SYMMETRY

Dr ED WITTICH

Symmetry of sweep: the importance of foot placement through the stroke

Sweep or single oar rowing has a long history as a competitive sport, with regatta events recorded as early as the 13th century. As a means of transport for early Greek vessels and Viking ships, the history is even older and more diverse – slaves who could 'pull an oar' would have always been in demand. The method of pulling an oar on one side of the boat, and hence on one side of the body, originated from these wide vessels, as the technique allowed crewmen to sit side by side. However, it has now evolved to what we enjoy today – the sum of up to eight bodies pulling on different sides of a thin cigar shaped shell of carbon fibre to make it track straight up a course at great speed.

Sweep athletes are very often defined by bodies that tell a tale of their role within the boat, whether that be on stroke or bow side. Asymmetrical muscle bulk of the mid-upper spine, a slight side-bent mid spine with one shoulder sitting higher than the other define these athletes, as a body adaptation in response to the thousands of strokes they take each week. Many osteopaths and physio's will have seen the characteristic spinal motion of the sweep rower on forward flexion – a straight line movement that usually elicits a →

side-bending and rotation to the side the athlete rows on. In many cases, it is even clear on the ergo. These body adaptations are often marked in adolescent rowers as they lack full muscular development and their bodies are very susceptible to change. What is not so clear however is asymmetry in the lower extremities – hinting that the 'base' may not be developing as much in this transverse, rotational plane of work. Of course, the spine is a keystone of rotation, but the body works as a unit for all motion. These asymmetrical findings are often linked to injury, such as overuse type shoulder, spinal strains and rib stress fractures. Asymmetrical foot force, especially at the drive phase, is further maligned by data showing a negative effect on overall rowing performance and a clear link to injury.

For the last 12 months at BAT Logic, we have been consulting with teams using our new on-water instrumented foot stretcher. To expand, this is basically a sole-type device that measures foot force, timing, symmetry and efficiency for what the feet are doing on the foot stretcher in any boat type over various conditions, rates and pieces. Our fundamentals have always been promoting good foot connection and symmetry at the base of your first link to the boat – the stretcher.

From the data we have taken so far, when a sweep athlete is producing their 'best' rowing (objectively and subjectively - splits/force/power trace/movement pattern etc., added to the age old coaches eye), we are finding that the symmetry of their foot force profile and timing is also at its best, or at least closer than when they are rowing sub-optimally. Data on this has been quite consistent at all levels, from elite down to school level athletes. Moreover, it is backed up by the recorded force on the blade being more effective. We are not suggesting

Fig. 1

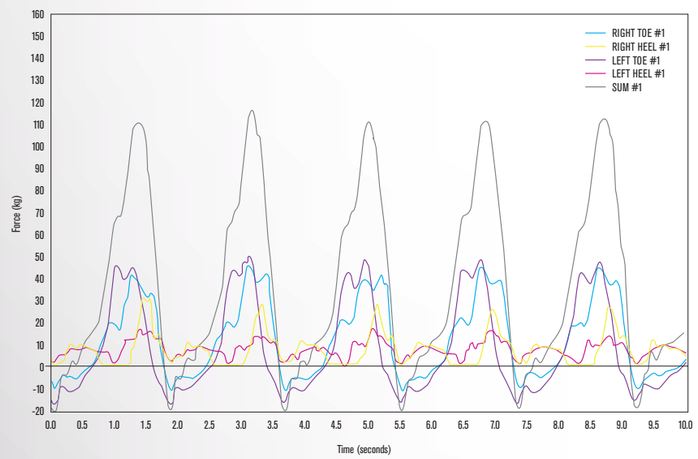
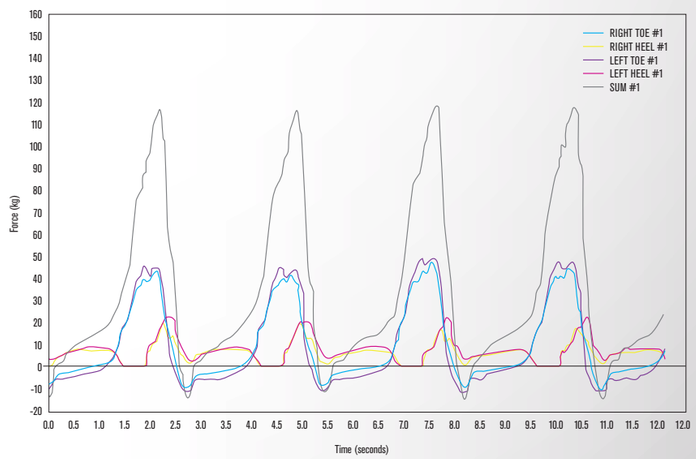


Fig. 2



that sweep should be or indeed is a symmetrical full body movement. However, when searching for consistent bodily factors that link to boat speed, it seems that foot connection and symmetry of foot load, even in the sweep movement, is certainly an important one.

It is often the opinion of many coaches we have met that there should be a very dominant pressure that changes between the feet through the stroke inside to outside. Others however have seen the importance of foot symmetry and consistency, which we subscribe to. What is not regularly coached, and not backed up by most of the foot stretcher equipment is an evenness on the recovery into the catch and overall awareness and sense of the feet through the drive. This creates an athlete who is often not conscious of the position of their feet and connection on the foot stretcher and so is trying to pre-prepare for an asymmetrical foot contact at the catch. This not only has effects on the body and its ability to prepare for when force is produced but it also negatively impacts the boat trim. This is perhaps best explained in an article found online by Loschner and Galloway: "The speed of the boat (and therefore the athletes' performance) is very dependent on the stability of the boat. Being able to keep the boat balanced around all axes will decrease the water resistance (hydrodynamic drag) and will be →

EXAMPLE

◂ Elite Female Heavy Weight Sweep Rower Foot Force

Figure 1 vs Figure 2 – less symmetry in former. Peak force and curve efficiency is enhanced with improved symmetry and control in data set 2, same characteristics are shown in application of force. Some asymmetry is always expected. No athlete is perfectly symmetrical but elite rowers can come close to this and are consistent.

energetically more efficient for the athlete to maintain or increase boat speed. The rower's seat and body mass move along the longitudinal axis of the boat, and the system (boat, athlete and sculls) is unstable". Pitch and yaw kill boat speed and, by being complacent with foot placement or even deliberately over-focusing on asymmetry, you will be directly affecting efficiency. The largest effect will always be the shift in your centre of mass through the catch to the finish. So, should we not also strive for reduced yaw with a more connected and stable foot stretcher, especially if this helps the body's ability to cope with load?

As we know, the legs of a rower operate as the 'struts' between the platform between the feet and the lower torso, the latter of which takes most of the strain during the stroke. The stability of this overall foot/leg platform will primarily depend on the position of the feet, and the nature of the struts themselves. Like a building built on uneven foundations, reduced performance and structural issues (injuries) are the likely outcomes for an athlete who has not addressed the position and make-up of their lower limbs. The rotation required for the body to align itself effectively with the required blade position must come from somewhere however. Again, the body acts as a unit so all segments are assisting or coupled to this motion, but the lumbar spine itself allows only 1.2-1.7 degrees of rotational movement. The highest degree of rotation happens via the mid or thoracic spine as this is a key part of its function. Creating asymmetry with the lower limbs followed by more extreme rotation through the mid spine can put undue stress on the lumbar and pelvic region as it is loaded during the drive. An article on biomechanical determinants of elite rowing explains this by saying that "bilateral asymmetries of the foot-stretchers are also seen to significantly influence lumbar-pelvic kinematics and pelvic twisting during the rowing stroke". A well connected, symmetrical base is not only more supportive of the spine but, as we are finding, it is also required for effective performance outputs.

In very simple terms, try this out the next time you're in the gym; get into a squat position with a narrow stance and place a moderately heavy (but achievable and safely weighted) medicine ball or other such weight in front but slightly off centre to your position. Place this to the left or right of you, depending upon which side you row. Now, taking care not to harm yourself, rotate your trunk to the object and try to lift it up by pressing most of your pressure through one foot only. Then, adjust your stance and try this again with an even weight loaded between both feet.

What did you feel? The second exercise should have provided a better base of support for your centre of mass to fall between, as there is a wider recruitment of musculature that is working to lift the object rather than hold onto your unstable body position. It's not a perfect example, and the effect of gravity and the centre of mass shift is different in the boat, but it will give you an awareness of your feet whilst trying to create an even base – this sort of discipline is far more effective for carrying and transferring load.

Getting a more consistent, stable and symmetrical base can also affect how the power is transmitted through your rotating torso in the catch-drive-finish sequence. The bones of the shoulder complex hinge from and work off the thoracic spine and rib cage, as well as attaching to the cervical spine. When muscles are added to the picture, the connections to the lower limb are even clearer. The abdominal muscles attach to the pelvis and on up to the rib cage whilst the erector spinae and quadratus lumborum back muscles also attach via the pelvis and run up to attach to the ribs and thoracic spine. These are all affected by the positions and movement of the lower limb, and can cause change to your shoulder position and, functionally, to arm movement. The function and movement of these structures are all affected by leg length and position, both anatomically and biomechanically. So, when the feet and legs are not set up appropriately or loaded asymmetrically in the boat, the shoulders are often also adversely affected, which can further compromise load and movement.

So, how best to summarise? We are not suggesting that 100% symmetry must be applied as sweep rowing is an asymmetrical movement pattern where rotation is needed. We've never worked with an athlete who utilizes complete symmetry, rower or sculler. What we are seeing from the athletes we work with is that when foot symmetry is at its peak, this seems to correlate to their best rowing performance. From a technical perspective, a link can be established clearly as to why this is the case.

At the very least, we would like to see rowers become more aware of their feet on the foot stretcher. The onus may have to be on coaches to address this important skill, especially for athletes who are beginning in the sport. There is symmetry in sweep, which can prevent injury and make you faster – you can't argue with that. **ROW360**

Dr Edmund Wittich, BAT Logic Performance Consultant, Osteopath BSc. MHSc.
www.batlogic.net

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