Q & A

? ***Dr.*** *Volker Nolte of University of Western Ontario is the best known expert in rowing biomechanics in the world. We have asked him the question:* ***"What should rowers and coaches do to maintain better boat balance?"*** *Dr. Nolte kindly agreed to answer the question and you can see his reply below.*

A.: The system consisting of rower(s), boat and oars is free to rotate around the longitudinal axis of the boat and the effort to control this movement (to maintain a postural balance) is important for the performance of the crew. This increases in difficulty when the boat is moving around its longitudinal axis. When a boat rolls, the crew members will adjust their body positions in an attempt to balance it. In addition, the oar and blade are often used for stability.

Since the centre of gravity (CG) of the system rower/boat lies quite a distance above the centre of buoyancy (CB) of the boat, rowers struggle with their balance in the boat. Of course, beginners experience more of a challenge from the balance than skilled rowers, but even a world class crew will show significant movements around the boat's longitudinal axis. (Fig. 2):

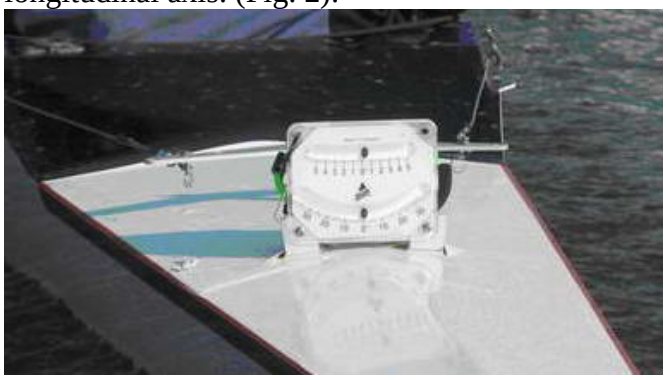

Fig. 1: Pitch-meter mounted on stern deck to measure balance.

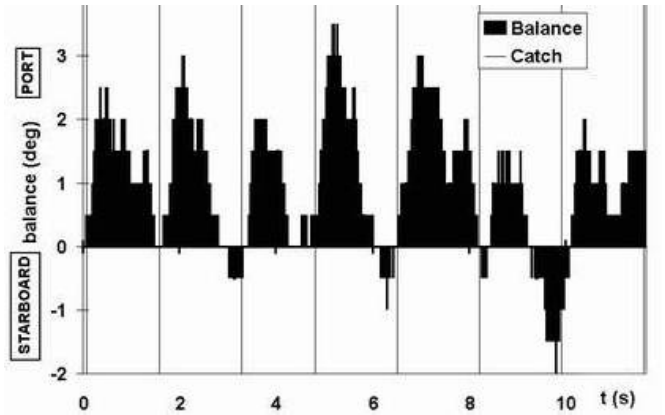

Fig.2: Balance measurements from a National team eight during normal training

To put the measured rolling angles in perspective, one must realise that if a sweep boat is 1 deg out of balance, the rowers on one side of the boat carry the hands at the end of the oars about 5 cm higher than the rowers on the other side. These are very significant differences to the optimal height the rowers carry their hands in a balanced boat. Coaches and athletes spend considerable time to rig the height of the oarlocks properly with millimeters accuracy.

In addition, the rowers sit on seats that are connected with the boat. This means, any rolling of the boat is directly transferred to the seats. The rowers then shift their body through movements in the lower back to regain balance. This can lead to extended loads in the spine, which can lead to back injuries, especially when rowers apply force on the oar in the moment the boat is out of balance. A rolling boat can therefore lead to injuries.

One goal in technique training is learning to keep the boat in balance. However, it is literally impossible even for the best crew to accomplish this task so that the boat would not roll at all. Every crew will have some kind of rolling motion. In the best case, it would be a minimal oscillation around the 0º balance point.

Why is it so difficult to keep the boat balanced?

It needs only very small forces to roll a boat. Two simple tests should illustrate this:

- Imagine a single rower sits in their boat that does not move. The rower holds one handle between the thumb and the pointer finger, when the other handle is been left alone. In this position, the rower can move the handle up and down with literally no effort that would create large rolling movements of the boat.
- Another example: an eight crew balances the boat with the blades off the water and the rowers' eyes closed. If the coxswain moves one arm out to the side, the boat will roll over to this side.

Therefore, a change in hand height during the recovery, a small shift of the upper body by a few millimeters, the swaying of the legs during recovery, or a light touch on the rudder will influence the balance of the boat.

Rowers obviously learn to compensate for all kinds of lateral movements happening in a boat and these counteracting movements eventually happen subconsciously with experienced rowers. Beginners tend to overcompensate in their attempt to balance, upsetting the boat even more. A highly

skilled crew reacts with very small and coordinated movements.

How can you learn balance?

We know from new motor control studies that rowers have to experience the whole variety of rolling movements, if they want to balance a boat. They need to feel the forces on the seat, handle and footstretcher when the boat is in certain positions. They need to find out, what they can do to bring the boat back to a level position. And finally, the fine art of rowing means that rowers learn to anticipate any rolling motions.

You could never learn balancing a boat in a stabilised boat (like half-crew-rowing). On the contrary, a rower needs to experience many different rolling positions. Therefore, the best boat to learn balance is the racing single, the most unstable boat.

Rowers also need to do balance drills. Let them experience the largest rolling movements by pushing the one side of handles down to the gunwales when the other side moves the hands up as high as they can without flipping the boat. Then roll the boat to the other side and eventually flop back and forth realising how easy it is to do this. If the environment is safe, let the rowers stand up in the boat and ask them to let the oars go.

Other good balance drills are:

- Pause every other stroke at a certain point of the recovery,
- One-hand-only rowing,
- Wide grip rowing etc.

Do not shy away from any new ideas – the wider the variety of the drills, the better for learning! You can do even fun and challenging stuff, like putting the handles in the water at the catch…

Finally, make sure the boat is well rigged. A poorly rigged boat will not allow the rower to experience the proper forces necessary to balance the boat or to bring it back in a balanced position.

Fig.3: Balance drill: Standing up in the boat

Fig.4: Fun balance drill: Clean your handles at the catch

Literature

1. McLaughlin, S. (2004), A Comparison of two Methods for Teaching Beginners the Sport of Rowing. Masters Thesis, University of Western Ontario.
2. Nolte, V., McLaughlin, S. The balance of crew rowing boats. In: Malaysian Journal of Sport Science and Recreation. Vol. 1 (1), 51-64, 2005

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