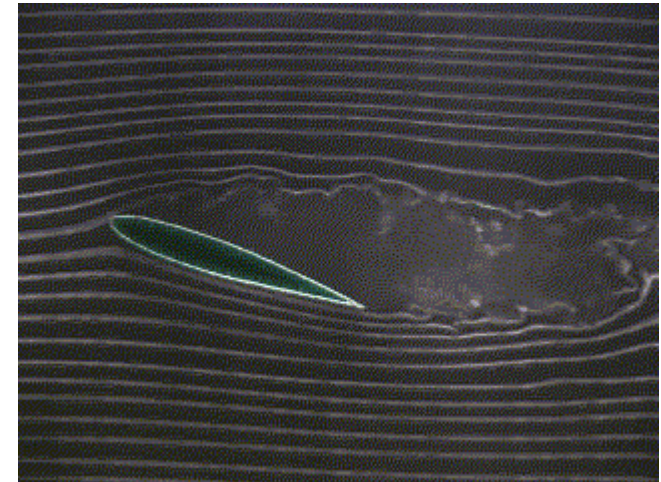
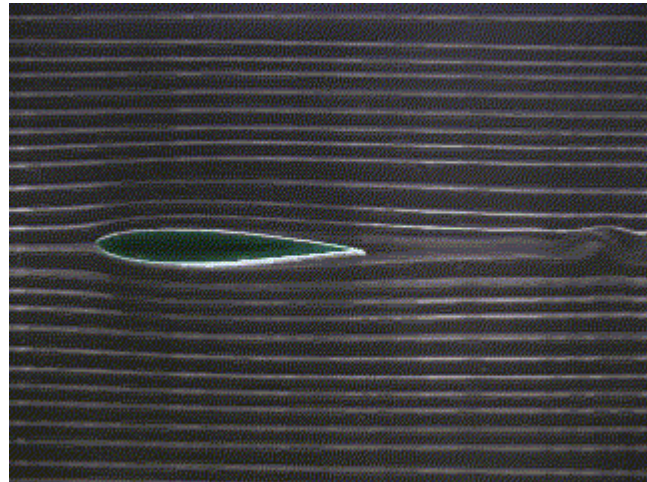
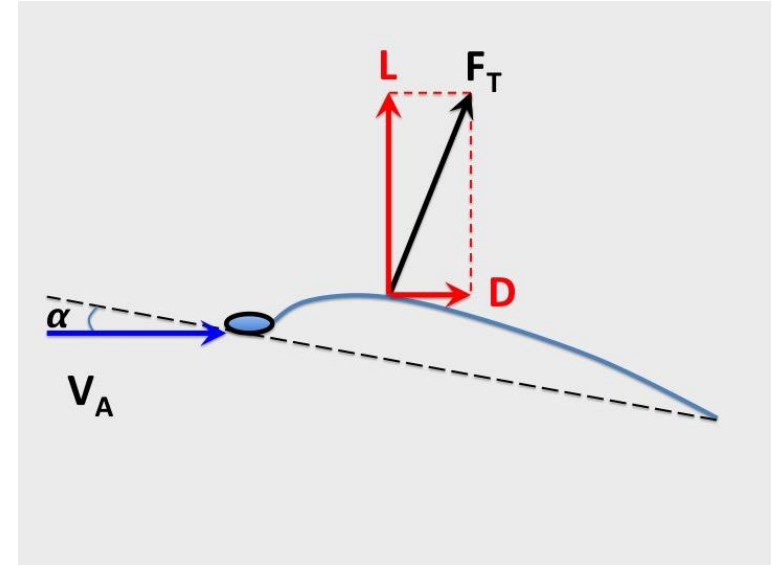


Sail Trim Fundamentals

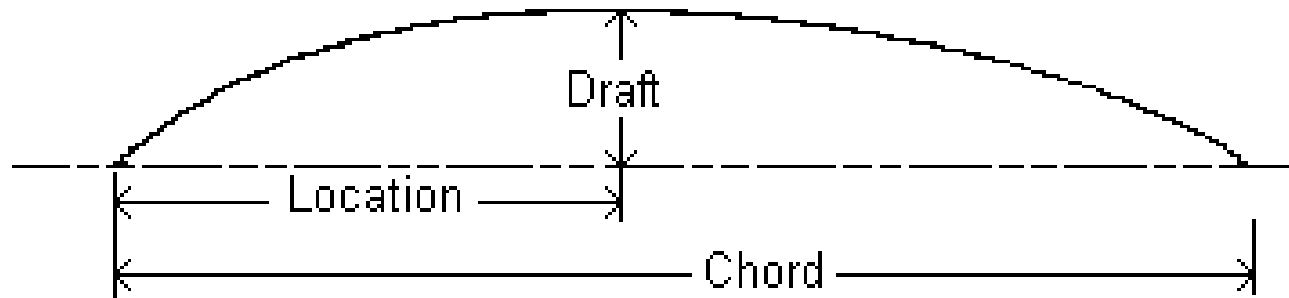
Basic Definitions

- Aerodynamic forces
 - Lift
 - Drag
 - Laminar flow
 - Turbulent flow



Basic Definitions

- Sail characteristics
 - Chord
 - Draft
 - Twist

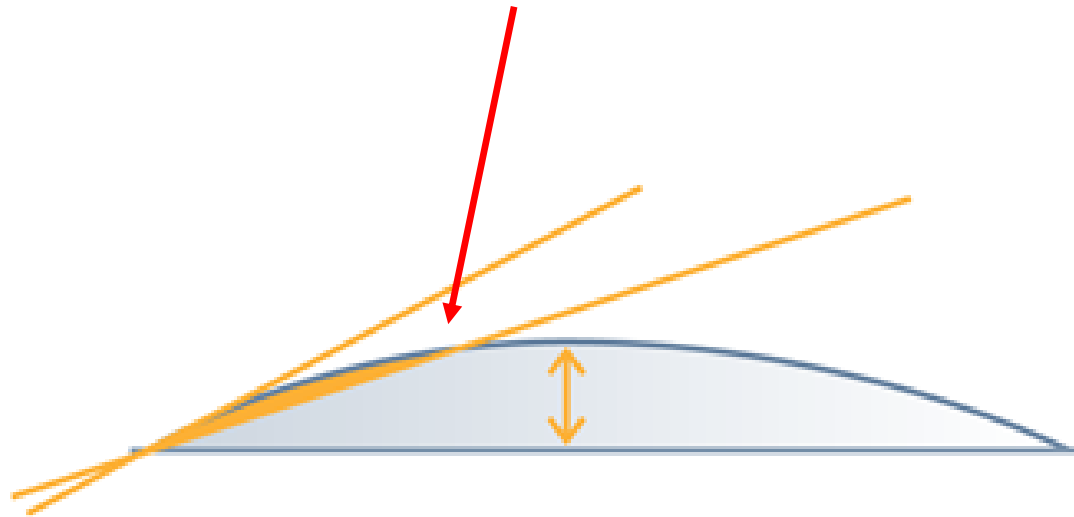


$$\text{Draft Position} = \text{Location/Chord (\%)}$$



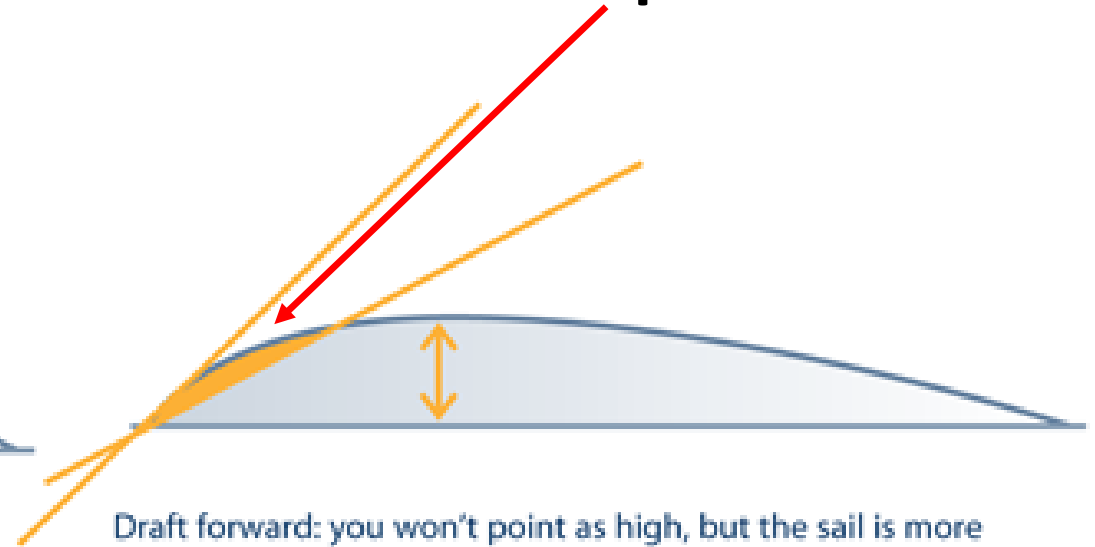
Draft position-In general...

Higher pointing



Draft aft: you'll point higher, but the sail is unforgiving.
A large area loses drive if you sail too close.

More powerful!



Draft forward: you won't point as high, but the sail is more tolerant.
Sailing too close only loses drive in a small area.

Draft placement based on wind strength



Light to moderate winds

$$\frac{\text{draft}}{\text{chord}} = 15\% \text{ to } 20\%$$

Draft occurs at 50% of chord.



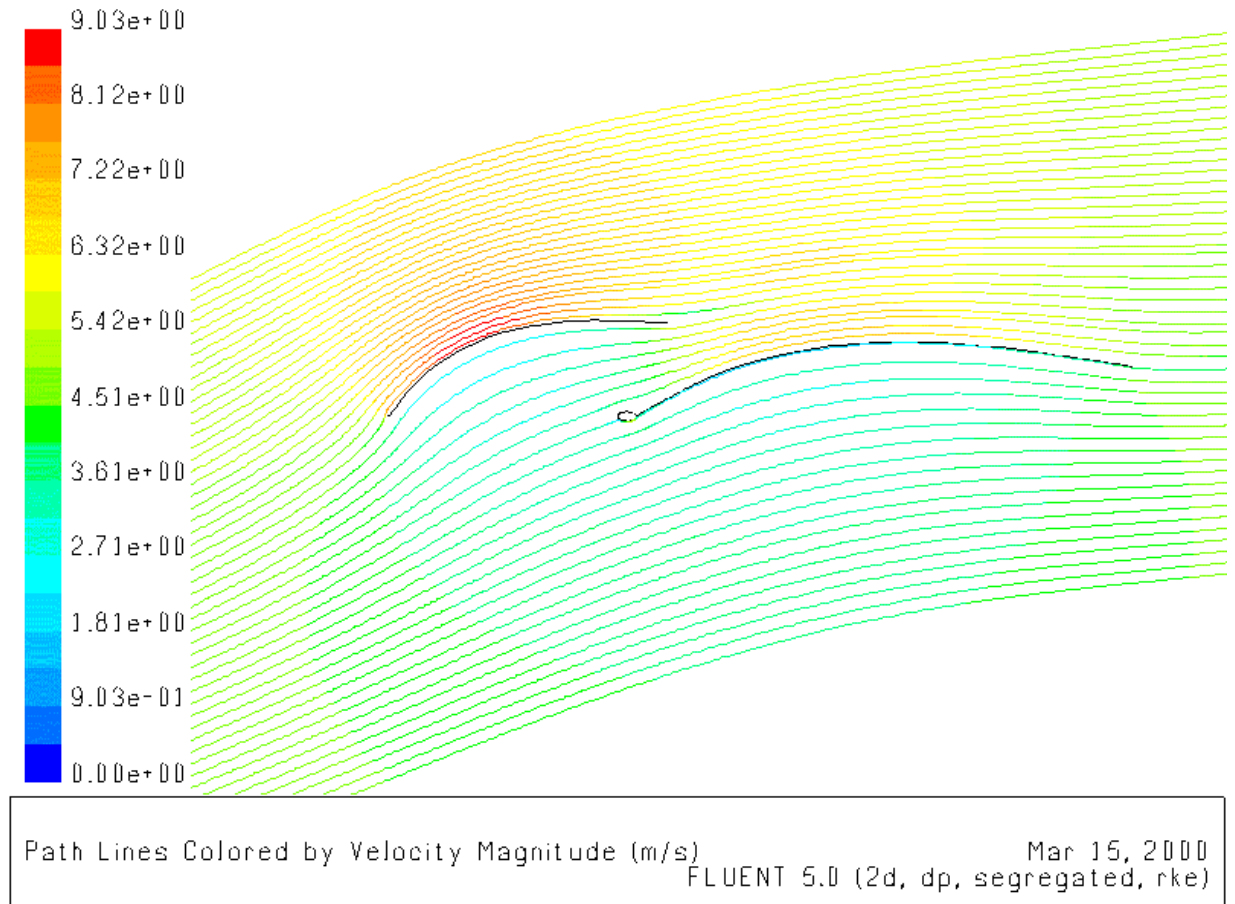
Stronger winds

$$\frac{\text{draft}}{\text{chord}} = 8\% \text{ to } 10\%$$

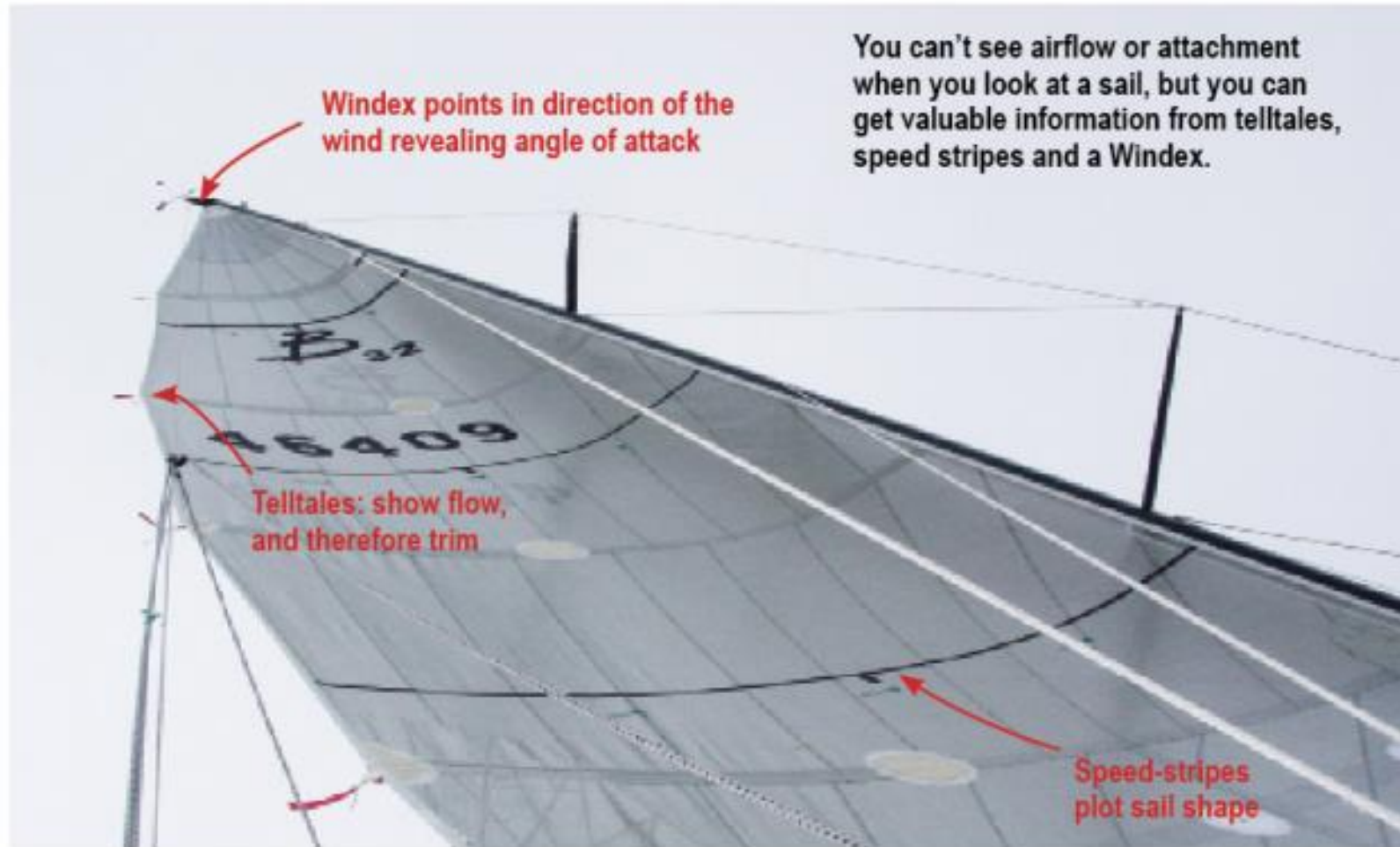
Draft occurs at 35% to 40% of chord.

The Sloop Rig

- **Jib**
 - most powerful lift force generator
 - less turbulence at the luff
 - supports greater forward draft
 - accelerates airflow on leeward side of main
- **Main**
 - typically draft farther aft
 - typically runs with less draft



How to Judge Sail Shape Underway

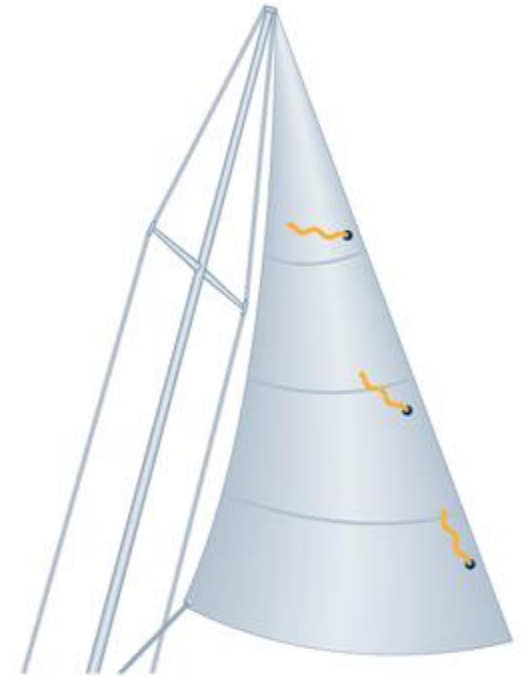


What the Telltales tell us...

- **Laminar flow?**
- **Car position(s) correct?**
- **Angle of attack correct?**
- **Draft depth/position correct?**



If the top telltale lifts first, the car is too far aft.



A lifting bottom telltale tells you the car is too far forward.

Tuning Essentials

- Tune when you are not racing and start when your not sailing
- Stare at your boat
 - Tie her off in the slip under power
 - Spend time with a measuring tape, laser pointer and some sail tape (painter's tape works too)
 - Lay on your back and study...change things and watch what happens (video)
- Mark your boat and lines
 - Sail tape your backstay at 25%, 50% and 100%
 - Mark your jib car initial setting and heavy air settings with nail polish
 - Sail tape your halyards, cunningham and outhaul (especially with a loose foot!)

Our Controls over Sail Shape (Most common)

- Halyard(s)
- Backstay tension
- Jibstay sag
- Cunningham
- Mainsheet
- Outhaul
- Boom Vang
- Jibsheet
- Traveler (Main/Jib)
- Crew Weight

Initial Setting: Lighter wind/smooth water

- 1st the Mainsail: goal is power with low drag
 - Light halyard tension
 - Top batten parallel to boom/top telltale just luffing
 - Outhaul on medium-loose the belly (lower 1/3)
 - Check uniform luffing head to tack with traveler-adjust with the mainsheet
 - Cunningham to position draft at 50% but no more
 - Center the boom on the boat with the traveler (usually above centerline)
- Then the Headsail:
 - Use medium jibstay sag—adds fullness/rounds entry of sail/shifts draft forward
 - Promotes attached flow
 - Keeps slot open
 - Allows you to close the leech (improved airfoil) w/o “pinching” the slot (off the spreaders)
 - Halyard loose-some wrinkles are good
 - Cars at “initial setting” splitting the luff
 - Check luffing head to tack-adjust with jib car (top 1st-forward; bottom 1st-back)
 - Uniform slot
 - Keep boat flat (unless very light winds)

As the wind freshens...

- Adjust the headsail first...bulk of power from this sail
 - Consider some backstay to reduce sag and flatten/stiffen sail
 - Tighten halyard slightly to pull draft forward (45-50%)
 - Tighten the jibsheet slightly to maintain the leech position (clew lifts)
 - Take car forward a little bit-open lower slot slightly
- Mainsail second...
 - Check with the helmsman...3-5 degrees of weather helm...no more
 - Slide the traveler down some, keep boom centered with mainsheet
 - Top batten still parallel with boom-top telltale stalls 50% of the time
 - Loosen the outhaul more, deeper draft in lower 1/3
 - Drop the traveler in gusts-not the mainsheet-"open the door"

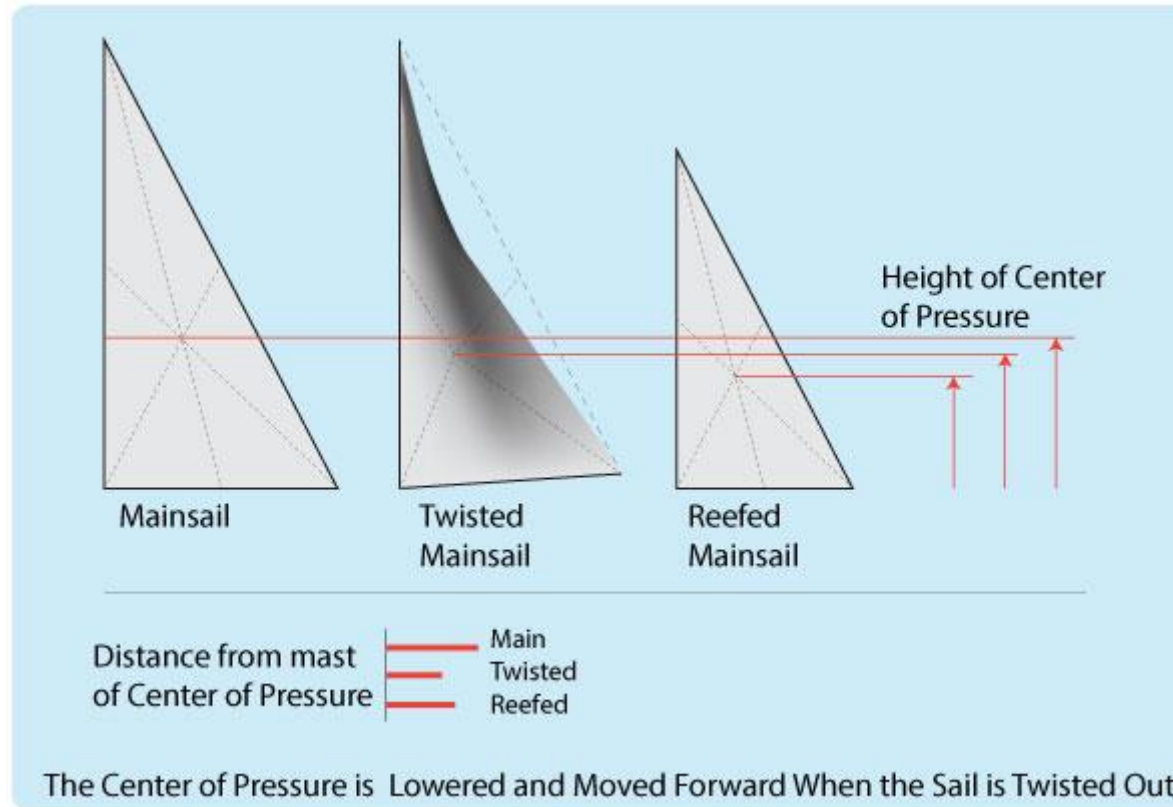
As the chop comes up...

- Boat starts to pitch...minimize it...power up the bow
- Headsail
 - More halyard on-pull draft forward for more power
 - Keep backstay medium to reduce “shock” to the rigging
 - Ease the sheets slightly to induce twist-(more forgiving)
 - Could also pull cars back slightly to twist off the sail
- Mainsail
 - Some vang on, ease the mainsheet-allows the leech to flex more keeping laminar flow during pitching moment
 - Drop the traveler in gusts-not the mainsheet—“open the door”

It is blowing--~25knots

- Flatten everything
- Twist the sails
- Open the slot
- Reef early-reduce heeling force

Reducing Heeling Force



It is blowing--~25knots

- Headsail:
 - Backstay on 100%-Flatten jib (is also flattening Main)
 - Halyard tight-maintaining draft position forward
 - Car moved aft to keep leech well twisted
 - Use outboard leads if you have them-let the slot breath
 - Jib must be powered...size down or furl if you need to
- Mainsail:
 - Outhaul tight, flatten it out
 - Cunningham tight- draft forward
 - Top batten open, lots of twist
 - Reef early, reef often
 - Traveler down-keep the helm happy
 - Vang on-keep the leech open though

Summary thoughts

- Spend time with your boat when not sailing
- Try everything to understand how your boat reacts to the controls
- Have a friend run the controls while you video and talk
- Keep a trim conversation going on the boat when racing
- Trimming is a dynamic art...not static
- Sail fast and have a blast!