to see where you are finishing your strokes. Do this on both sides, as it is common for them to be different. Correcting strokes that are even a few inches short will let you travel noticeably farther with each stroke and thus take fewer strokes.

Safe and Efficient Recovery and Entry

In swimming, even the motions you make in the air are important. They affect how you move in the water in much the same way that a kayaker's arm motions above the water affect the kayak in the water. Correcting how your arm comes out of the water, moves forward, and reenters the water can increase the effectiveness of your technique. The following focus points are offered in order from the beginning of your recovery to the end of your entry.

FOCUS POINT ➤ Marionette Recovery

The recovery starts from where the stroke and rotation have finished—you are on your side, with your hand just below the surface by your thigh (or, in some drills, resting on your thigh). Imagine that you are a marionette. Your puppeteer has a single string attached—to the elbow on your recovering arm. Your puppeteer lifts your arm out of the water by pulling up on that string. Your elbow rises while your forearm and hand hang down, relaxed from the elbow, with the fingertips near the water's surface (perhaps even dragging through the surface) and close to the body (figure 5.6*a*). As the elbow travels toward the front end of your vessel, the hand follows a nearly straight line forward, never straying far from the body or the water's surface (figure 5.6*b*).

FOCUS POINT ➤ Neutral Shoulder

A common recovery mistake is to allow, or force, the elbow to move behind the plane that divides the body between the front (navel) side and back (butt) side. This causes the head of the upper-arm bone to bind against the back and top of the shoulder socket—a no-win bone-on-bone conflict. Over the course of thousands (or millions) of repetitions, this motion will almost certainly cause an injury. But in the marionette recovery, you want to keep the shoulder roughly in the center of its front-to-rear range of motion. This keeps the elbow in front of the body plane and allows the shoulder to stay high and relaxed throughout the recovery (figures 5.6*a* and *b*).

FOCUS POINT ➤ Laser-Beam Rotation Trigger

I have talked about rotating the body from one side-glide position to the other, but not much about *when* to rotate. The secret to timing your rotation is in the recovery. Imagine a laser beam stretching across your lane at the front edge of your head, a few inches above the water's surface. As your puppeteer moves your elbow, forearm, and hand forward, nothing else about your body position should change (i.e., you stay on your side and you

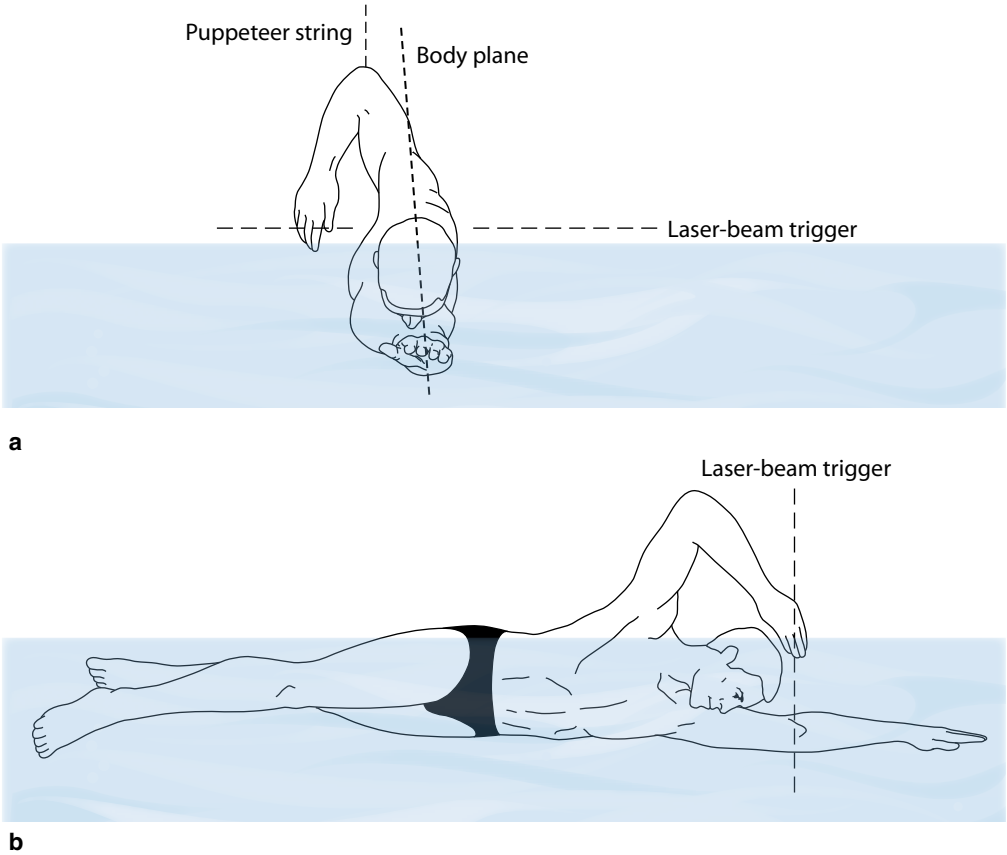

Figure 5.6 Marionette recovery with fingertips dragging through the surface. *(a)* Head-on view. Note the side-glide position and the high elbow in front of the body plane. *(b)* Side view. The recovering hand is passing through the laser-beam rotation-trigger point at the top of the head.

keep the other arm fully extended). When the recovering hand crosses the laser beam, this is the trigger to begin rotating your body (in the side view of the marionette recovery figure, the recovering hand is just crossing this imaginary laser beam). As your legs drive your core rotation, the recovering hand continues moving forward toward the entry point. Using this mental image will result in a nearly perfect front-quadrant stroke.

FOCUS POINT ➤ Sliding-Board Entry

Your legs are not alone in driving your core body rotation. Their job is to *initiate* the rotation, and another mechanism helps complete the rotation. Lifting your arm and shoulder out of the water during the recovery stores energy (potential energy) in the form of a lifted mass that is poised to fall again (kinetic energy). As your hand passes through the imaginary laser beam and you begin the next core body rotation with your legs, you release that stored energy by allowing your arm and shoulder to fall toward the water. You guide its descent—as if the hand were zipping down a sliding

board so that it pierces the surface of the water at a downward angle toward your extension point. The kinetic energy of this falling and extending mass adds to the energy of your core body rotation and is thus transmitted to the stroking arm through your tight line and paddle linkage. The muscles that you use along that side of your body to aggressively enter and extend further add to the power and snappiness of your rotation.

Turning

Whether swimming or drilling, once you get to the wall, you need to do one of two things: (1) turn or (2) get out. Assuming that you opt for the former, there are a few considerations. What you want with any turn is a rapid change of direction in a minimum amount of time, without losing speed, and while conserving energy.

You can choose to do a flip turn—that somersault-looking thing that fast swimmers do when they swim freestyle—or you can do an open turn, the turn commonly used for breaststroke and butterfly. The open turn allows you to take a breath at the wall but the flip turn does not. For just a lap or two, this is not a big deal. But for distances of 200 yards or more, this difference adds up. Flip turns are more complex and take much longer to learn than open turns. Virtually everyone who swims laps, however, wants a high-quality flip turn as part of their swimming arsenal. Following are descriptions of lightning-fast, low-cost turns of both varieties and of what should happen following either.

Open Turns

To execute an open turn, as you near the end of the pool, take your last stroke aggressively into your balanced side-glide position, with one arm extended in front of you, your trailing arm just at the surface of the water, and your navel facing the sidewall. (Throughout the turn and push-off, your navel should face the sidewall.) Continue kicking as you finish this last stroke and until your extended hand touches the wall. Allow the wall arm to bend as your momentum moves your body toward the wall (figure 5.7*a*). Avoid grabbing the gutter, since pulling yourself up breaks the momentum of the turn and wastes energy. Draw your legs up tightly under you and let the momentum of your body swing your hips toward the wall as you push your upper torso away from the wall with your arm (figure 5.7*b*). Leave your trailing arm near the surface rather than moving it with your hips. Your body will pivot around a point in your midsection.

As the wall arm pushes off the wall, your torso is straight and your legs are tucked in tight under you as you swing them toward the wall. Your wall arm swings over your head as your body continues to pivot around a point in your midsection. At this instant, no part of your body is touching the wall (figure 5.7*c*). While your upper torso pivots down into the water, you want the top arm to meet the trailing arm below the surface of the water at the instant your

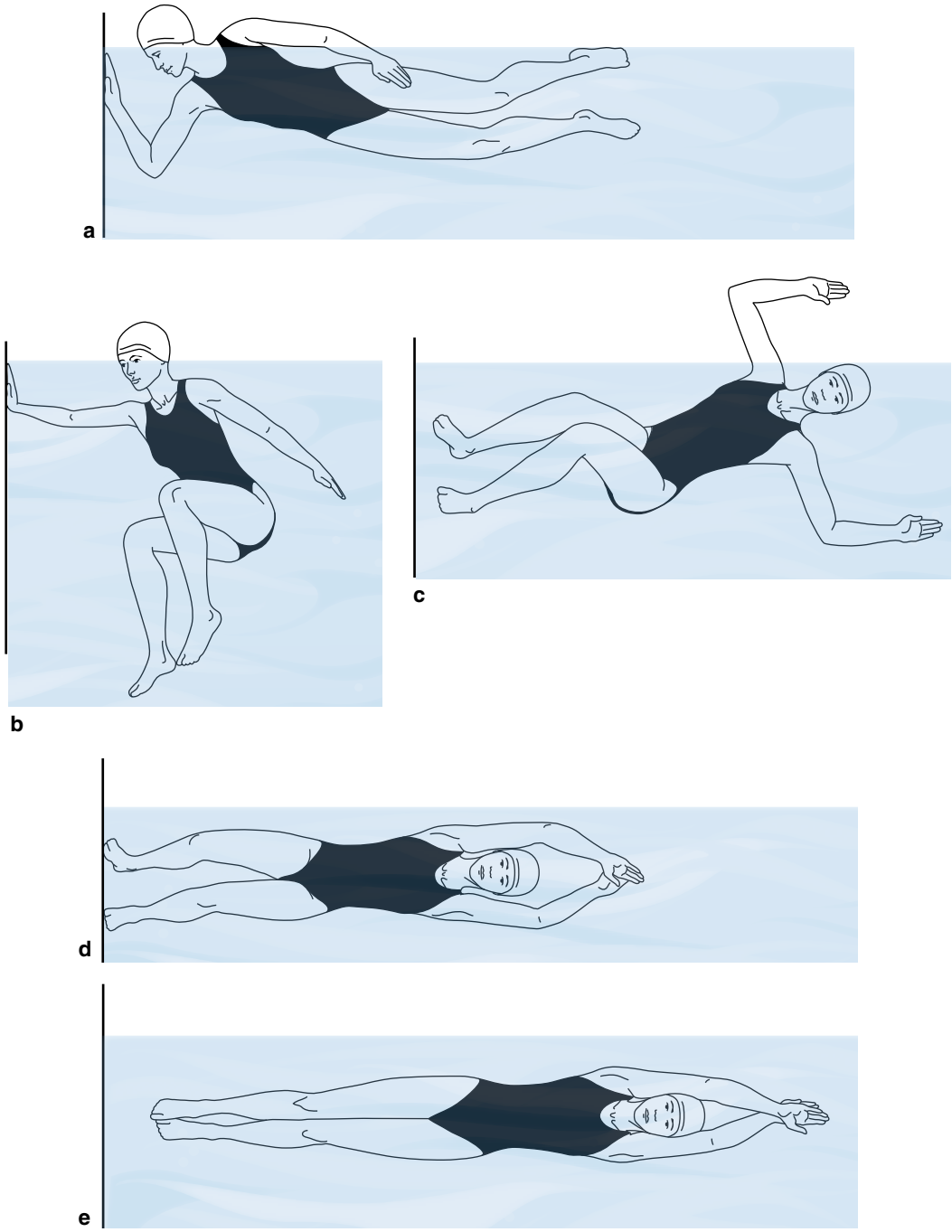

Figure 5.7 A good open turn allows you to take a breath while still turning lightning fast. *(a)* Accelerate your last stroke into the side-glide position. As your extended hand touches the wall, allow the arm to bend without grabbing the gutter. *(b)* Draw your legs up tightly under you. Momentum swings your hips toward the wall as you push away from it, while your body pivots around a point at your midsection. *(c)* Swing your arm straight over your head as your pivot continues. No part of your body is touching the wall. *(d)* Your top arm meets the trailing arm below the surface as your feet make contact with the wall and you begin leaping away. *(e)* Snap into javelin position as you leave the wall on your side.