



DRAGLESS: EFFICIENT SWIMMING IS ATTAINABLE

ming efficiency. Unfortunately, many athletes look to take their freestyle swimming to the next level by strictly adding yardage, which makes you a fitter swimmer, not a more *efficient* swimmer. When swim efficiency improves, you save energy and swim faster. Once your efficiency is maximized, you can work on becoming more fit.

Every swimmer needs to understand how to define the swimmer's "tube"—an imaginary cylinder that surrounds every swimmer and comes to a point in the front. The athlete's focus is to keep as much of his or her body movements within the tube. Even better is to look at reducing the width of the tube by adjusting technique, which also reduces drag. Although the pull portion of the stroke, when the arm is pointing straight down, does go outside the tube, no other body parts should ever break the tube's edge.

REDUCING DRAG

Efficiency will improve once drag is reduced. To do this let's look at portions of the stroke that limit forward propulsion because of the amount of negative force produced.

We'll start with the reach and pull portions of the freestyle stroke. During the reach, most swimmers glide their arm forward just below the surface, breaking out of the swimmer's tube. With the reach completed, the pull portion is engaged in which the arm has to push down for a portion of the stroke before water is actually grabbed. During the "push down" portion of the stroke the arm disrupts the body's position by forcing the chest up slightly. This makes the hips dip slightly, diminishing forward propulsion. Not a good thing.

To counter this negative result, instead of the hand gliding just under the surface, the arm should be driven forward, with a good amount of effort, at approximately 30 degrees to the water's surface and within the swimmer's tube. This leaves out the portion of the stroke that involves pushing down before grabbing water.

Continuing with the typically inefficient pull portion of the stroke, once the 90-degree point is reached (arm straight down), from that point efficiency is reduced since the stroke becomes a push with an up emphasis. To prevent this, start the recovery at the 90-degree point. The arm is brought up with a high elbow and the reach portion is started again so that you re-enter the water with a straight arm just forward of the head.

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Think Inside the Tube

ADJUST YOUR TECHNIQUE TO REDUCE DRAG

By Joe Friel and Brian Roche

As Sir Isaac Newton stated, "for every action (force) there is an equal and opposite reaction (force)." Examining Newton's third law while swimming describes how each body movement creates forces—most which propel you forward, while others limit that forward propulsion.

Movements that hamper forward propulsion are the "equal and opposite

reaction," or force, that we call negative force. Making a few adjustments to your technique can diminish the amount of negative force your stroke produces and make you a faster swimmer.

NOW IS THE TIME

Since the off-season is upon us, there's no better time to look at improving swim-