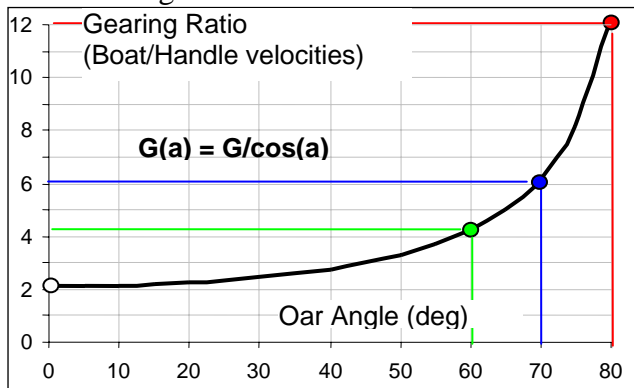


Facts. Did you know that...

...the effect of the oar angle on gearing is significant at angles greater than 45deg? The chart below shows the dependence of the actual gearing on the oar angle:



- An angle of 60deg makes it twice as heavier;
- An angle of 70deg makes it three times as heavier;
- An angle of 80deg makes it six times as heavier.

The chart is valid for both catch and finish angles, but the latter usually do not exceed 45deg, so the effect at the finish is not significant.

We know that catch angles mostly lie between 60 and 70deg (average is 64.0deg) in sculling and between 50 and 60deg (average is 54.2deg) in rowing. This means that, on average, gearing in rowing is 34% lighter at the catch than in sculling. This can be related to other facts, which probably compensated for this difference:

- In general, outboard/inboard ratio in rowing is 7.8% heavier than in sculling (the average in the four Olympic rowing classes being 2.26 compared to 2.10 in sculling, RBN 2006/11).
- Racing stroke rate on average is 2.4% higher in rowing than in sculling in similar boat types (37.3 and 35.7 in W2- and W2x, 38.7 and 38.1 in M2- and M2x, 40.9 and 40.2 in M4- and M4x, RBN 2003/01). This happens in spite of higher speeds in sculling boats.

Feedback & comments

✓ We received a number of interesting comments and questions about gearing and dimensions of oar/span/spread.

Jamie Croly, RSA Junior Women Coach has written: "I have felt that we have not explored the full range of possibilities offered by the newer oars and sculls that can be adjusted. Most of the mind sets of coaches are still stuck in the old school of thinking where a change in the inboard automatically affected the outboard and gearing. It seems a little strange that most rowing texts that offer a chapter on rigging have the same measure-

ments. ... This is obviously a left over from when club only had one set of blades that had to be used in many boats. In order to keep the "internal" position the same to get the same feel the coach only had the option of moving the pin. Why are oars only rowed 370-380 and sculls 282-292? Why not 350 or 400, 270 or 300?"

✓ Other interesting comments came from Stephen Aitken, an ARA Coach Educator and Coach at Tideway Scullers School. Stephen set angles 70deg at the catch and 40deg at the finish as a target. Then using the boat and rower geometry he derived the oar dimensions and span, which would be required to achieve these criteria in different categories of rowers. He found that the shortest dimensions for sculling inboard/oar-length/span in juniors (stroke length 144cm) should be 78/251/138cm and the longest dimensions in seniors (stroke length 167cm) should be 93/295/166cm.

We used similar method, based on the ratio of stroke length to rower's body height. From database of 4620 samples we found that the average ratio was 85%. Then we derived the normal stroke length and rigging dimensions, which required achieving a total angle 110deg in sculling and 92deg in rowing. Other variables for the calculation were the average gearing ratio from RBN 2006/11 and overlap values from RBN 2006/12. The Table shows the results of the calculations:

Body Height (cm)	Stroke Length (cm)	Sculling			Sweep		
		inboard (cm)	Oar Length (cm)	Span (cm)	inboard (cm)	Oar Length (cm)	Spread (cm)
165	140	77	254	134	100	329	68
170	145	79	261	139	103	338	71
175	149	81	268	143	106	347	74
180	153	84	275	147	108	355	76
185	157	86	282	152	111	364	79
190	162	88	289	156	114	373	82
195	166	90	296	161	116	382	84
200	170	93	302	165	119	390	87
205	174	95	309	170	122	399	90

You can see that Stephen's minimum and maximum dimensions are quite close to our data for rowers of height 165 and 200cm.

Concluding, normal rigging dimensions from text books would suit a sculler of 190cm height and rower of 193cm. It is make sense to vary the dimensions for rowers of significantly different height, or they should row at different angles.

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