

# Para-Rowing Rigging Considerations

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Foundation



# World Rowing Championships - Gifu, Japan, 2005

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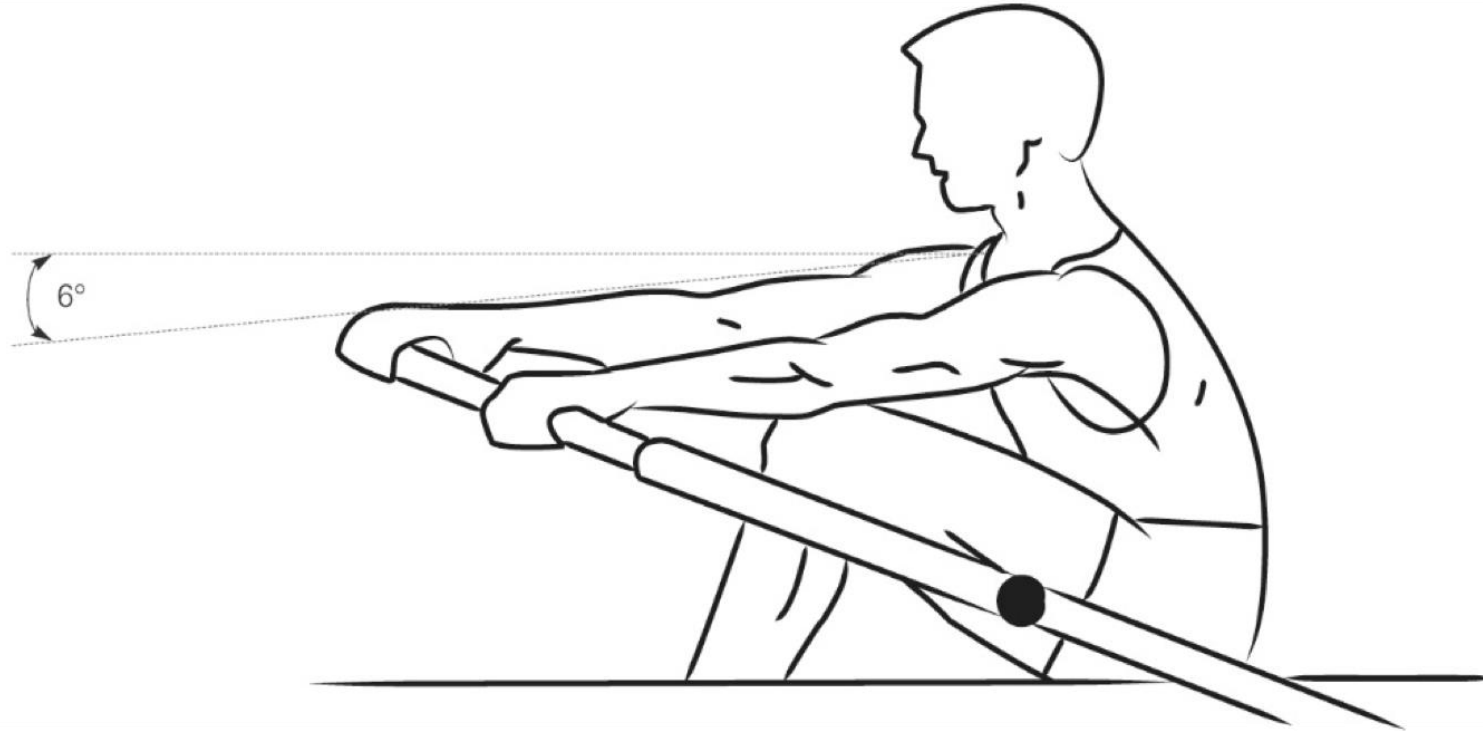
<https://vimeo.com/151682117>

## PR3

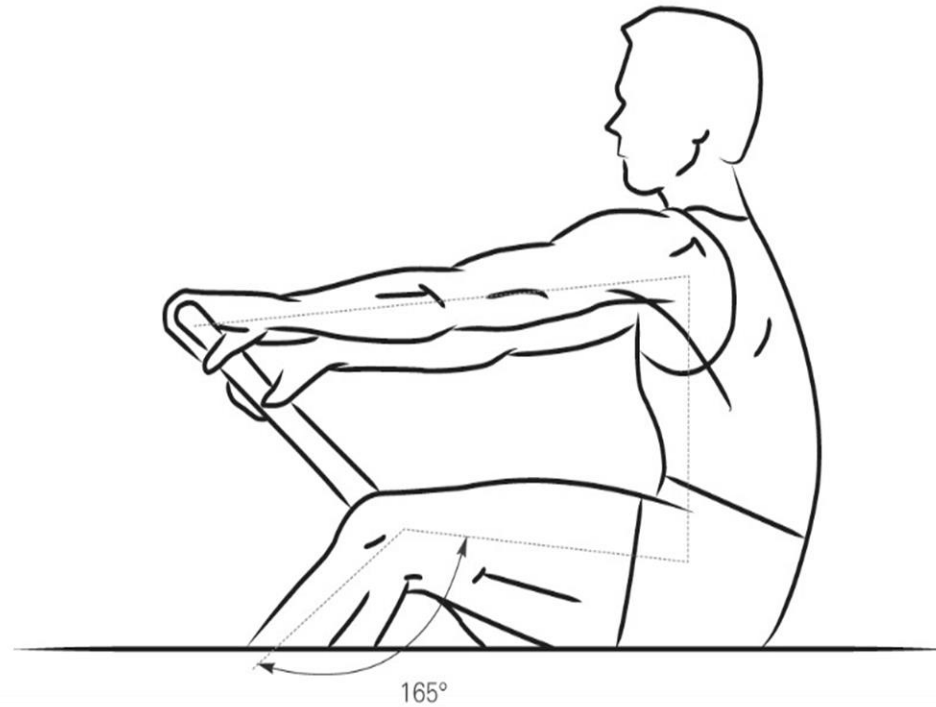
When considering rigging a boat for PR3 athletes many of the principles that apply to able bodied rigging set-ups will apply.

Further considerations should be given to the following:

- Mixed gender crews (strength, height, stroke length)
- Disability mix within boat (physical, visual)
- Mobility range of athlete (fused ankle, elbow)
- Use of prosthetics and the effect of this on stroke length and balance



- The height of the draw
- Rower's movement horizontally with respect to the pin

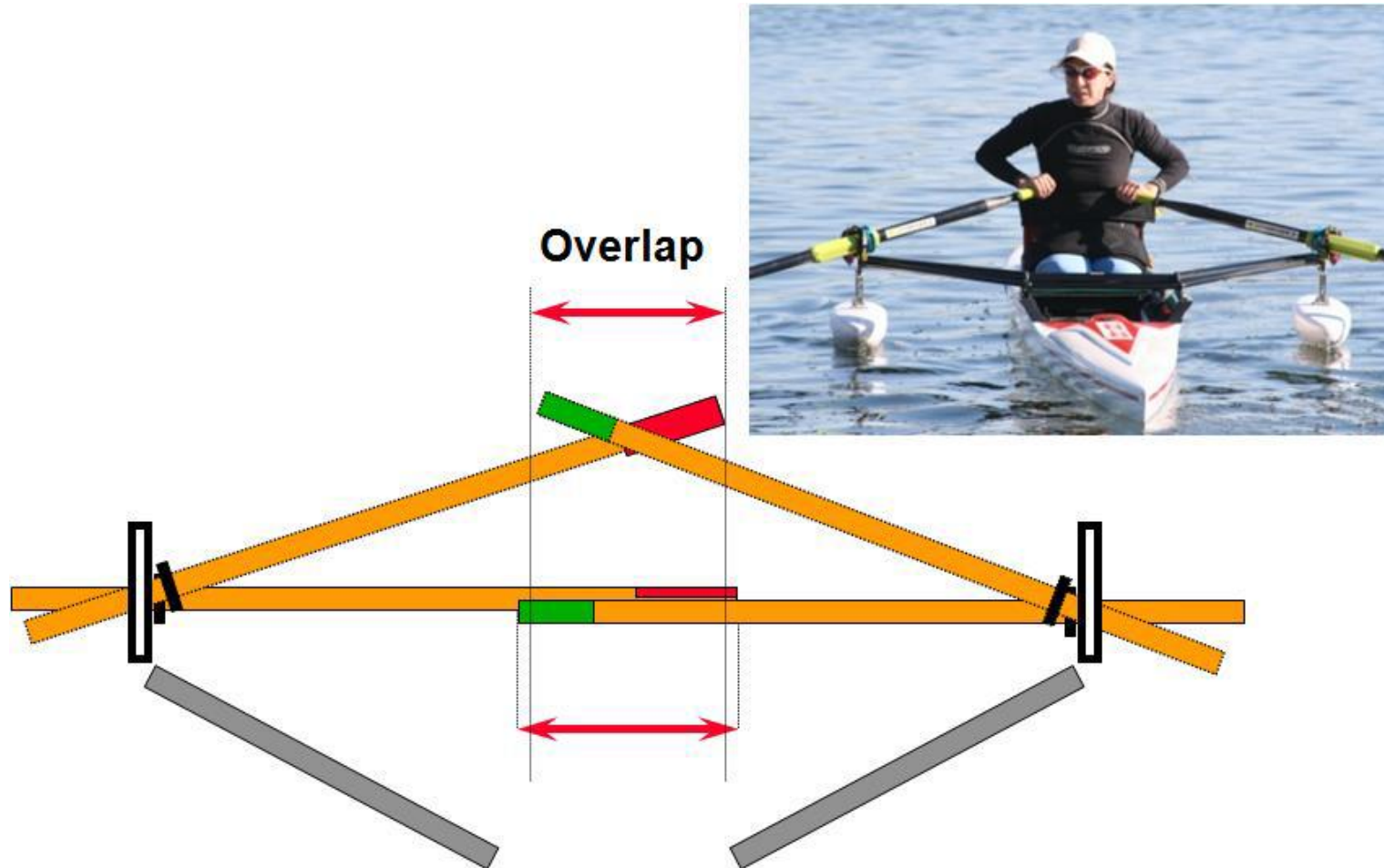


Body Position at the Orthogonal

# PR1 & PR2 (fixed seat boats)

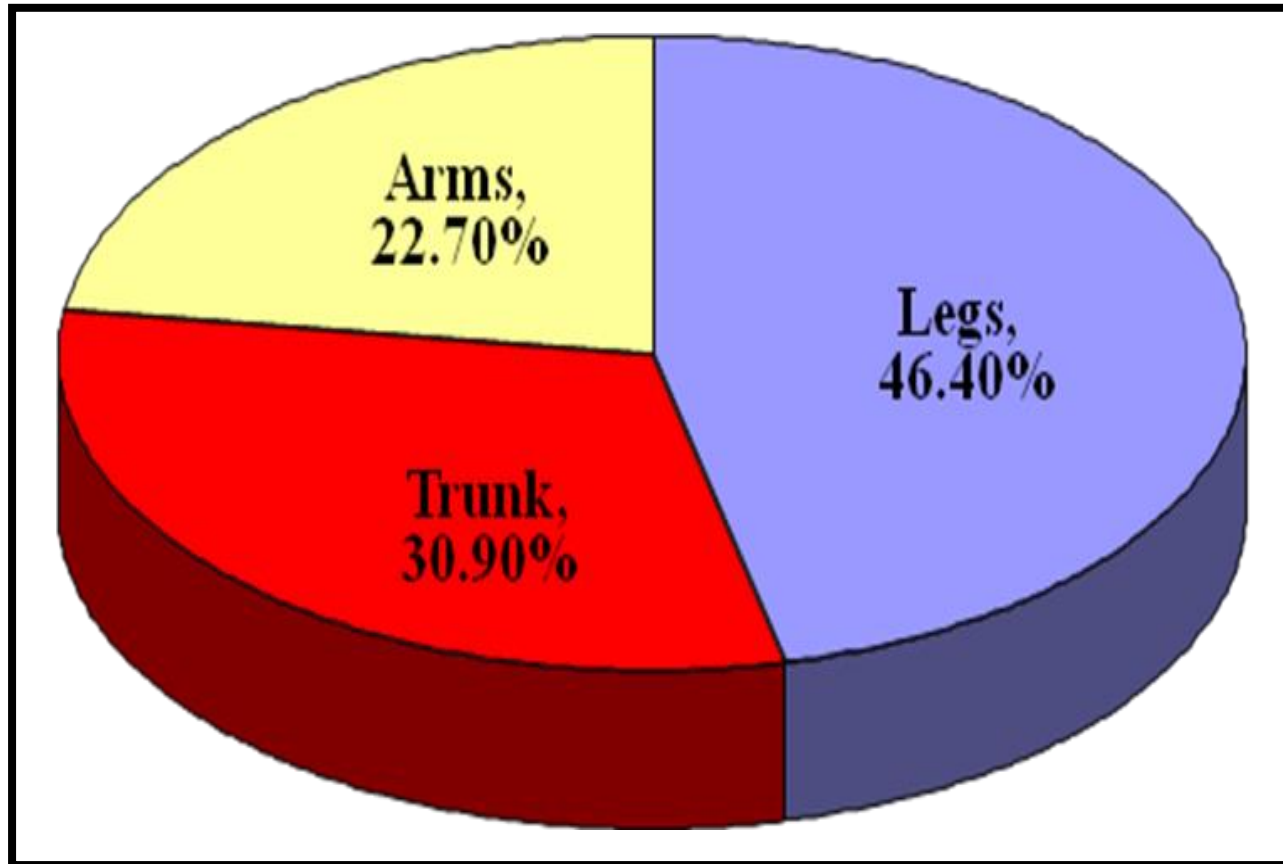
- Mixed gender crews (strength, height, stroke length)
- Mobility range of athlete
- Implications with amputees on balance
- Oar/Scull - consider shorter overall length
- Reduced inboard length with no 'cross-over' in PR1 and no/minimal in PR2 boats
- Oarlock heights set level
- Factor additional sitting height of athlete with seat padding/cushion
- Seat back rake angle set at  $< 90^\circ$
- PR2 rowers should be encouraged to maximise their function and row without the backrest if possible
- Pontoon depth can impact on rigging heights
- PR2 rowers with good sitting balance should be encouraged to row without pontoons

# Rigging Overlap PR1/PR2 Boats



**PR1 & PR2** athletes will be able to tolerate less overlap with reduced trunk swing and no use of legs to unwind overlap

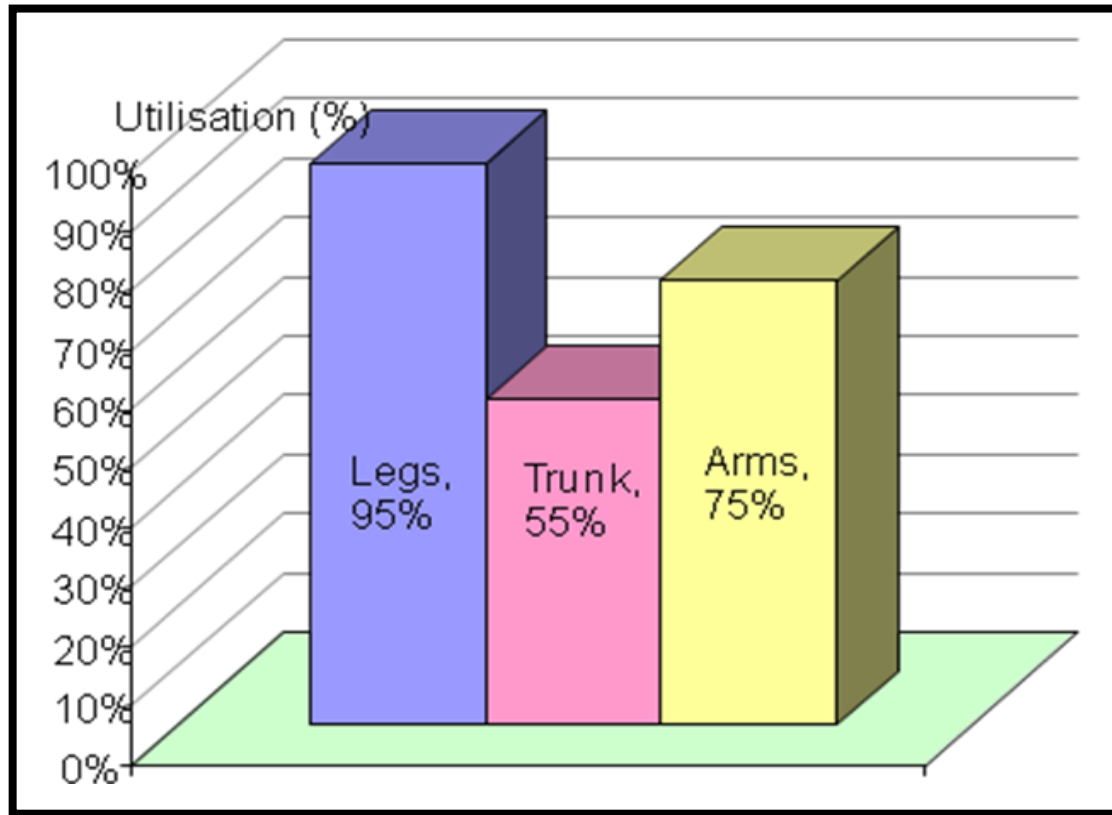




What we can learn from able-body sliding-seat rowing with regards to input of body segments into rowing power?

- Legs produce nearly half of rowing power
- Trunk produces nearly one third of rowing power
- Arms produce nearly one quarter of rowing power

*Dr Valery Kleshnev 2006*

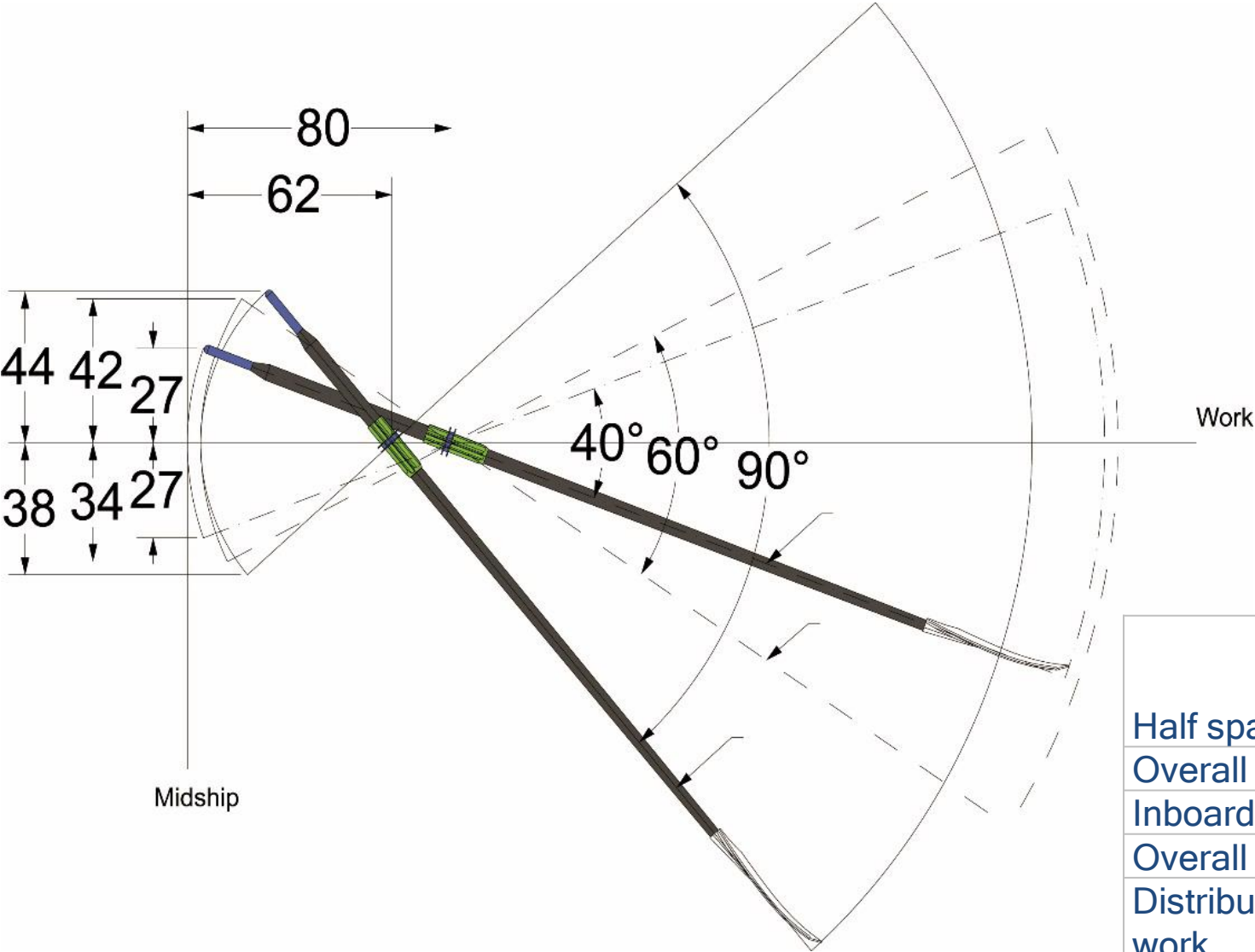


Utilisation of work-capacity of the body segments:

- Trunk muscles utilise only about 55% of their power
- Legs use up to 95% of their power
- Arms' utilisation is about 75% of their power

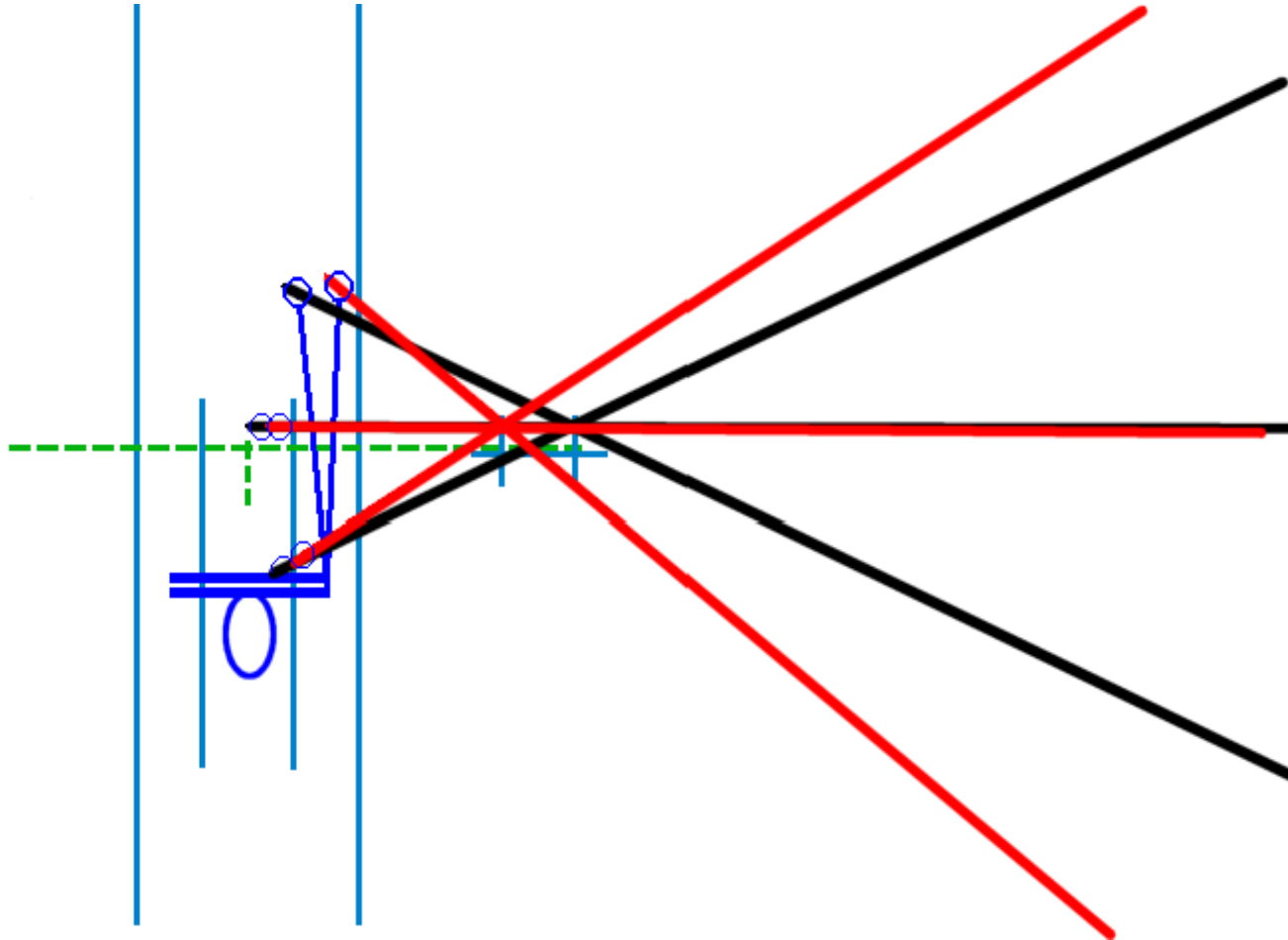
- PR1 rower who is strapped to the seat around the torso, the reach is restricted to <600mm, and if the rigging is similar to an able-bodied rower then this results in a stroke arc of around 40 degrees through standard rigging
- PR2 rower, the reach is achieved by extending the arms and body swing. The body swing can be exaggerated and a total stroke length of 1000mm can be achieved. On a standard rig this would equate to an arc of 67 degrees
- By adjusting the span and the inboard for adaptive athletes, two things can be achieved:
  - Increased stroke arc overall - aim for >90-degree arc
  - Distribution of the stroke arc achieved with the optimum position in relation to the pin

# Theoretical Stroke Arc Scenarios



	40°	60°	90°
Half span	80	80	62
Overall length	278	278	252
Inboard	80	76	58
Overall degree	40	60	90
Distribution to work	50/50	55/45	55/45

# Current trends in Para-Rowing rigging used in international competition



Wide PR1 1x: 160/278/80

Narrow PR1 1x: 124/252/58

Figure above shows the wide variance in adaptive rigs for the fixed-seat boats currently used in international competition, with wide and narrow spans (at mid-point reference) together with effect on overall stroke arcs.

When evaluating any rigging parameter a clearly defined protocol should be used:

- How does it feel?
- How does it look?
- Record speed measurements / timed pieces
- Check / double check
- Adjust one parameter at a time only and evaluate

Further consideration:

- Encourage a strength and conditioning programme that increases upper thoracic mobility which will allow the athlete to employ effective use of the shoulders, which will help to increase length of the stroke in the fixed-seat boats.
- Encourage athletes to feather which will reduce air drag dramatically.

# Para-Rowing Rigging Table

	Span/Spread (cm)	Inboard	Oar/Scull Length (cm)	Outboard (cm)	Gearing
PR1 beginner	130-140	About ½ of span	230-250	160-185	2.3-2.7
PR1	125-140	About ½ of span	240-270	170-200	2.5-3.2
PR2 beginner	140-155	About ½ of span	245-270	165-190	2.3-2.5
PR2	135-155	About ½ of span	260-285	180-205	2.4-2.8
PR3 (Mix 4+)	83 – 86	113 – 116	366-375	253-259	3.0

A Para-Rowing rigging survey for teams that competed in the Rio Paralympic Games 2016 can be found here:  
[http://www.worldrowing.com/para-rowing/Rigging survey Adaptive Paralympic 2016 POG FINAL](http://www.worldrowing.com/para-rowing/Rigging%20survey%20Adaptive%20Paralympic%202016%20POG%20FINAL)





Thank you !