

# Rigging your boat to make the most of your rowing

Rigging can be broken down into these 5 elements. All of them have bearing on the way the boat moves through the water in relation to how the stroke is made.

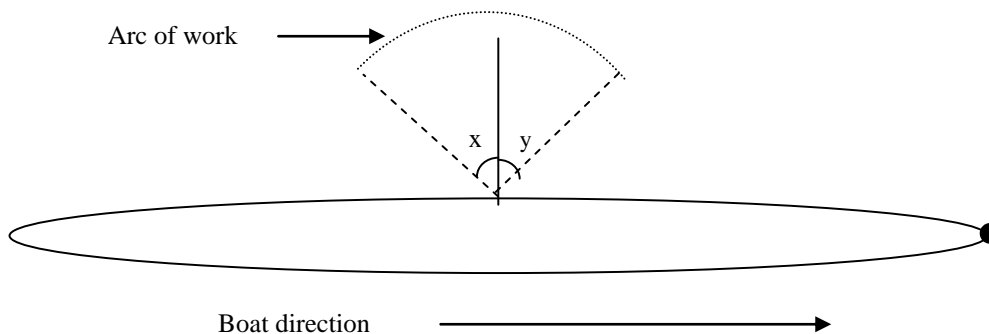
- Stroke length
- Catch position
- Finish position
- Blade depth through the stroke
- Gearing

All of these can be adjusted either to enhance performance, make allowances for different levels of strength and fitness or to correct bad set up.

It is important to remember that changing one element in isolation is not the way forward. Each aspect is changed when one is adjusted. The four things that can be changed are The stretcher/slide position, the rigger height and span, the pitch of the pin and the blade length and inboard/outboard ratio

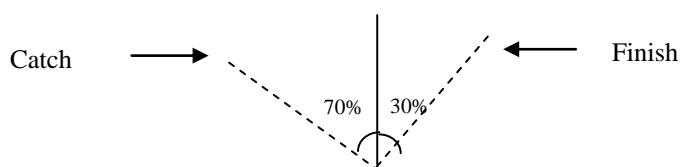
## The stretcher

Moving the stretcher backwards or forwards changes the arc of work: and further adjustment can be made by moving the slide rails (the seat rails) to alter the position of the front stops. A good starting point for sweep oars is to have the front stop approx. 75 mm in front of the pin. With sculling the distance should be approx. 50 mm. This ensures that at the catch (y) the force is not pushing out too far sideways and the finish (x) is not pushing too far in. The objective is to get the maximum force of the stroke to be in the direction of the rear of the boat. These starting points are only a guideline and will vary depending on the type of boat (8, 4, 2, 1x)

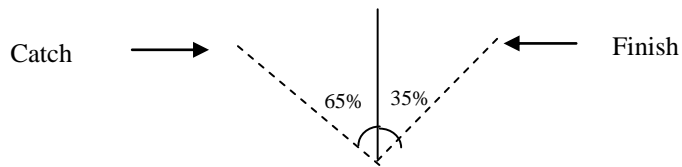


In sweep-oar rowing this arc (x + y) is about 90° and in sculling about 110°. In a faster boat (e.g. an eight) you want more work in front of the pin, and in a slower boat (e.g. a pair) more work behind the pin. You also want the athlete to be comfortable in the boat, i.e. the outside hand should be able to pull to the finish without having to bend the wrist out as the stroke comes in to the body. Plus you want the whole crew to finish at the same position, so each persons rig can be different because of size and height etc . get the catch and finish angle as similar as possible

Effect of moving the stretcher forwards



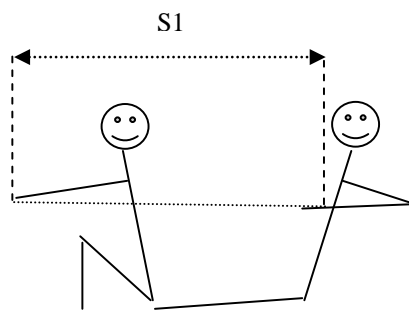
Effect of moving the stretcher backwards



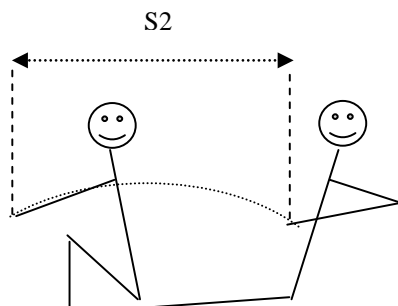
You can also adjust the height and angle of the footplate depending on the size of the rower. The rower should be able to attain a vertical shin at the catch, so the footplate should be set low down and at an angle of 42°. If the footplate is set too high, the rower will not be able to achieve full compression and in addition the boat will be less stable. If it is set too low, the rower may over compress

### The riggers and pins

A significant adjustment is the height of the gate (rowlock), which should be set so that the rower can pull in a straight line, producing a long stroke. At the finish position, the blade handle should be level with the sternum and the pull through of the stroke should be level from the catch all the way to this point



If the pin is set too low, the rower will pull the oar in an arc, producing a shorter stroke: If the pin is too high the finish hand level will be too high at the finish



The typical height range is 16cm – 19cm for sweep oar, 15cm to 18cm for sculling.

The stroke length is also determined by the spread (the distance from the centre of the boat to the pin). The spread should be reduced for a shorter crew and increased for a taller crew in order to maintain the correct angle and arc of work. In sculling we measure the span (distance between the two pins) rather than the spread. However, you should always check the spread to make sure it is the same both sides.

Crew Height and Span/Spread		
Height (cm)	Spread (four)	Span (single)
185-195	85-86	158-160
176-185	84-85	156-158
166-175	83-84	154-156
155-165	82-83	152-154

These figures are rather theoretical – in practice most coxed fours are rigged with a spread of 85.5 cm (half a cm less for coxless) and most scullers go for a span of 159-160 cm.

The span/spread is also reduced as the boat speed increases – the span of a double scull will be about 1 cm less and a quad about 1½ cm less than a single. An eight will have a spread about 1 cm less than a four and 2 cm less than a pair.

It is very important to ensure that if the span is changed then the inboard of the oar and scull has to be changed as well. For sweep oar, if the span is reduced by 5mm then the inboard (distance from the handle end to the button) has to be reduced by the same amount. For sculling, if the overall span is reduced by 10mm then each blade inboard has to be reduced by 5mm.

## Pitch

Pitch is the angle of the pin from vertical. There are two planes of movement:

- Towards the bow or stern
- Inwards or outwards

Most modern blades are manufactured with 0° pitch and any adjustments should be made using the pin. You need some pitch to hold the oar in position in the water, since the oar is not horizontal when you pull on it, but angled downwards. About 4° is normal, which used to be set by having angled blades but these days is done using the plastic inserts in the swivels. At the catch it is better to have a little more to prevent the oar going too deep. At the finish you need a little less to make it easier to hold the blade in the water. So how do we achieve this?

1. You could try setting stern pitch, but this will give less at the catch and finish and more in the middle, giving a good finish, but a poor catch and drive. Setting the pitch towards the bow has the opposite effect, giving a good catch but poor finish and drive. Pitch will always be a compromise as the pin is a fixed object with the blade at an angle down to the water so the pitch will change through the stroke.
- 2.
3. You could have neutral pitch, giving the same angle throughout the stroke. This will suit most crews.
4. If you angle the pin outwards, (most modern riggers are set this way) you really do get more at the catch and less at the finish. 1½° of outward pitch gives you 5° at the catch, 4° in the middle and 3½° at the finish, assuming you are using 4° inserts. Using a pitch gauge to check the outward angle and the stroke angle to check the inserts is not as difficult as it sounds.

## Blade length

Taller people need longer oars than shorter people. Because they have longer arms and legs they reach forward further and finish further back. The span should be set wider for tall people to achieve the same arc of work. This means the inboard of the oar will also need to be greater as covered above so that they can reach right out to the catch and draw through at the finish. Modern oar or sculls are adjustable so within reason, rowers of different heights can all be set up in the same boat to achieve the same catch and finish angles.

Gearing is the ratio of inboard to overall blade length. If it is too high, then rowing will be very hard work, resulting in a “two part” stroke where the rower is unable to maintain pressure through to the finish or cannot maintain a high enough rate. If the gearing is too light, the crew will have to take more strokes to achieve the same amount of work, pushing the rating up which uses up energy. The level of fitness and strength of the rowers of the crew needs to be taken into account.

Typical oar lengths range from 372 cm (lightweight women) to 378 (heavyweight men) and sculls from 288 cm (lightweight women) to 294cm (heavyweight men).

You also need to adjust the gearing for the type of boat –an eight moves faster a pair so the gearing can be higher. Likewise a quad moves faster than a single

So the inboard depends on a number of things, but principally:

- The rower (height, level of skill fitness)
- The type and span of the boat

Typical inboard oar lengths are 114cm for an eight, 115cm for a coxed four and 116cm for a coxless pair, and scull lengths 88.5cm for a single, 88cm for a double and 87.5 cm for a quad. These lengths are taken from statistics for international crews, who are generally tall with long legs. Lesser mortals will require shorter inboards!

To illustrate the differences in gearing picture this. If you had 300 bags each weighing 10kgs that had to be moved 100 mtrs it would be impractical to shift each bag at a time as you would travel 60K in return trip. Likewise you could not possibly carry all 300 bags in one trip. Somewhere in the middle would be the ideal weight/distance compromise for your physical strength and fitness

### **Points to remember**

- All rig changes the way you row. Make a note of the starting point so you can always go back and start again
- Some rig changes are designed to change the way you row, some are made to even out differences in the rowers
- Adjustable rigging is for the benefit of the athlete, not vice versa
- Rig changes will be needed as you get fitter and more skilled but playing with set up too often is counterproductive.
- All crew members do not have to be rigged the same and changes may be needed but it is a good starting point.
- Adjust one thing only, then try it out
- Keep a note of measurements, how it feels/looks, how it affects the boat speed (do timed pieces)

### **Order of adjustment**

Start with the easiest thing first:

- Stretcher
- Height
- Oar/scull length and inboard
- Pitch
- Spread/span

Many thanks to Gordon Burton and Nigel Weare of the ARA who REALLY know about rigging and Caroline Turnbull who put the bulk of this article together (with only a few additions by me)