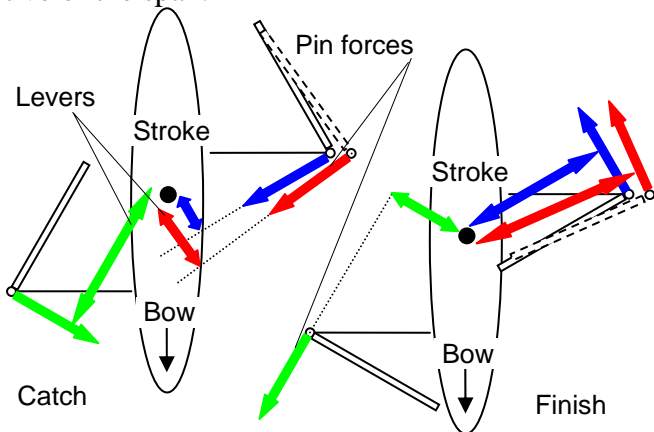


Q&A

? **Q:** When talking about gearing, coaches very often relate it to span or spread. During the latest FISA rigging survey the gearing was officially defined as a ratio of the span/half-spread to the outboard. The common opinion is that the wider span/spread is “lighter” and the narrower is “heavier”. We even heard an opinion that change of one centimeter of the span/spread is equal to the change of three centimeters inboard, but no evidence found for this opinion. On the contrary, from the theoretical point, the ratio of the handle/blade forces/velocities depends on the oar inboard/outboard ratio only and should not depend on lateral position of the centre of oar rotation. Here we try to investigate this controversy.

✓ **A:** The most obvious influence of the lateral position of the pin can be seen in sweep rowing, where the span works as a lever of the rotational moment of the pin force (RBN 2002/04). In a pair the rower with wider span will produce more torque relative to the centre of the boat at the same force, or the same torque at less force, which looks like lighter gearing. However, it is not a real gearing, because if we determine ratio of the handle/blade forces/velocities, it is the same irrespective of the span.



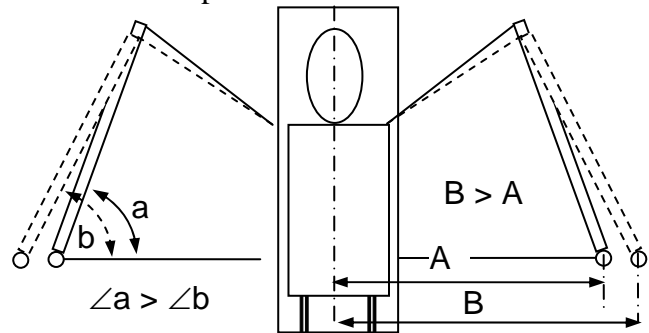
Half of the pairs measured during the latest FISA rigging survey had different span. Usually stroke had 0.5-1cm wider span (with one opposite exception in GER M2-), which would help him to overcome the difference in torque of the pin forces at catch. The picture illustrates the mechanics of the leverage in a pair, which is equal to the distance from the line of pin force to the boat center of mass. On the contrary, at the finish the stroke rower in pair has longer lever of the pin force and His wider span increases the boat rotation.

The table shows average, minimal and maximal values of the spread and span, measured in

FISA rigging survey during Worlds-2006 in Eton. The bigger/faster boats had narrower span/spread:

Boat	Span/Spread (cm)			Overlap (cm)		
	Aver.	Min	Max	Aver.	Min	Max
M1X	159.92	158.8	161.1	21.91	19.3	26.8
LM2X	158.96	156.9	160.3	21.46	18.8	23.7
M2X	159.22	157.0	161.2	21.46	18.8	25.0
M4X	158.75	157.2	160.4	21.22	18.6	26.4
W1X	160.03	157.4	162.2	20.27	16.3	22.9
LW2X	159.51	157.0	162.5	20.87	18.6	24.5
W2X	159.35	157.9	161.0	21.22	19.4	23.2
W4X	159.09	157.2	160.2	19.92	15.9	22.8
M2-	86.09	84.5	88.5	32.26	31.0	34.0
LM4-	85.10	83.5	86.0	32.07	31.0	33.3
M4-	84.72	83.8	86.0	32.29	31.0	33.7
M8+	N/M	N/M	N/M	N/M	N/M	N/M
W2-	86.34	85.0	87.5	32.10	31.3	33.0
W8+	84.41	83.0	86.3	32.20	31.3	34.5

In sculling the lateral distance from the boat centreline is usually the same for the right and left pins. However, its value changes geometry of the arms-inboard and affects angles at catch and finish. The picture below shows that narrower spread allows longer angles at the same inboard and seat/shoulders position:



As we discussed in RBN 2004/05 and 2006/06 the longer angles at catch work as a heavier gearing. However, from the pure geometrical point the effect of the spread on the angles is quite small: every two centimeters of narrower spread (at the same inboard) add only 0.5 degrees to the catch angle, which can hardly affect the rower’s feeling. Changing inboard accordingly (maintaining a constant overlap) is slightly more effective and adds 0.8 degree for each two centimeters of the spread. Above changes affects overlap and allows moving the stretcher, which changes angles again. However this is a topic for other discussion.

Concluding, the reason of exaggerated importance of the spread/span for gearing still remains unknown to us. We greatly appreciate if you can send us your thoughts, opinions or references.

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