

FREESTYLE TECHNIQUE

In this third technical article, and the first of two for freestyle, Nick addresses the body position (movement), timing (coordination) and stroke rate (tempo).



Nick Gillingham MBE, OLY, FIOS is one of 10 men over the last 35 years to hold the 200m breaststroke world record and is a licensed Swim England tutor.



THE BODY POSITION (MOVEMENT)

Principles of physics, research and competition have clearly determined the mechanics of an optimal freestyle technique. However, humans must learn the skills. When swimming freestyle, the body position is horizontal to the water surface and the movement pattern is rotational through the long axis of the spinal line. The body cuts and carves from one side to the other and this is called

axis rotation where the shoulders, core and hips are connected with the body moving as a single unit. The focus here is to rotate the shoulders and hips together. Torso rotation is best synchronised with hand entry and as the arm reaches forward, the torso rotates downward with swimmers pushing the hip forward as the hand reaches to full extension. Think of this as the fingertips pulling

the very tip of the hip forward with an invisible elastic band.

Having a long-reaching arm stroke, with the arm in line with the shoulder and breathing as the hand reaches forwards underwater, helps to develop efficient body movement. Breathing bilaterally on every third arm stroke as well as having a constant kicking action is seen to support and stabilise efficient body



movement. The most basic goal for optimising technique is to swim as fast as possible with as little effort as possible. Minimising resistance and maximising propulsion help to achieve this goal. So, first consider the body position that minimises resistance – the streamline position. Emphasis for skill development is important before age 11 years for girls and age 12 years for boys – a key stage of skill development remembering growth and development considerations (Peak Motor Co-ordination). Still working within physical literacy, this stage is now referred to as learning to train with a focus on deliberate skill practice, development and fun for boys aged 9-12 years and girls 8-11 years. Athlete Development Support Pathway (ADSP) recommends any emphasis on specific physical, i.e. aerobic volume training, at this point is to be minimised.

Complexities

The head weighs between 4.5kg and 5.5kg and can cause issue with body movement as excessive head motion distorts the body position. The head position should remain fixed throughout the non-breathing stroke cycle with no vertical, lateral or rotational movement. Fix the head into a streamline position even when breathing by pivoting the chin to maintain the spinal line, keeping one eye in the water and one eye out when breathing; a good example is pictured left. As teachers and coaches we will be well on the way to supporting stroke development by fixing the head. Lack of mobility in joints and muscles makes for added complexities and often restricts optimal movement resulting in greater drag such as tail drag, where the body is angled head to feet rather than horizontal.

Common Faults

Slipping or releasing the water when pulling, where the hand/forearm moves to the opposite side of the body, causes lateral deviation or snaking of the body as it can be called. This is a common fault but paddling with the hand and forearm towards the hip on the same side of the body, while maintaining a high elbow position underwater and keeping the head in streamline, will help to stabilise the body. A high head position sees arching of the back and increased levels of drag (resistance). Excessive head motion distorts the body position. Swimmers should use the psychological skill self-talk (mind talk) when training and racing and constantly use cues (buzz words) to allow an action to be more deliberate and so to optimize technique and move away from ineffective habits.



TIMING (COORDINATION)

The timing and coordination of freestyle is seen as an alternating stroke technique with constant propulsion created from the whole of the body, not just the arms and legs. As one arm is pulling underwater, the opposite arm is recovering through the air and just as the pulling arm exits the water the other arm commences its pull. No dead spot in freestyle should be evident as there should always be high pressure through a constant pulling pattern as well as a constant kicking pattern.

The timing and coordination of freestyle can also be seen as a six-beat kick action to a full stroke cycle, whereby the feet kick six times through an alternating pattern to every right and left arm action.

This also helps stabilise the body as well as offer propulsion. There are variables here with the kick pattern – four beat or two-beat kick action – which can be seen over longer freestyle races, including open water events and marathon swimming. A six-beat kick has three downbeats for each leg per arm cycle. A two-beat kick synchronises best if there is a downbeat kick with the arm entry on the opposite side. A four-beat kick is the least popular and can be referred to as a weak six-beat kick. When first beginning to work on technique, maintaining the legs in position behind the torso should be a real focus, irrespective of the kicking tempo.

Complexities

Focusing on one cue or one coaching point at a time by seeing or feeling something specific after a clear explanation and demonstration is a proven way to expedite the learning process. However, it will still require many repetitions, tens of thousands of each skill to develop autonomy. Technique changes require a swimmer to process a great deal of information derived from the principles of physics, specifically, biomechanics and hydrodynamics.



STROKE RATE (TEMPO)

Stroke rates can be taken in real time but can also be taken in strokes per minute on a stopwatch. Stroke rates are taken on a stopwatch in stroke mode, which measures the rate after the third full stroke cycle to give an average across six arm strokes. Technology software can give stroke rates for individual arm strokes and you may see racing tempo as high as 124 across sprint events or 62 in stroke mode on a stopwatch. It's important to maintain full stroke length when trying to achieve an appropriate stroke rate for the differing distances swum, simply chopping the stroke short to increase stroke rate will not equate to a more effective performance or an increase in speed.

Good Practice Summary

We need to coordinate, time and execute the stroke efficiently. We need to move from basic to effective to efficient strokes and it may take years. We should strive for a smooth constant flow. Swimmers need to feel constant balance and movement, cutting and carving through the water.

The freestyle leg action, pulling pattern and breathing (aquatic breathing) will be addressed in the next edition of Swimming Times. ST

Common Faults

Ineffective arm synchronisation (timing) like catch-up stroke is a common fault – so too is adopting the stroke technique of a champion just because they swim fast! Scientific research and analysis based on principles of physics, including force measurement technology, is now making the difference. Watch out for any irregular kicking action as well as pausing/stopping the hand at the leg prior to recovery. Watch out for breathing too early or too late as this interrupts the flow (fluidity) of the stroke.