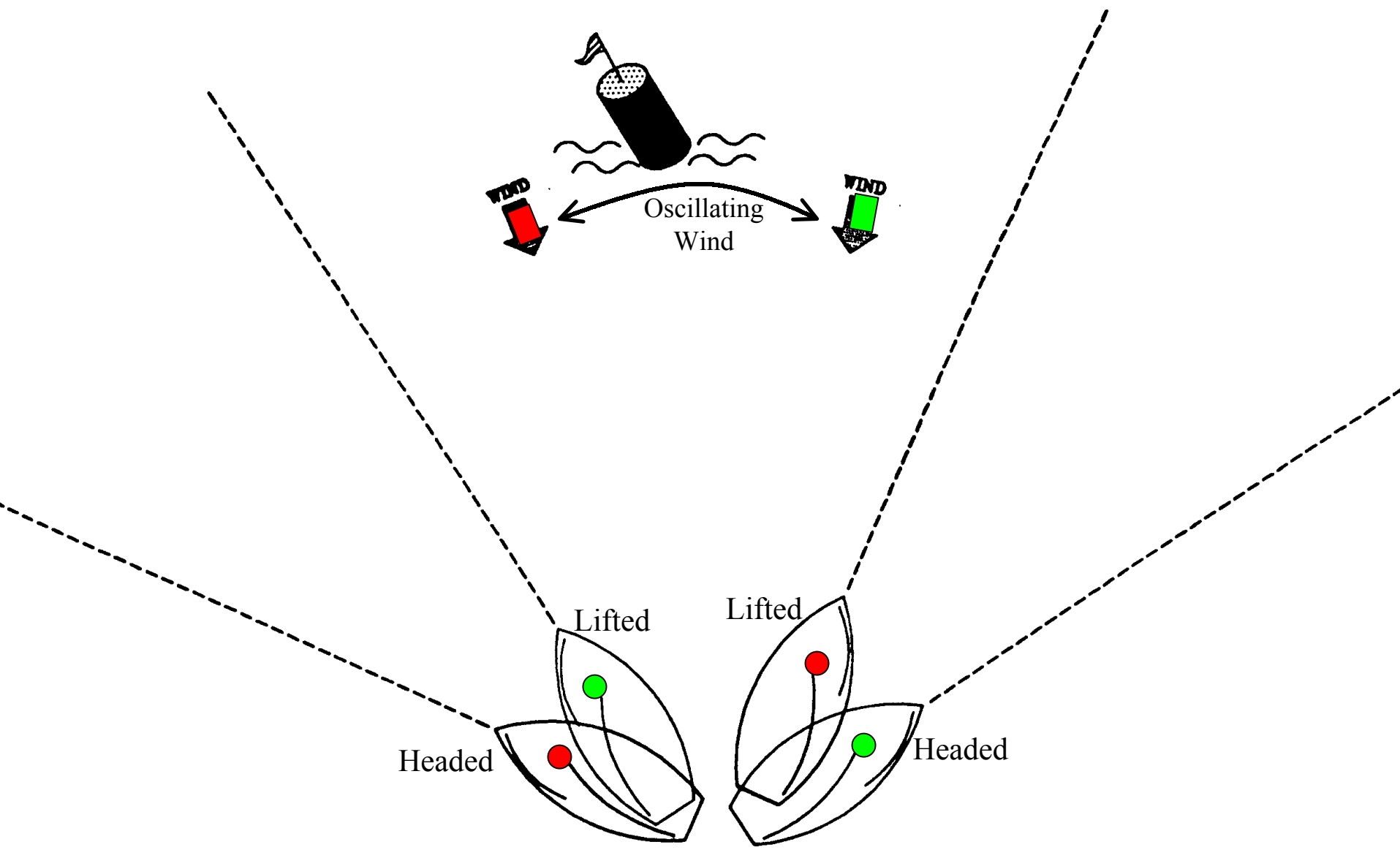
- 10 kts. of wind
- Olympic course with $\frac{3}{4}$ mile beat
- Assume three 20-degree shifts per beat & run
- Tacking angle = 90 deg., jibe angle = 40 deg.

How much would a boat lose over the course of a typical race?

	Boat Speed, kts, in 10 kt winds	Course Runline Distance, nm	Nominal Sailing Distance, nm*	Sailing Distance Using 20 Deg. Shifts	Sailing Time, No Shift Advantage, min.	Sailing Time Using Shifts, min.
Beat 1	4.67	0.75	1.061	0.979	13.64	12.59
Reach 1	5.09	0.53	0.530	0.530	6.25	6.25
Reach 2	5.09	0.53	0.530	0.530	6.25	6.25
Beat 2	4.67	0.75	1.061	0.979	13.64	12.59
Run	4.67	0.75	0.798	0.762	10.26	9.79
Beat 3	4.67	0.75	1.061	0.979	13.64	12.59
		4.06	5.04	4.76	63.67	60.05

How do you know if you are on the lifted tack upwind?

- When sailing with sails trimmed properly and jib telltales streaming, the weather mark is less than 45 degrees off the bow.



WIND

WIND

Oscillating
Wind

Lifted

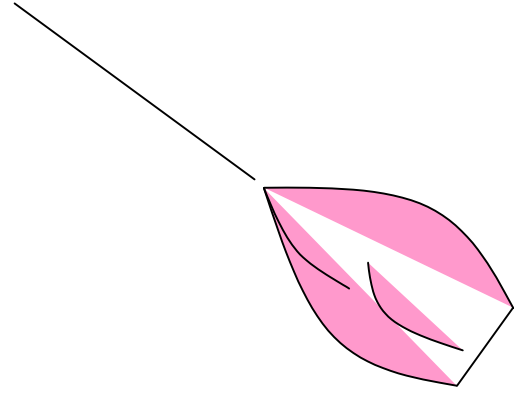
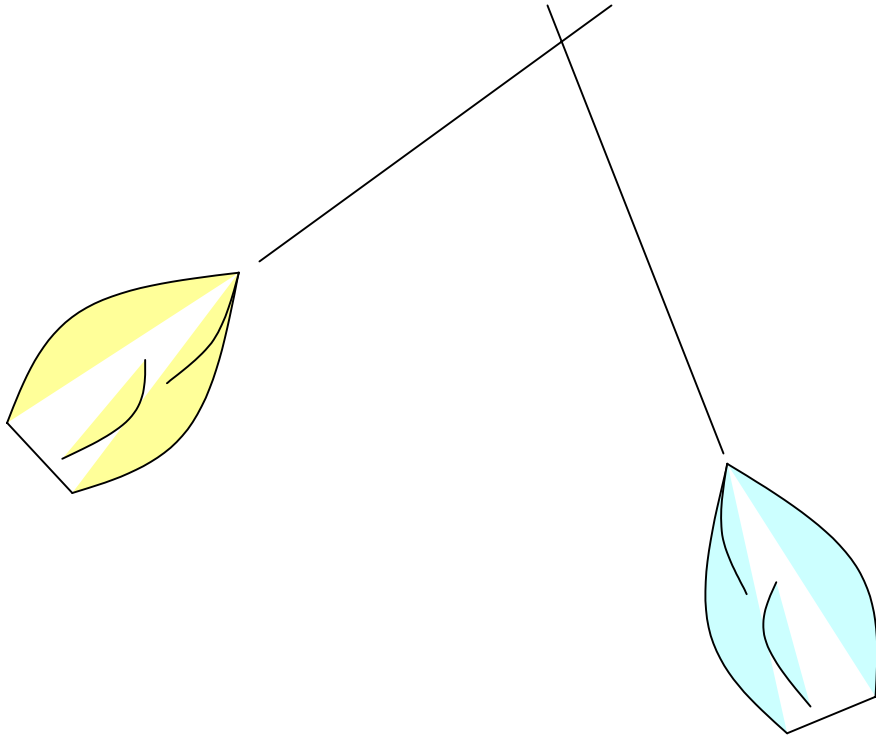
Lifted

Headed

Headed

How do you know if you are on the lifted tack upwind?

- Your heading is closer to the mark than other boats on the same tack.
- Your angle with boats on the opposite tack is less than 90 degrees.



How do you know if you are on the lifted tack upwind?

- Your angle with a previously established reference on shore is higher than earlier.
- Your compass heading shows that your current sailing angle is closer to the wind than an earlier-established mean reference angle for that tack.

Reference Point for
Earlier Heading

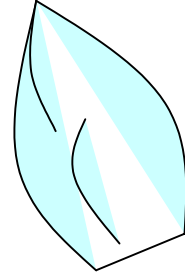


Shoreline



Current Heading

Current
Wind
Direction



Earlier
Wind
Direction



How do you know if you are on the headed tack downwind?

- Generally same methods-
 - Check relative angle to mark on opposite tacks.
 - Check angle with other boats on the same and opposite tack.
 - Establish and check shore reference points.
 - Use compass references.

	Difference In Performance (10 kt. Average Wind, Lake, Flat Water)				
Lacking In...?	Percent Impact	Seconds Lost	Sailing Boatlengths*	Sailing Distance, ft*	Seconds/ Course Mile
Finding & Using Shifts	6%	217	90	1710	53.0

A Trick Related to Shifts – Use “Wally”

- Upwind -
 - When you are lifted, foot *just slightly*. Definitely do not pinch when lifted.
 - Pinch up *just slightly* when you are headed and can not tack immediately onto the lifted tack.
- Dead Downwind –
 - When headed, bear off with the header but ease pole forward just a little and sail a little bit hotter and faster angle.
 - If lifted and can not jib right away, bring pole back just a bit, bear off a bit and sail at a bit slower boatspeed.
- See “Wally Beats the Targets” by Jim Marshall in *Sailing World*, September 1988.

The #2 Priority for
Winning on Lakes -

Consistently Finding and Using
Puffs or “Pressure”

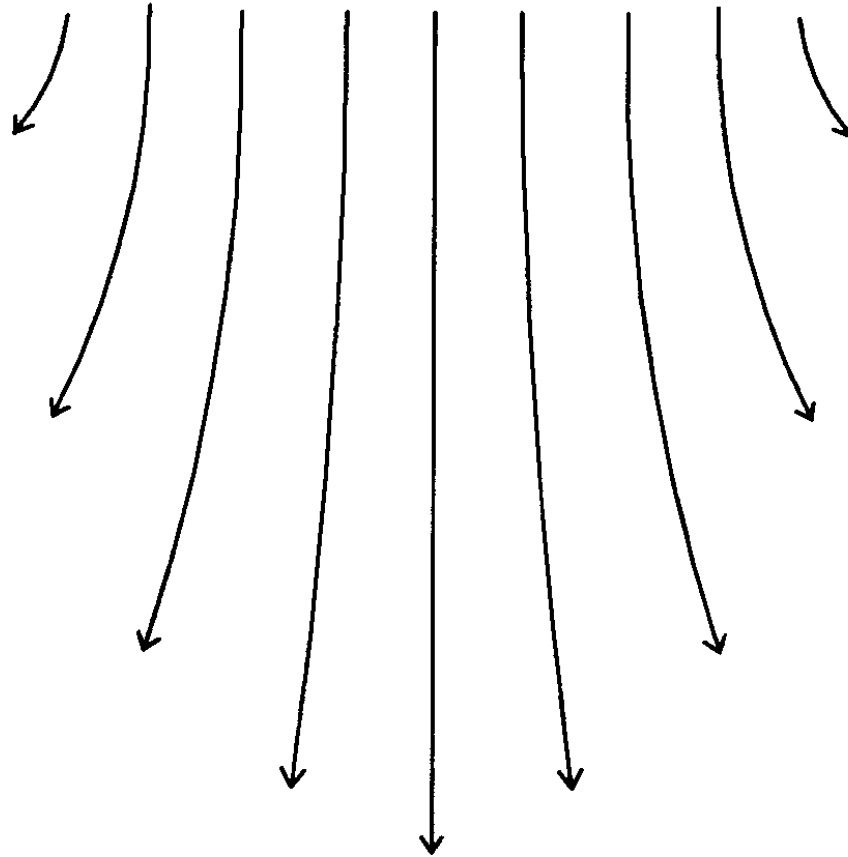
(In light air, this is #1 priority!)

Why Finding & Using Puffs Is Usually The #2 Priority On Lakes -

- There are lots of them!!
- Wind strength variation on lakes is larger than the variation found on larger bodies of water.
- Even a small puff can make a significant difference in boatspeed, especially on any point of sail in light air and moderate air, and downwind in heavy air.

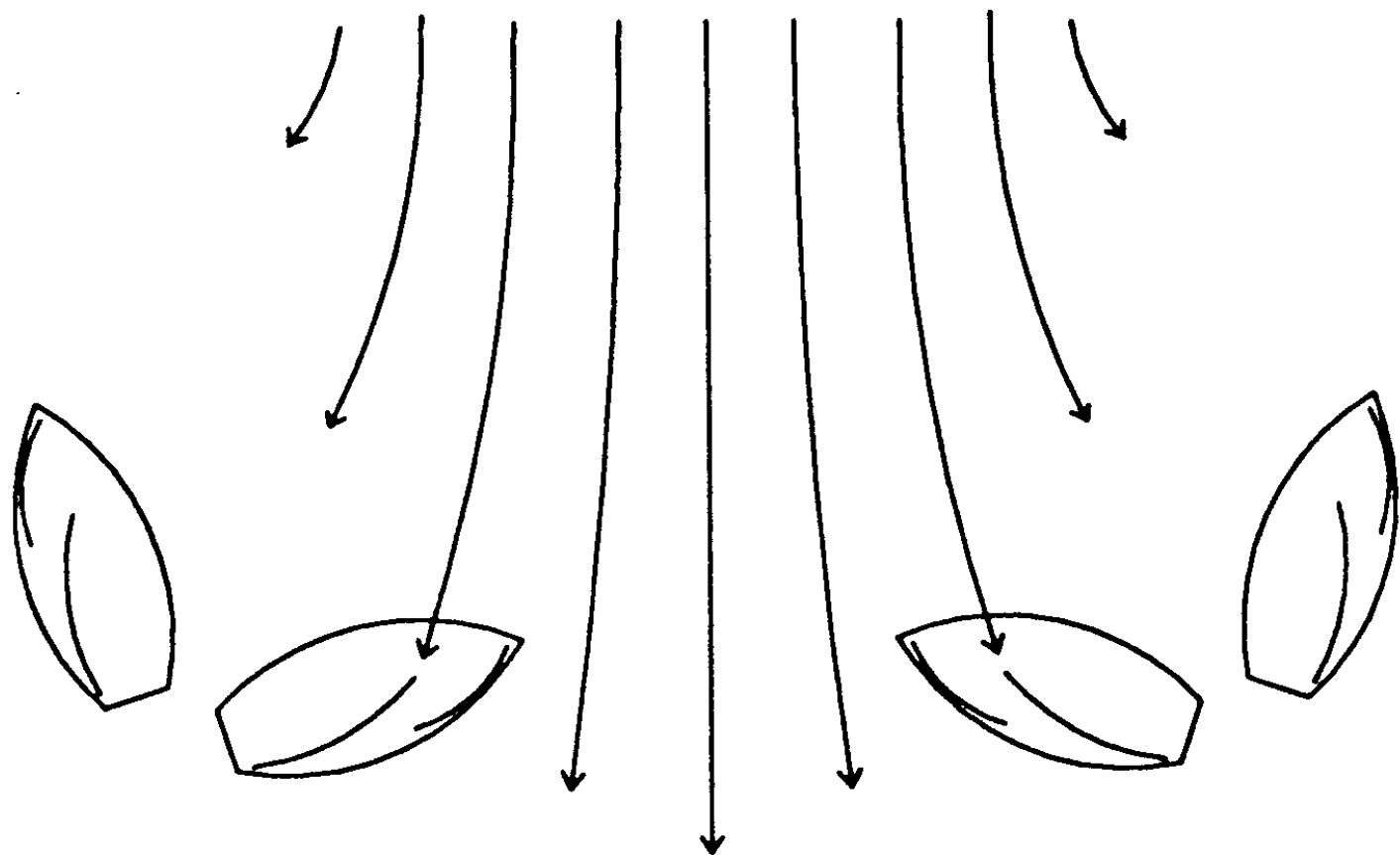
What a puff looks like when it
hits the water -

PUFF



So opposite tacks are favored on opposite sides of a puff, upwind and down -

PUFF



When a Puff Comes From Ahead Sailing Upwind -

- If the center of the puff is to starboard, you want to tack onto starboard tack when the puff arrives, and visa versa. Look at the puff on the water. Also, if you are sailing on the wrong tack when the puff hits, you will be headed – a clear sign to tack.

When a Puff Comes From Behind Sailing Dead Downwind -

- If the center of the puff is to starboard, you want to jibe onto starboard tack when the puff arrives, and visa versa. Again, look at the puff on the water. Also, if you are sailing on the wrong tack when the puff hits, you will be lifted – a clear sign to jibe.

Another Extremely Important
Aspect of Puffs -
Velocity Shifts

A velocity shift is a change in the APPARENT wind direction due only to a change in wind *speed*, not a change in true wind direction.

Velocity Shifts -

- Puffs cause apparent lifts.
- Lulls cause apparent headers.
- Particularly important in light air.
- Don't let them fool you!!

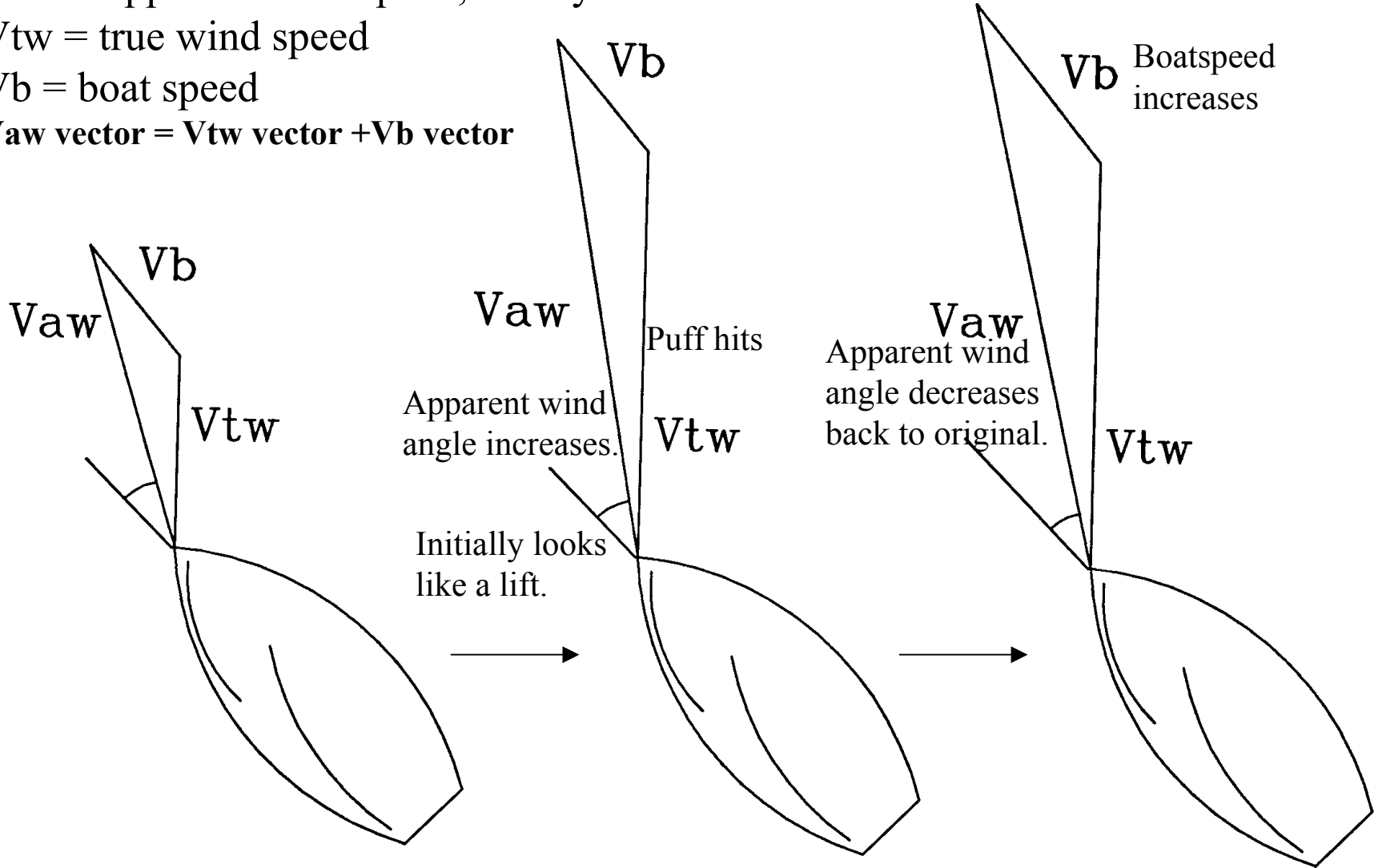
Velocity Shifts From a Puff-

V_{aw} = apparent wind speed, what you and the sails feel

V_{tw} = true wind speed

V_b = boat speed

V_{aw} vector = V_{tw} vector + V_b vector



Velocity Shift Rule Upwind, Puff

- If you sail into a puff, expect a velocity lift.
- If the lift is not there or you get a header, tack as soon as you reasonably can because it is a *real* header.
- If the lift is there, ease the jib *just a little*, hike hard and ease the main as necessary to keep the boat flat. *Do not head up immediately*. Wait until the boat finishes accelerating in the new breeze, then trim in the jib to the normal position and sail to the telltales.

Velocity Shift Rule Upwind, **Lull**

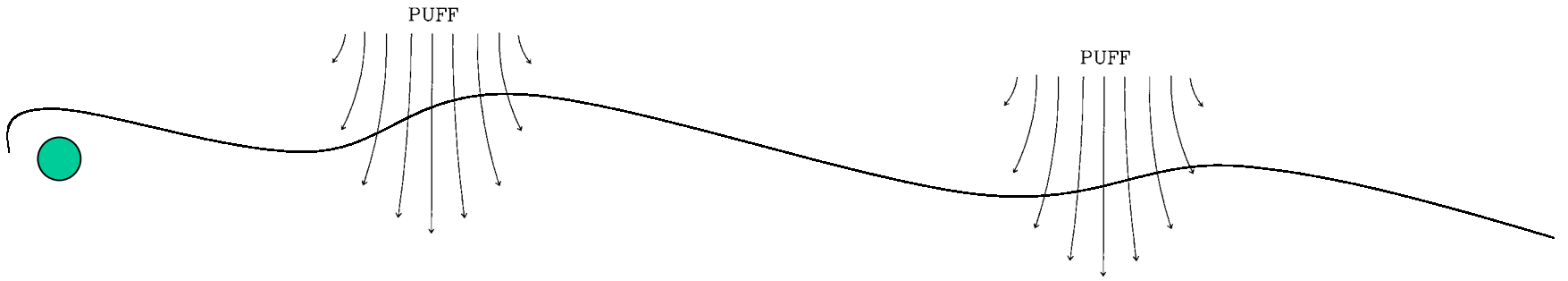
- If you sail into a header, immediately ask yourself if you just sailed into a significant lull.
- If not, it's a real header. Tack!
- If you did just sail into a significant lull, do not fall off trying to get the telltales flying and the jib to stop luffing, and *DO NOT TACK*.
Sail/coast straight ahead and let the jib luff.
- As the boat slows the apparent wind will come aft and the jib should then refill on its own. If after the boat slows the jib does not fill and there is still some breeze, tack because it is a real header.

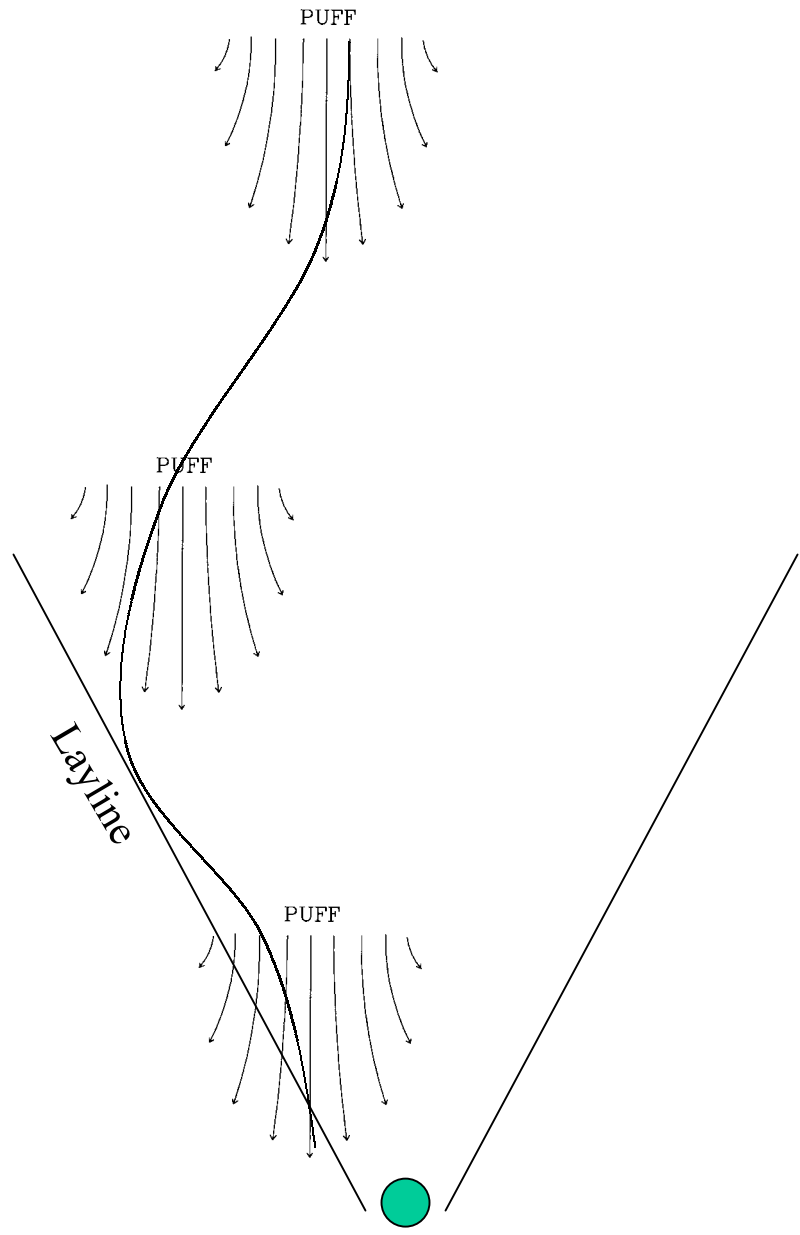
Velocity Shift Rule Upwind, Lull

- If you just react and immediately tack in a lull-induced velocity header, you will be doing the classic header-to-header tack through 100+ degrees and will lose major DMG and boatspeed.

Offwind in Puffs & Lulls

- Bear off in puffs slightly below the normal course, *doing everything necessary to keep the boat flat* except dumping the chute (be sure board is up most of the way, hike hard(!) and aft, ease vang, main, and jib in that order)
- Sail slightly higher in lulls. This increases apparent wind, boatspeed, and VMG, and also positions you to get the next puff sooner than boats to leeward.





Lacking In...?	Difference In Performance (10 kt. Average Wind, Lake, Flat Water)				
	Percent Impact	Seconds Lost	Sailing Boatlengths*	Sailing Distance, ft*	Seconds/ Course Mile
Finding & Using Shifts	6%	217	90	1710	53.0
Finding & Using Puffs	5%	181	75	1425	44.2

Also a #2 Priority for
Winning on Lakes -

Strategy

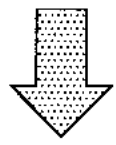
Objective of Race and Leg Strategy -

Find the fastest way around the course or down the leg in the absence of other boats.

Typical Upwind Lake Strategy -

- Sail on the lifted tack and in the most breeze to shorten distance and time sailed to mark.
- Stay close to rhumline and away from the laylines until the very end of the leg so that you can take advantage of every shift and puff.

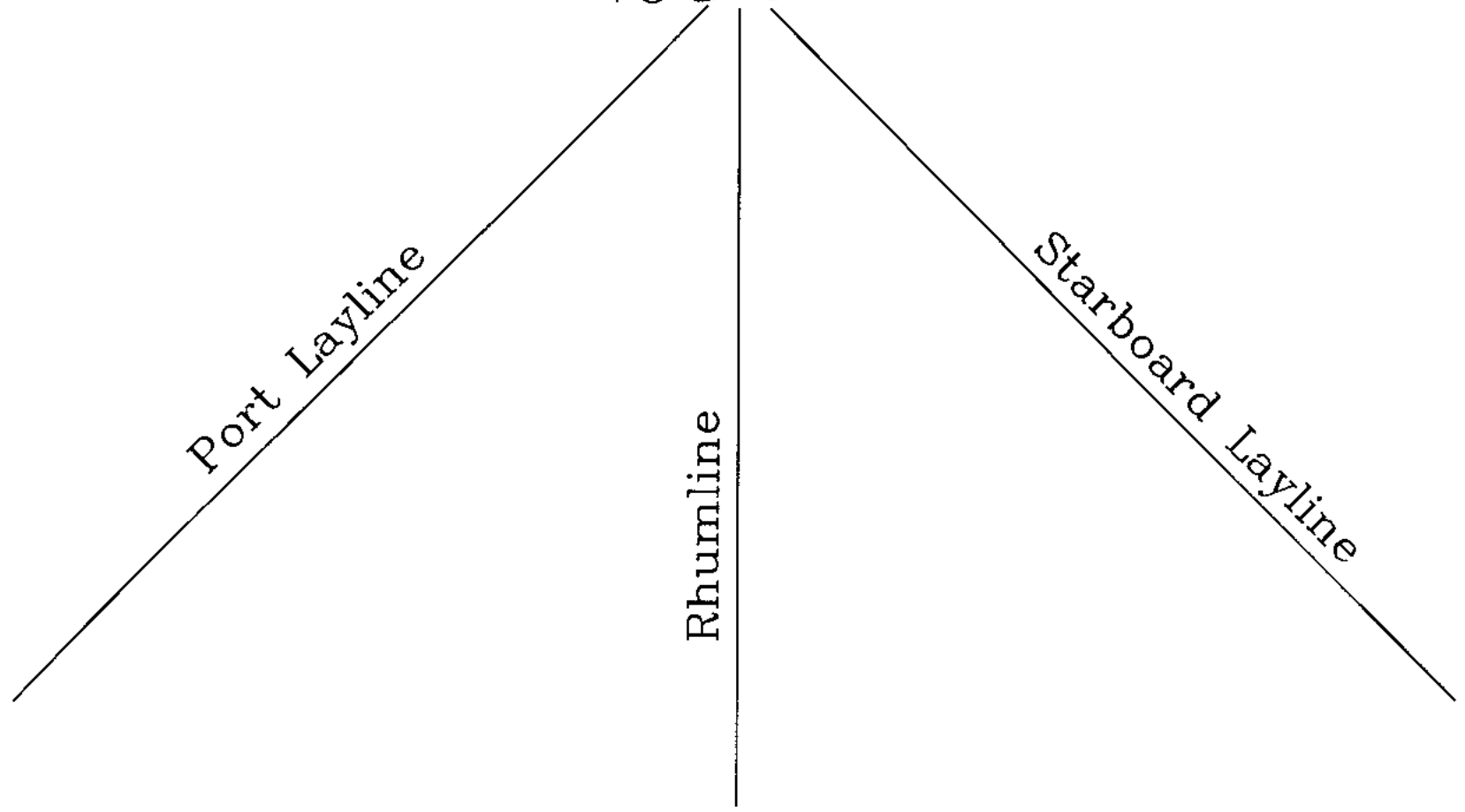
Mean
WIND



Port Layline

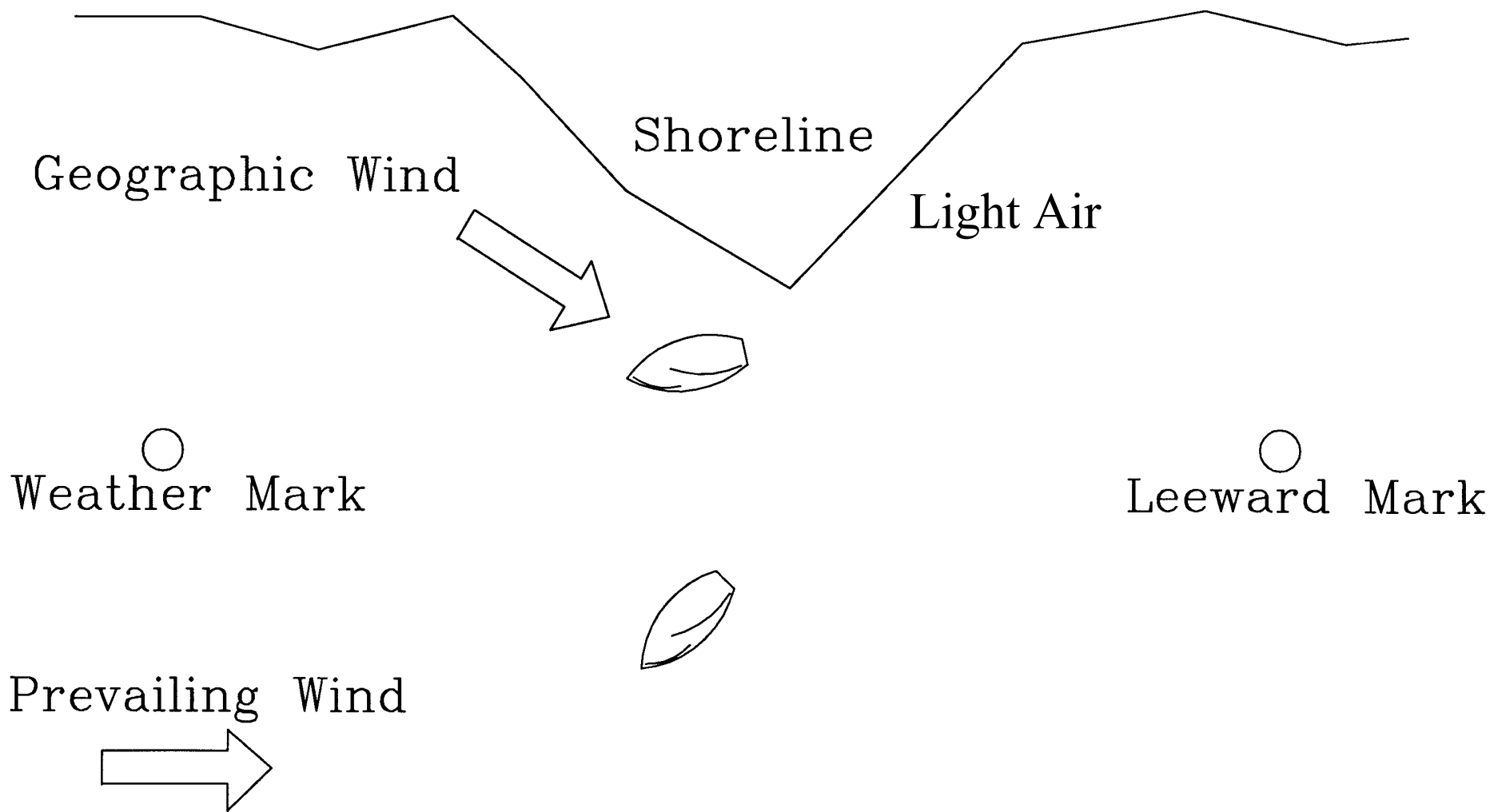
Starboard Layline

Rhumline



Variations on typical upwind lake strategy - *geographic effect*.

- If there is a geographic feature like a shoreline, point, or hill that creates a lift or more pressure, take advantage of it.
- If there is a geographic feature that creates lighter air or a header, avoid it.

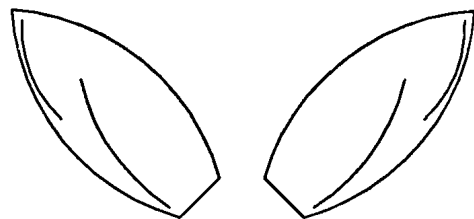
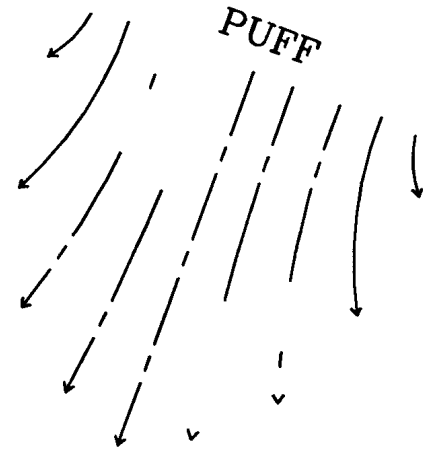


Variations on typical upwind lake strategy - *puffs from one side of predominate wind direction.*

- Favor the side of the course from which the puffs are coming.
- Typically happens during a summer day as a cold/storm front is moving in from the west. Winds are from the southwest and gradually building, and cool puffs are slightly veered (to the right/west).

INITIAL AND LULL

WIND



Typical Downwind Lake Strategy –

- Find and use the puffs!
- Going dead downwind, stay away from the laylines until the end of the leg so that you can continue to jibe back and forth to take advantage of shifts and get in front of puffs.
- Have to continually look upwind (behind) to spot the puffs.

Lacking In...?	Difference In Performance (10 kt. Average Wind, Lake, Flat Water)				
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Effective Strategy	5%	181	75	1425	44.2

Also a #2 Priority for
Winning on Lakes -

Tactics

Objective of Tactics -

In the presence of other boats, to go where you want to go in clear air, and to force the other boats to go where you want them to go in bad air if possible.

Objective of Tactics -

- Upwind and dead downwind stay closer to the rhumline than your competitors. Take every opportunity to go back toward the rhumline on a lifted tack upwind or headed tack dead downwind if you can in reasonably clear air.
- Force your competitors toward the laylines.
- If you are just ahead of a pack of boats upwind, keep your competitors in a single group ideally going toward an unfavorable side of the course. Don't let them split.
- Get inside for mark roundings.

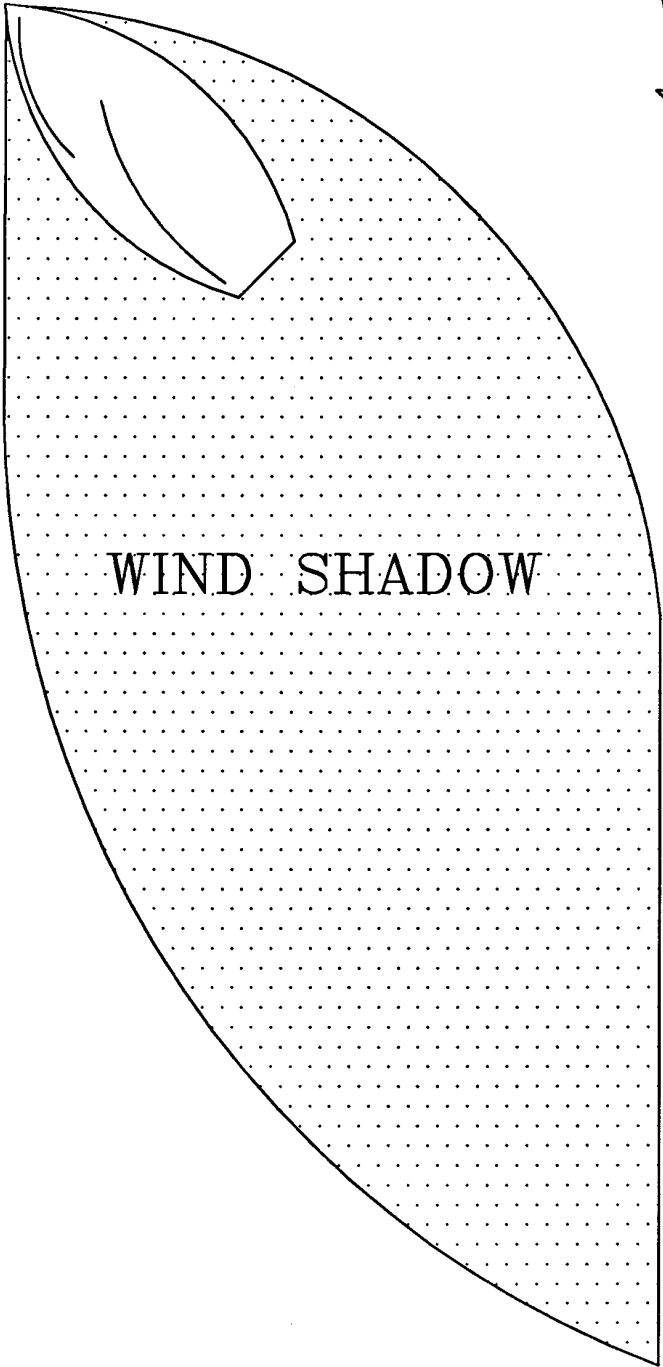
Tactical Tools -

- Your wind shadow.
- Your knowledge of important course features like geographic features, sand bars, channels, laylines, and weed patches.
- The racing rules.

Wind Shadow -

- Extends from a boat in the direction of the *apparent* wind (where the telltales are pointing).
- Extends 5-7 boatlengths in moderate air and up to twice that distance in light air.

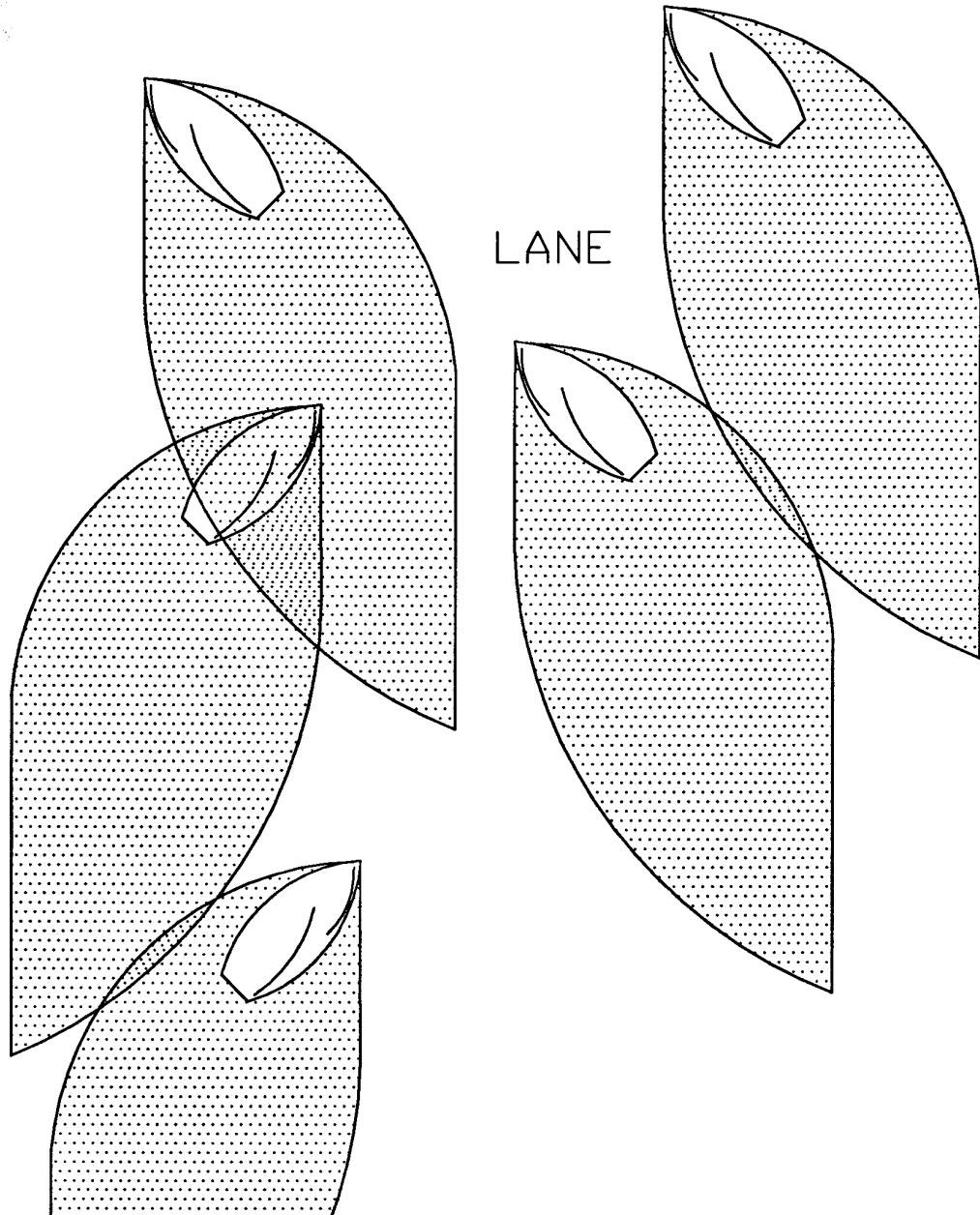
WIND



WIND SHADOW

Upwind and down you need to find a “lane” of clear air that you can use to go generally where you want to strategically.

WIND
↓



Think about tactical situations with competitors before they happen -

- *Do not just react* as a confrontation happens or you may find yourself in trouble with the rules or going the wrong way.
- Requires that you always pay attention to where close competitors are relative to your position and course.



"Why is she going that way?"



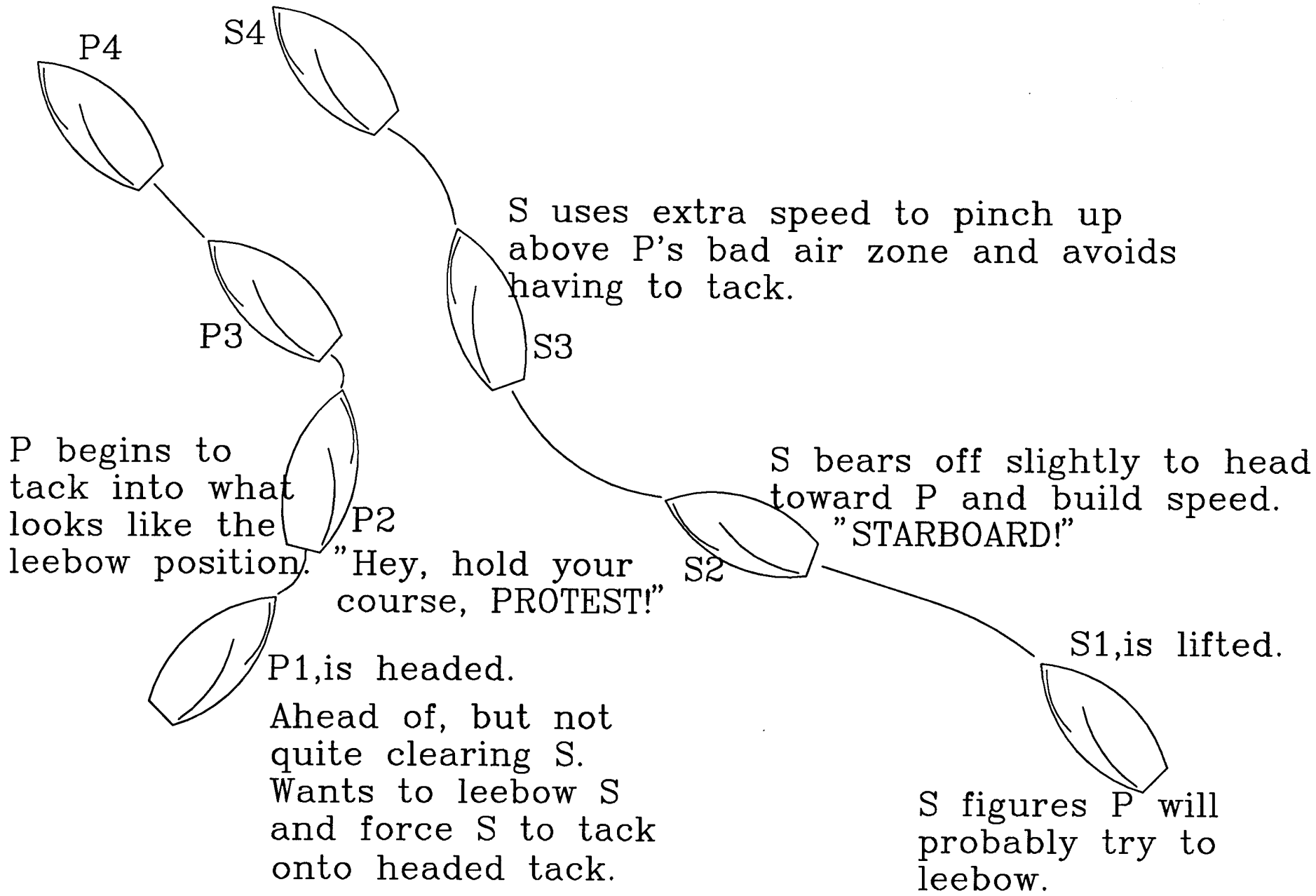
"Why is he going that way?"

Questions for each boat to be asking at this moment:

- Am I lifted or headed right now?
- Where am I relative to the rhumline, laylines, and mark?
- Where am I relative to the majority of the fleet?
- Where do I want to be on the course next strategically?
- Do I want this other boat to go the same direction as me, or do I want them to go the other way?

Need to decide before you get there:

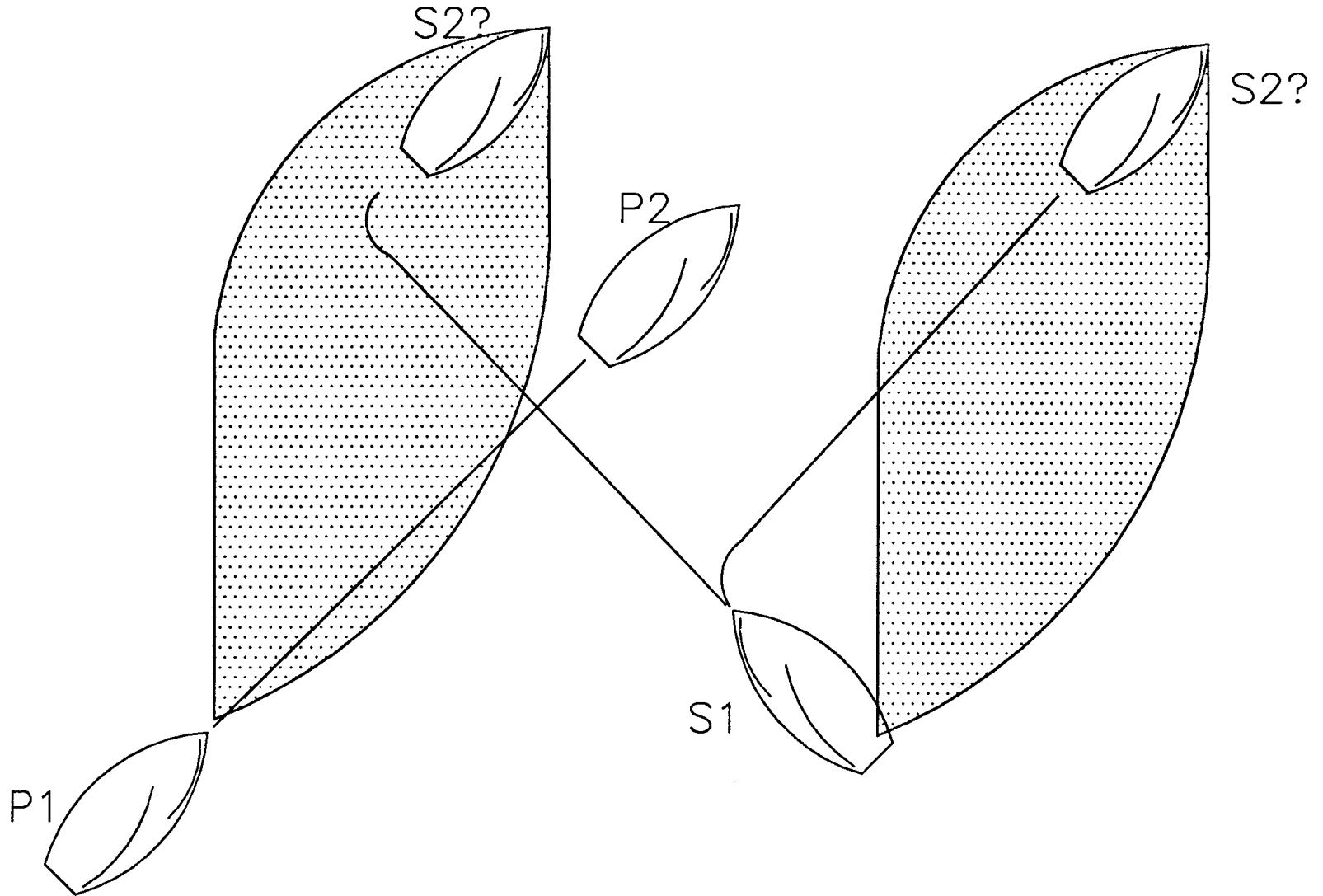
- Whether to hold or tack.
- Whether to try to get the other boat to hold or tack.



When to “loose cover” -

- You want to go the same direction as the other boat.
- Want the other boat to continue going in the same direction.
 - Toward the layline.
 - With/toward the rest of the fleet.

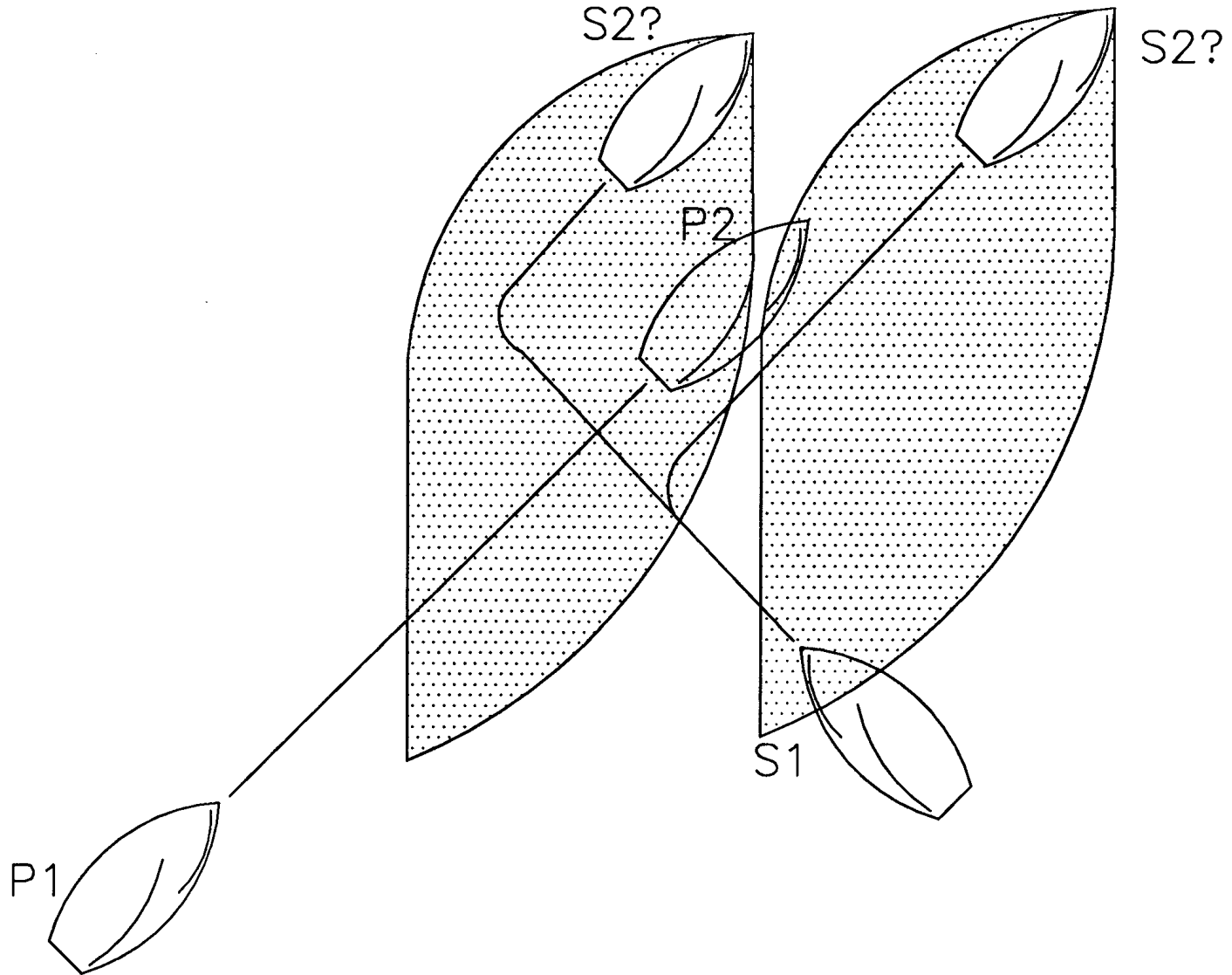
P can continue with S



When to “tight cover,” “slam,” “face” -

- Want the competitor to tack and go in the other direction.
 - From going toward rhumline to going toward the layline.
 - From going away from the rest of the fleet to going with the rest of the fleet.
 - From lifted tack to headed tack.

P Forced To Tack



Lesson: Do not react and slam competitors all of the time just because you can. Think first! Often it is better to loose-cover or even let them go entirely.

A Tactical Trick

If you are on port tack and approaching a starboard tacker that you can almost cross, and you want to avoid tacking, you can yell, “Tack or cross?!”

This signals the starboard tacker that you would like to keep going, but if he does not let you go, you will lee-bow him. This works quite often.

Another Tactical Trick

If you are leeward boat on a reach and another boat is moving up close behind and to windward, try *early* to talk him out of trying to go above you.

If he does not listen, luff him hard as soon as he gets an overlap and force him below you, then get going again so as not to lose on the fleet.

Lesson: Should not always use the rules to the max just because you can (port-starboard, luffing, etc.).

Sometimes it is in YOUR best interest to let someone slide.

Example: You are on a starboard tack lift and a port tacker is coming that can not quite cross you. Instead of yelling, “Starboard!,” yell, “Go ahead and cross!,” duck him and keep going.

If you often use the rules as a weapon regardless of the negative impact on your own performance, you won't have many friends. If you know someone like this, just do your best to avoid them on the race course.

Another Tactical Trick

Dead downwind, use your wind shadow to attack from behind. Get in a position so that your telltales point straight at the boat ahead. Try to get them to jibe toward the layline or onto the lifted tack.

If someone is doing this to you, try to work your way up or down slightly to find a clear lane (use telltales as guide: Are they pointing right at the boat trying to gas you?). If you can't clear your air, jibe away and then jibe back in another lane.

Lacking In...?	Difference In Performance (10 kt. Average Wind, Lake, Flat Water)				
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Finding & Using Shifts	6%	217	90	1710	53.0
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Effective Strategy	5%	181	75	1425	44.2
Effective Tactics	5%	181	75	1425	44.2

The #3 Priority for
Winning on Lakes -

“Shifting Gears”

“Shifting Gears”

- Small adjustments to *sail trim* and *rig controls* upwind to match changes in conditions and also present objectives.
 - Sheets (angle of attack, leach twist)
 - Jib leads (twist and jib fullness)
 - Jib halyard (jib & main fullness)
 - Backstay (main & jib fullness)
 - Luff tensions (main & jib fullness, draft location)
 - Traveler (main angle of attack, power)
 - Vang (main twist, only offwind in Lightning)
 - Outhaul (main fullness low)

Most Important - Sheet Adjustment

- Generally want a telltale on the leach of the main at upper batten to fly aft about 50% of the time. If you want to foot, ease sheet just enough to let it fly 90% of the time. If you want to pinch for a short time, trim in slightly so it flies 10% of the time.
- Generally want the leach of jib at the spreader pointing 4-5 in. in from the spreader tip. Footing: 0-3 inches. Pinching: 5 inches.
- *On a lake, requires nearly constant sheet adjustment as wind speed changes.*

Example of Shifting Gears:

Overpowering Puff -

- Pull jib halyard 1/2 - 1 in. tighter.
- Pull backstay as tight as possible.
- Trim main hard to retighten leach.
- Pull both sail luffs as tight as possible.
- If leeward jib car is adjustable from windward side, let it slide back 1 in.
- Play traveler as puff hits to keep boat flat.
- Do this all in less than 5 seconds.
- Reverse as puff dissipates.

Lacking In...?	Difference In Performance (10 kt. Average Wind, Lake, Flat Water)				
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Effective Tactics	5%	181	75	1425	44.2
"Shifting Gears"	4%	145	60	1140	35.3

The #4 Priority for
Winning on Lakes -

Good Boat Handling

Boat Handling

- Roll tacking and jibing.
- Crew weight position -
 - Move all the way forward in light air, and aft as wind builds.
 - Crew (not skipper) moves in and out to balance helm with consistent slight heel in light air to no heel in heavy air.
 - allows helmsman to sit on high side to see jib clearly (in all conditions but a drifter).
 - keeps helmsman from having to move around to maintain boat and helm balance.
- Spinnaker sets, jibes, takedowns
- Mark roundings
- Starts
- Use crew weight and sail trim to steer boat and let the rudder just follow along.

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"Shifting Gears"	4%	145	60	1140	35.3
Good Boat Handling	3%	109	45	855	26.5

The #5 Priority for
Winning on Lakes -

Tie

-Avoiding Fouls

-Hull Strength and Stiffness

Avoiding Fouls

- Know the rules.
- Follow the rules.
- Pay attention and think about rule-related tactical situations before they happen.
Don't just react.
- If you are the burdened boat in a foul situation where there is some reasonable probability that you were wrong, just do your circles and get back to racing.

Boat Strength and Stiffness

- Buy a boat that is in good condition.
 - Push and knock on the hull in all stressed areas.
 - Don't necessarily buy a class hotshot's boat. It has likely been sailed and trailered hard.
- Even though Congress does not care, prevent repetitive stress injuries to your hull (bouncing against the trailer or dock).
 - Use bumpers or haul the boat out between races.
 - Use very large bunks on your trailer and strap the boat down solidly.

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Good Boat Handling	3%	109	45	855	26.5
Avoiding Fouls	2%	72	30	570	17.7
Hull Strength & Stiffness	2%	72	30	570	17.7

The #6 Priority for Winning on Lakes -

Tie

-Condition of Sails

-Rig Tuning

-Condition of Foils

-Basic Condition of Bottom

Condition of Sails – There is about a 1% performance difference between an OK set of club sails and new sails.

Rig Tuning – Follow your sailmaker's tuning guide for upper and lower shroud tension, rake, deck block position, etc. Guides are all available on the web, often with more recent regatta notes from the hotshots. Adjust for the expected conditions before going out. Re-adjust between races if necessary. Get your sailmaker to help you tune up, and even go sailing with you.

Condition of Foils – Clean. No dings or scratches. Polish as smooth as possible because laminar flow is possible over entire surface.

Basic Bottom Condition – Clean. No significant dings or scratches. Reasonably fair. Round chines forward, sharp chines aft. >600 grit smoothness not really necessary because laminar flow is only possible within the first couple of feet from bow.

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Avoiding Fouls	2%	72	30	570	17.7
Hull Strength & Stiffness	2%	72	30	570	17.7
Condition of Sails	1%	36	15	285	8.8
Rig Tuning	1%	36	15	285	8.8
Condition of Foils	1%	36	15	285	8.8
Basic Bottom Condition	1%	36	15	285	8.8

The #7 Priority for
Winning on Lakes -
Tie

- Running Rigging
Layout/Operability**
- Deck and Cockpit Design**
- “Optimum” Hull Shape**

Poor running rigging layout and/or operability makes it difficult to shift gears, and may cause crew movement that hurts performance (like having to reach into the boat to adjust something when you need to be hiking hard).

Poor deck & cockpit design just makes the boat unnecessarily uncomfortable to sail. This causes fatigue and hurts overall focus.

Sub-optimal hull shapes do not exist in winning builders boats'. This is easy > buy a proven brand.

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Basic Bottom Condition	1%	36	15	285	8.8
Running Rigging Layout/Operability	0.5%	18	8	143	4.4
Deck & Cockpit Design	0.5%	18	8	143	4.4
"Optimum" Hull Shape	0.5%	18	8	143	4.4

The Last Priority for
Winning on Lakes
(or really anywhere)-

Ultimate Bottom Smoothness

	Difference In Performance (10 kt. Average Wind, Lake, Flat Water)				
Lacking In...?	Percent Impact	Seconds Lost	Sailing Boatlengths*	Sailing Distance, ft*	Seconds/ Course Mile
Finding & Using Shifts	6%	217	90	1710	53.0
Finding & Using Puffs	5%	181	75	1425	44.2
Effective Strategy	5%	181	75	1425	44.2
Effective Tactics	5%	181	75	1425	44.2
"Shifting Gears"	4%	145	60	1140	35.3
Good Boat Handling	3%	109	45	855	26.5
Avoiding Fouls	2%	72	30	570	17.7
Hull Strength & Stiffness	2%	72	30	570	17.7
Condition of Sails	1%	36	15	285	8.8
Rig Tuning	1%	36	15	285	8.8
Condition of Foils	1%	36	15	285	8.8
Basic Bottom Condition	1%	36	15	285	8.8
Running Rigging Layout/Operability	0.5%	18	8	143	4.4
Deck & Cockpit Design	0.5%	18	8	143	4.4
"Optimum" Hull Shape	0.5%	18	8	143	4.4
Ultimate Bottom Smoothness	0.2%	7	3	57	1.8

Lacking In...?	Difference In Performance (10 kt. Average Wind, Lake, Flat Water)					% Importance	Cumm % Importance
	Percent Impact	Seconds Lost	Sailing Boatlengths*	Sailing Distance, ft*	Seconds/ Course Mile		
Finding & Using Shifts	6%	217	90	1710	53.0	15.9%	15.9%
Finding & Using Puffs	5%	181	75	1425	44.2	13.3%	29.2%
Effective Strategy	5%	181	75	1425	44.2	13.3%	42.4%
Effective Tactics	5%	181	75	1425	44.2	13.3%	55.7%
"Shifting Gears"	4%	145	60	1140	35.3	10.6%	66.3%
Good Boat Handling	3%	109	45	855	26.5	8.0%	74.3%
Avoiding Fouls	2%	72	30	570	17.7	5.3%	79.6%
Hull Strength & Stiffness	2%	72	30	570	17.7	5.3%	84.9%
Condition of Sails	1%	36	15	285	8.8	2.7%	87.5%
Rig Tuning	1%	36	15	285	8.8	2.7%	90.2%
Condition of Foils	1%	36	15	285	8.8	2.7%	92.8%
Basic Bottom Condition	1%	36	15	285	8.8	2.7%	95.5%
Running Rigging Layout/Operability	0.5%	18	8	143	4.4	1.3%	96.8%
Deck & Cockpit Design	0.5%	18	8	143	4.4	1.3%	98.1%
"Optimum" Hull Shape	0.5%	18	8	143	4.4	1.3%	99.5%
Ultimate Bottom Smoothness	0.2%	7	3	57	1.8	0.5%	100.0%
	38%	1363.483	565.500	10744.500	333.017		

Blue: on the water, **Yellow:** bought, **Pink:** work ashore and in shop.

Time on the water accounts for 73% of performance.

What you buy accounts for 12% of performance.

Time working on the boat accounts for less than 10% of performance.

All the top priorities relate to getting out on the water and sailing.

Another way of looking at it:

One hour of practice will gain you 365 times more performance improvement than one hour of polishing the bottom with 1200 grit.

Or, a day on the water is worth a year in the shop trying to perfect the bottom.

You should budget ~1 hour for working on the boat for every 8 hour of racing and practice.

And this boat work should focus on:

- Tuning the rig for the conditions before you leave shore each time (15 minutes before each outing).
- Making sure rudder and board are clean and smooth (4 hours in the spring; wipe off and quickly buff before each outing – 10 minutes).
- Making sure bottom is OK (4 hours in the spring; wiping off before each outing – 2 minutes).
- Making sure all adjustments are placed and working well (2 hours in the spring, minor necessary maintenance & changes throughout season).

Personal Preparation

- Wear the right clothing for conditions.
- Bring along plenty of carbs and hydrating liquids.
- Use sun screen.
- Stretch before and between races.
- Preload with Ibuprophen.
- Keep notes of what went right and wrong.
- Go out with the primary objectives of having fun and challenging yourself, not beating your competitors.