

Current Comments

Catching the Wind. Part 1. Sailing.

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When I was about 11 years old, my family often drove down to Eastchester Bay just off the northeast Bronx coast. I remember riding with my sister in the rumble seat of our Chevy coupe. After picnicking and swimming on Orchard Beach on Hunters Island, we would go over to the marina at City Island to watch the fishing and sailing boats. Occasionally there would be a large private yacht. This fitted my Hollywood-fostered image of yachts as huge boats owned by presidents and the super-rich. I didn't realize until years later that many of the smaller sailing boats I saw off Hunters Island were also called "yachts."

It is not surprising that I thought of sailing as a rich man's sport. I assumed sailboats and yachts were luxuries epitomized by J.P. Morgan's famous quote: "Anyone who has to ask about the annual upkeep of a yacht can't afford one."¹ (p. 729)

Even today, I think most Americans have the same impression of sailing. Although millions of people now own an infinite variety of sailing craft, there is still the notion that there is something snobbish about owning a boat, especially one that can be described as a yacht.

Undoubtedly, this is not the case in every country. A great many Norwegians, for example, own boats. If you visit Norway on June 24, you'll find half the population out on the fjords

celebrating Midsummer Day (the feast of the nativity of John the Baptist) in their boats. There are so many boats that you can "walk" quite a distance just by hopping from one boat to the next. Later in the evening, bonfires are lit all along the shore just as in pagan times.

My childhood impressions of sailing are not unique. Children raised in cities, or on farms, may never see a sailboat, let alone go out on one. For this reason, most people think it will be difficult, if not impossible, for them to learn to sail. But the fact is you don't have to be an Einstein to learn how to sail or, as I shall explain in a later essay, windsurf or boardsail. (In case you are not aware already, I mention Einstein because he was a sailing enthusiast.)

Modern technology and mass production methods have made sailboats affordable for almost anyone. Small dinghies can be bought for as little as \$450—within the reach of a boy or girl scout troop. The cheapest catamaran goes for about \$2,800. But while sailing yachts can reach into the millions of dollars, there are plenty in the price range thousands can afford.

Probably the best known American models of sailboats are the *Sunfish*[®] and *Sailfish*[®]. There are others which are not much more than long boards. These boats cost around \$1,000 and are suitable for one or two people. My first experience with a *Sunfish* was at a Gordon

Research Conference. That summer, my daughter Thea and I went sailing on a beautiful lake in New Hampshire. And I've had many wonderful sailing experiences since then. An example of one person who thought sailing was difficult is my staff coordinator Calvin Lee. At the American Chemical Society meeting in Hawaii in 1979, I convinced Calvin to try a catamaran. In 15 minutes he was sailing without difficulty.

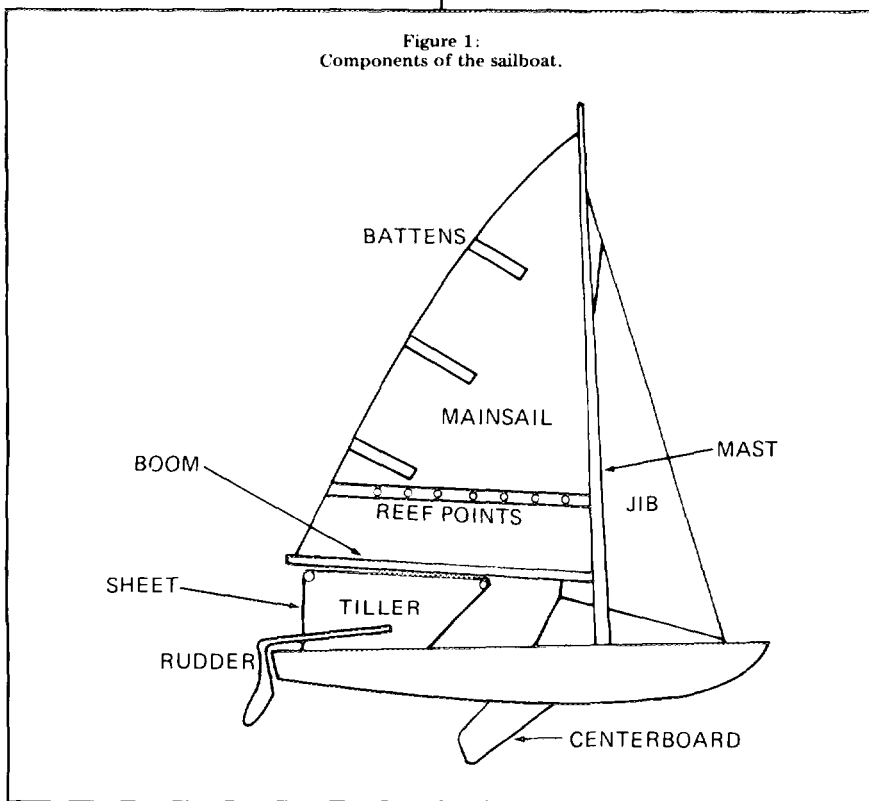
Sailing is a beautiful way to enjoy the wind and water and, most of all, relax. I won't attempt to explain sailing in great detail in this essay. A number of books and pamphlets have been written on this subject.^{2,3} However, I'd like to mention a few things about sailing that seem to amaze people who have never sailed.

One of the first steps I'd recommend when learning to sail is that you famil-

iarize yourself with the language used by sailors. You could be heeling in a close reach with the wind to starboard and not even know it! Let me emphasize that I did not understand this last piece of jargon until it was explained to me. So mainly I shall talk in the language of a landlubber. There are, however, two very important terms you should familiarize yourself with before learning to sail—windward and leeward. Contrary to what any logical person would believe, the word *windward* means the opposite of what it implies. Windward means "toward the direction from which the wind is coming." *Leeward* means "downwind."⁴ (p. 123)

First of all, most people appreciate the role of a boat's rudder (see Figure 1). This is a flat piece of wood or metal vertically attached to the end of the

Figure 1:
Components of the sailboat.



boat by moveable hinges. It is connected to a long stick, or handle, called a tiller, which is used to move the rudder and, therefore, control the boat's direction. Larger sailboats have a steering wheel, linked to the rudder by chains or cables. So if you know how to steer a car, you can certainly steer a sailboat.

The more difficult part of sailing lies with understanding how to use the wind to propel the boat. It's easy to understand how you sail "before the wind"—that is, sail with the wind blowing directly into or perpendicular to the sail. But how can you sail in the direction from which the wind is coming?

Did you ever consider why an airplane is able to fly? In Figure 2 you see a typical airplane wing. The propeller causes thrust, forcing the plane forward. This forward motion causes air to flow under and over the wing. Since the top surface of the wing is curved, the air passing over the wing must travel faster than the air passing under it. The pressure of the air under the wing is now higher than the pressure of the air on top of the wing. This difference causes lift.

The principles of sailing are similar. Except when sailing before the wind—that is, with the wind coming from behind you and pushing directly on the sail—all movement of the sailboat is a result of the "pull" caused by a reduction in air pressure. Please consult Figures 3 and 4 as I explain how this occurs. Just imagine that the sail is an airplane wing that is turned 90 degrees.

When *running*, or *sailing before the wind*, you are moved by the wind blowing on the sail from behind you (see Figure 3). Unfortunately, as you pick up speed, you create a wind which blows in the opposite direction, on the so-called *leeward*, rather than *windward*, side of the sail. This slows you down, but when there is plenty of wind it's more than enough to keep you going at a nice pace. Running before the wind is not the fastest way to sail. At best you can equal the speed of the wind. So you may be surprised to learn, as I was, that you can exceed the velocity of the wind. To do this you *reach*.

In Figure 4 you will get another perspective on reaching—that is, sailing into the wind. Remember, you want to reach a point in a direction opposite the

Figure 2:
The difference in air pressure under and over the airplane wing causes lift.

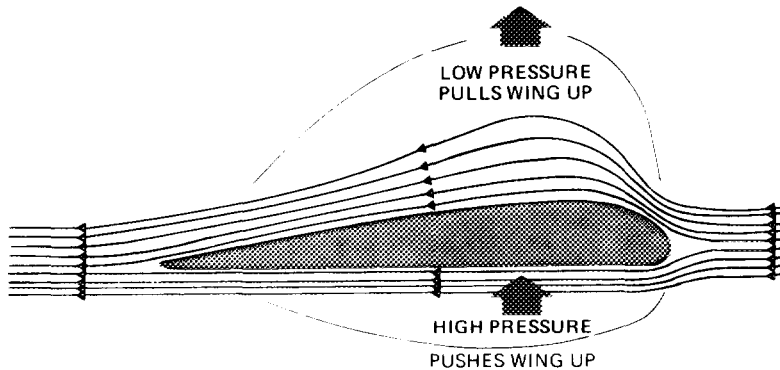


Figure 3:
Sailboat running before the wind. The wind caused by the forward motion of the boat counters that of the "true" wind and slows the craft.

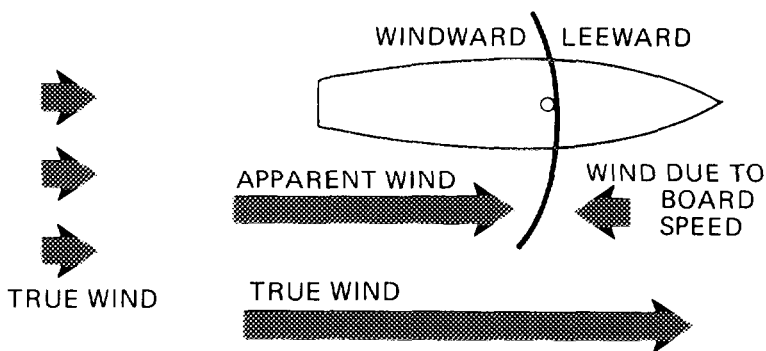
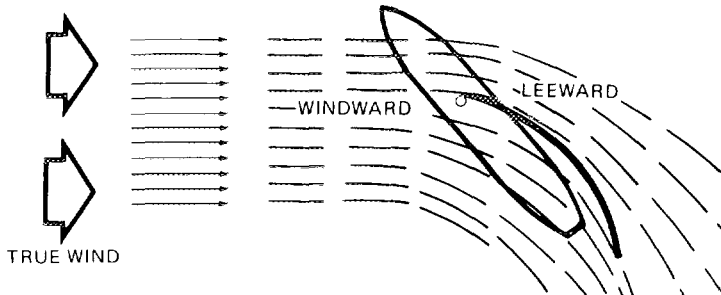


Figure 4:
Sailboat reaching at angles to the wind. The low pressure area leeward of the sail causes the sail to be pulled forward.



direction of the wind. The side of the sail on which the wind is blowing is referred to as the windward side. The other side is referred to as leeward. On the windward side of the sail, the air has to flow further and faster than on the leeward side. This causes the air pressure on the leeward side to fall off. Whenever there is a difference of pressure, air flows into the low pressure area. As a result, the sail is pulled to the leeward direction by suction. The sail is actually pulled leeward, in a direction directly parallel to the boom—the pole supporting the sail. The reason you don't actually move in that direction,

but straight ahead, is that the centerboard prevents such sideways movement. The force produced by the pulling of the wind pressure is converted into forward propulsion.

Once you learn these two basic maneuvers—reaching into the wind and sailing before the wind—you can progress to the stage of *tacking*. Since you can never reach directly into the wind, you must sail at an angle to the wind to move in the direction from which the wind is coming. As a result, you are always deflected slightly to the left or right of your destination. To actually arrive at your target, then, you must *tack*.

This involves a series of "zigzag" maneuvers in which you alternate the direction of the boat (see Figure 5).

When tacking, you must "come about" or turn each time you zig or zag. For some people, learning how to turn proves harder than it should be. Of course, it involves turning the rudder by pushing the tiller way forward. But as the boat turns, your sail will swing in the opposite direction. If you are not careful, you can get a severe headache.

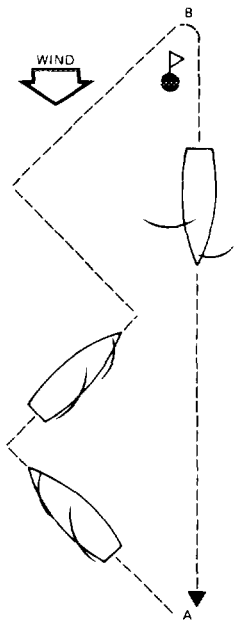
A common fear is that the sailboat will overturn. This is justified because you see it happen often. But it is not justified in the sense that it can be avoided by taking no chances. In Figure 1 you can see a rope, or "sheet," that is used to pull in or let out the sail. If you let go of this rope, you probably won't turn over. Unless you are caught in a monstrous gale or hurricane, that little *Sunfish* and most other sailboats will re-

main upright. So why do people overturn? While sailing, the various forces at work cause the boat to tilt one way or the other. To offset this tendency, you sit on the opposite side of the boat. But if the boat tilts too far, all you have to do is let out some of the line that controls tension on the sail. If you let it out too much, the sail will flap or "luff" in the wind but the boat will float upright. As you gradually take up the slack on this line, the sail will get firmer and gradually the boat will tilt toward the sail. The degree or angle of tilt is entirely dependent on how tightly you pull in the sail.

On certain days the wind can suddenly become stronger just for a few seconds. These bursts of wind are called "gusts." If you are holding onto the rope too tightly, your hand may "freeze" and instead of letting go, you may tighten up. This will cause the boat to tilt too far. If this happens it is no tragedy. After you turn over, it is easy to get the boat upright again by standing on the centerboard and pulling on the side of the boat. But this is not pleasant if the water is too cold. That's why a novice should only sail on warm water and always use a life jacket.

The more than one million sailboat owners in the US have a wide range of sailing and boating magazines to turn to for information. *SAIL* and *Yacht Racing/Cruising*, the major national magazines devoted solely to the sport, feature articles on equipment, adventure, competition, and other subjects of interest to sailing enthusiasts. *Yachting* and *Cruising World* run articles on motorized boats and sailboats, while *Boatman* focuses on the Chesapeake Bay area and *Bow Waves*, on the Atlantic coastal area. *Charter World International* is for sailors and would-be sailors who enjoy, or want to try, a sailing vacation as a member of a working crew or as a passenger.

Figure 5:
Boat tacking at angles to
the wind and running before the wind.



The simplest way to try sailing is to rent a sailboat. Most beach or lake resorts rent out sailboats or catamarans. They can cover the basic principles in one demonstration lesson. Sailing on a lake is safest but you can go out on the ocean if the people in charge can come after you in another boat. Even experts can get stranded.

You might get the idea from this essay that I am a regular sailing enthusiast. Actually it's a little too quiet for my taste now that I've learned about one of

the fastest growing sports in the world—windsurfing or boardsailing. Now that we've covered the basics of sailing, next week I'll discuss the sport of boardsailing. Once you're hooked, your life may never be the same.

* * * * *

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