In my opinion sailing downwind fast is mostly a function of puff anticipation, wave placement, steering and smooth S turning combined with the proper setup of the rig and sail trim. Not much has been written (that I could find) about sail trim while sailing downwind. This article will attempt to lay some groundwork for achieving maximum power from the sail downwind.

Rather than try to cover all wind and wave conditions, I’ve decided to focus only on conditions where surfing or planing is possible (> ~12 kt wind and ~1 ft swells). Many of the concepts discussed also apply in lighter wind; however going through all the exceptions would dilute the central theme. Please keep this caveat in mind.

There are a couple of commonly used terms people tend to use when discussing sail trim that I feel require a definition so the context is clear.

**Twist**
Twist is the curve naturally taken by the leech when the sail is under load and is usually measured by comparing the angle of the top batten to that of the boom. Zero twist is when the top batten is parallel to the boom. Negative twist, sometimes called “hook”, occurs when the top batten is angled inboard of the boom. Twist can also be measured by comparing the relative angles of each batten to one another.

**Active Leech**
As the sail loads up due to a puff, the upper roach reacts by creating more twist. When the sail unloads after the puff, the roach oscillates until it settles back at its neutral position. An “active leech” easily oscillates about the neutral position without any help from body kinetics or pumping the main sheet. In one of his DVD’s Michael Blackburn says: “The leech should move 2 to 3 foot of its own accord”. Careful - this natural action can be easily mistaken by some judges as “leech flick” if the motion appears rhythmically synchronized with body movement. Watch the following video clip to see Robert Sheidt demonstrating the active leech concept (fast fwd to about 2:15).
Sail Trim

On the final approach to the windward mark it is common to adjust the cunningham, outhaul, and boom vang for the conditions expected on the run. Immediately after the rounding, you can catch the first wave and pass those who are fiddling with lines. Normally on the run the only control line requiring adjustment is the mainsheet. The only exception is after a significant change to the wind (velocity or direction). With this assumption in mind, this guide will discuss things to consider when deciding how to quickly set the control lines properly before the rounding.

Cunningham
Pretty simple. All the way off except in very high wind. If you have rigged your cunningham with too much purchase, you may need to manually free up the lines due to friction which is not desirable. I suggest removing purchases till the lines run free when un-cleated.

Outhaul
At the 2000 Cancun Master Worlds I arrived two days early and watched the finals of the Senior Worlds. Scheidt, Ainsle, Blackburn, Suneson, Mendleblatt, Stoffelsma and many other downwind maestros were 4 months away from the Sydney Olympics and had 15 to 20 knots with 2 to 3 ft seas in crystal clear water that was downwind heaven. I walked around the beach before racing and noticed that almost every boat had a similar outhaul rig. This was in the old school days when the outhaul was cleated on the boom and a purchase was achieved by wrapping the tail around the mast and back to several thimbles. On every boat, I noticed that when the outhaul was eased all the way to the knot (handle), the clew grommet was always about 9 to 10 inches from the fairlead on the boom. Watching the Gold fleet round the weather mark, every boat eased the outhaul so the knot went all the way to the thimble and thus the 9 to 10” setting. When in Rome...

Boom Vang
Given the 9” to 10” outhaul setting, the optimum vang setting to achieve an active leech will vary slightly depending on the wind and sea state. The ideal situation is for the top and middle battens to oscillate so that when in the neutral position they are kept parallel to one another and also 90 degrees to the boats centerline. Not enough vang tension will create too much twist with no springiness and excessive vang tension will create a hooked leech. Both these situations will result in an inactive leech. The optimum vang
setting to achieve an active leech is somewhere between these extremes and necessitates finding the optimum amount of twist for the wind and sea state. Here is how I keep track of the proper setting.

I recommend placing a stopper knot in the vang tail to mark the loosest setting you will ever need. Fortunately I have found this setting to work in zero to about 18 knot winds. At the windward mark all that is required is to un-cleat the vang and let it run to the knot. In the upper wind ranges (> 18 kts) it will be necessary to pull the line in a bit to limit twist. To determine where to put the stopper knot here is a procedure:

1. With the boat on a beach dolly, put the sail on and step the mast.
2. Put the boom in the gooseneck and attach the vang. Lift the aft end of the boom until the vang purchases goes tight.
3. Grab the clew in one hand and the aft end of the boom in the other.
4. Pull down and aft on the leech (without bending the mast) and lift up on the boom (without bending the boom).
5. The vang stopper knot should be adjusted so the clew grommet is about 4-5 inches above the top of the boom.
6. When you get a new sail (not yet stretched) it may be necessary to adjust the stopper knot if you have previously been using a relatively used (stretched) sail.
7. This procedure sets the position of the stopper knot so that when fully eased the vang is in its loosest setting and is adequate for up to 15 knots of breeze.

You may find a need to adjust things a little bit but this vang setting should serve as a good starting point.

**Mainsheet**

While the vang is set to achieve an active leech, the main sheet is the adjustment used to keep the top batten perpendicular to the boat centerline. If all settings are left alone, twist will increase as wind speed increases. For this reason, when in surfing conditions, the boom should always be less than 90 degrees to the centerline.

To keep things simple and provide a good frame of reference, I placed an electrical tape mark on my main sheet that is 25’ 6” from the end that ties to the becket block. When this mark aligns with the forward boom block the sail has about the proper twist in 15 knots of wind with the vang eased to the knot. Since the main sheet is in your hand and easily adjustable, think about the pressure you feel and trim to maximize this pressure. The value of the mark is to allow you to quickly get yourself to a fast setting after your mind drifts away to some other task like establishing a clear lane, positioning for the next puff, recovery from a near capsize, or the hangover from last nights party.
When sailing by the lee, the mark is typically eased 8 to 12 inches and similarly when heating up it is tighter by 8 to 12 inches. The mark may need to be moved slightly to match your style; however I suggest the 25’6” as a starting point.

When sailing downwind in 30+ knots I have had this mark near the ratchet block. When sailing downwind in 3 knots the mark is typically near the boom becket block.

**Conclusion**

My hope is that this guide will stimulate some experimentation and fine-tuning of your own downwind sail trim. There are many theories on what is fast and what is not. Having standard settings and control line marks are important for finding what is fast and reproducing them consistently. Most of your minds focus should be on puff anticipation, wave placement, ... and not focused on evaluating sail settings.

One irrefutable fact is that time in the boat (TIB) will do the most to improve your downwind performance. Sailing the 27 mile down-winder from Cascade Locks to Hood River, OR is an excellent venue for fine tuning your sixth sense for downwind sailing.

Good sailing — Michael Johnson, Seattle Laser Fleet.