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Biomechanics of Triathlon

All motor programs for sport activities are under volitional control i.e. they can be altered and improved with training! The primary issue when learning a new sport activity (or component of it) is the issue of neuromuscular fatigue. For example, when doing swim drills – there is a point of diminishing returns – in which "pushing ahead" will only reinforce bad movement patterns. From a neurological (central nervous system) perspective, the goal must always be one of quality, maintaining the goal movement pattern, and then stopping!

All triathlon disciplines will benefit significantly from improvements in motor programming. Perhaps the most important is swimming as the resistance encountered with drag will improve significantly with improvements in form (as compared to the other sports that have you moving through air, a much less dense medium).

Swimming Biomechanics and Technique:

Water is a very dense medium through which to travel. Becoming more "streamlined" in the water is critical to long-term improvements in efficiency.

Primary cues for swimming

- body position: "long" in the water; "reach"; "glide"; swimming on your side vs swimming "flat"; long axis rotation and "balance"
- hand entry: "sliding hand into sleeve"
- catch: elbow flexion; anchor hand
- pull: once hand is anchored – the cue is to move the body relative to the hand (instead of pulling the hand through the water); elbow at 90 degrees to provide a larger surface area
- release: extending past the hip – do not shorten stroke
- recovery – high elbow, finger tips brush the surface of the water
- kicking: from the hips (not the knees)
- breathing – emphasis on breathing out; long axis rotation facilitates breathing

Cycling Biomechanics and Technique:

Bike positioning is integral to optimal force transfer and power output. The primary aspects that will affect these factors are seat height and fore-aft position.

Aerodynamics: This is the catch phrase with triathletes! Aerodynamic effects will start to have an impact at about 22-25 miles per hour average (if not higher). This is not data from the cycling manufacturers or the "gurus" of the sport – this is from well-established literature in the automotive and aeronautical industries.

The primary aspect of importance in aerodynamics is frontal area – how much area you present to the wind. The challenge, aerodynamically, is that a cyclist has two rotating objects (namely, wheels and tires) that produce a huge level of turbulence for the cyclist to contend with while riding. Along with this, cyclists rarely face a pure headwind or tailwind, but more often some degree of crosswind.

There is a compromise between "aero position" and comfort. Ultimately, in a longer race, the goal is the maximum power output with the greatest possible comfort. An aero position will give you another body position to revert to during a longer race.

Primary cues for cycling

- optimize the top and bottom parts of the stroke – "pushing toes in shoes" and "scraping mud off the bottom of the shoe"
- do not be concerned with "pulling up" as it is actually counterproductive to power generation
- cadence 90-100 rpm

Running Biomechanics and Technique:

"I was told that I can't change my running form – is this true?" NO! Running is like any other sport activity – this would be like telling someone that they can't improve their golf swing!

The long-term goal is to have a midfoot strike. Rearfoot strikers transmit large loads through the joints and produce a huge braking force on heelstrike. Midfoot strikers utilize the muscular tissues to attenuate the loading at footstrike. This can be accomplished via training.

Primary cues for running:

- "hips tall" – this will ultimately prevent you from excessive rearfoot strike
- head up
- cadence/stride frequency – 90 steps per minute
- arm position – elbows 90 degrees, "brush waistband"
- think about posterior arm swing – as posterior arm swing drives leg extension and thus propulsion
- arms control the feet/legs – to increase stride frequency, move arms faster
- "crisp"
- listen to your footstrike

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Allan Besselink, the CEO of SSI, is a physical therapist with 19 years of clinical experience. He graduated from Queen's University (Kingston, Canada) in 1988. Allan is one of approximately 300 practitioners in the world to have attained the Diploma in Mechanical Diagnosis and Therapy from the McKenzie Institute International. His international sports experience includes the 1996 Summer Olympics and 1988 World Junior Track and Field Championships. He worked with the United States track and field team at the 1994 World Cup of Athletics, the 1997 World Cup Racewalk, and the 2001 World Half Marathon Championships. He is currently coaching a number of endurance athletes ranging from triathletes to ultrarunners across the United States and Canada.

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