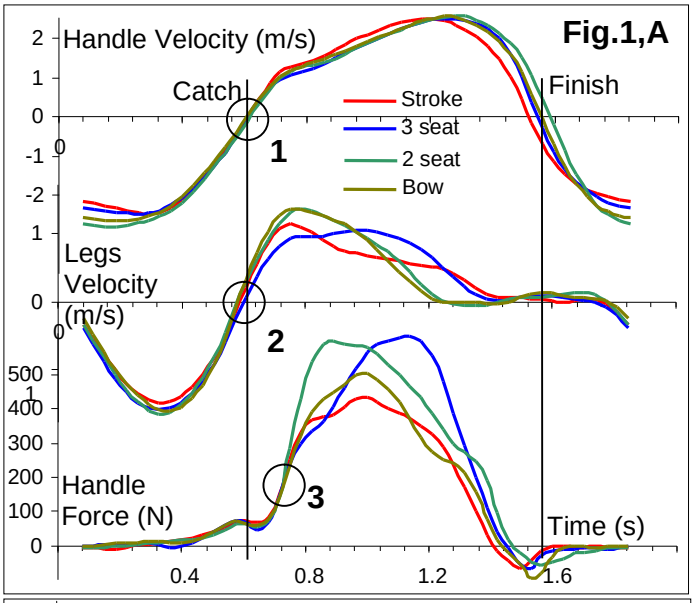
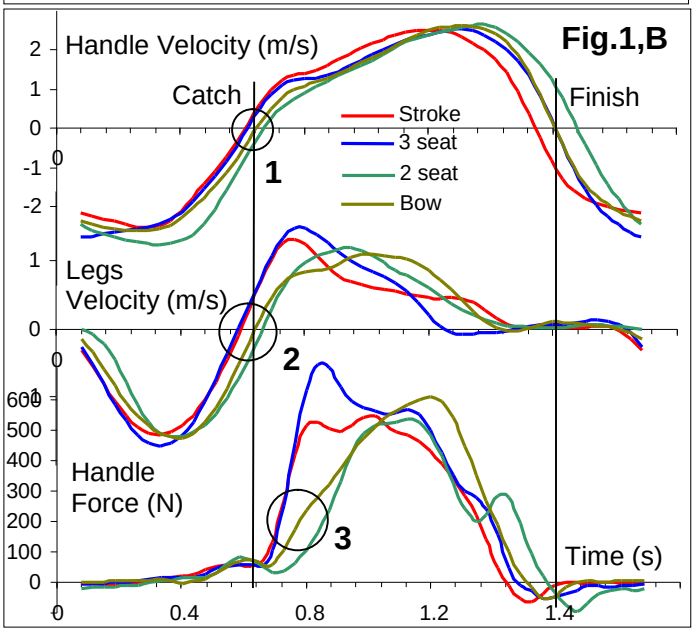
Case study on synchronization

In RBN 2014/05, evaluation criteria for synchronisation in a crew were defined (the 12 moments during the stroke cycle). Recently, very interesting data was obtained with the ***BioRow™*** telemetry system (Fig. 1), which confirms the importance of synchronization. Two junior quads (A and B) were measured at 33.5-34 str/min, where crew A had much better synchronisation at the catch in the handle (1) and seat (2) movements, and in the force increase after catch (3).

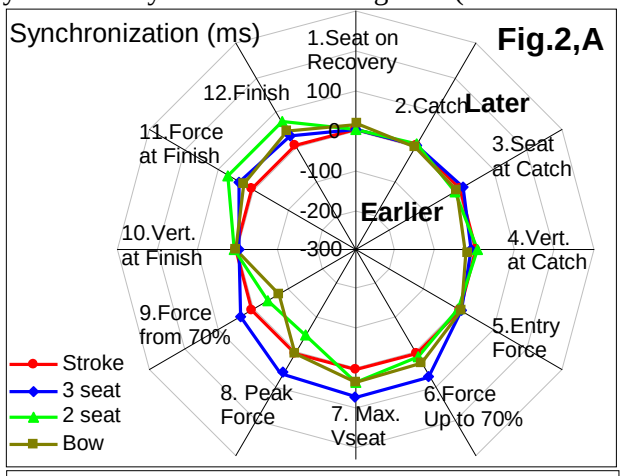


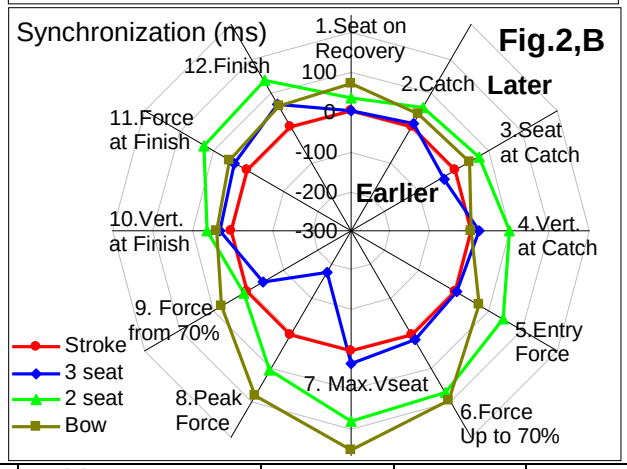


An effective presentation of synchronization data is a radar chart (Fig. 2), where 12 axes indicate corresponding criteria moments. As the synchronisation is defined as the time lag (in milliseconds) relative to the stroke rower, so his data is always zero and presented as a perfect red circle on the charts. Negative values are located inside the red circle and mean earlier timing – overtaking the stroke. Positive values are outside red circle and mean later than the stroke.

Three rowers were the same in both crews, only one athlete was replaced and the other two changed seats. However, **the speed in crew A with better synchronisation was 2.1% faster (7s over 2km) at the same weather on the same water**, even though their total power was slightly lower. Therefore, the drag factor ***DF*** was lower in the crew A, which is related to lower internal energy losses due to better synchronisation.

The Table 1 shows the magnitude of synchronisation (standard deviation of time lags of three crew members, except the stroke, RBN 2014/05) for 12 criteria in these two crews and their correlations with ***DF***. On average, the crew A had more than two times better synchronisation: its magnitude was 38.7ms compare to 65.2ms in the crew B. The most important criteria (the highest correlation with ***DF***) were even better in crew A: at the catch, they had more than four times better handle synchronization (5.9 and 25.7ms), their seat changed direction nearly four times more synchronously (11.7 and 41.4ms), and forces achieved their entry level nearly 12 times better together (4.7 and 69.7ms).





N	**Table 1**	Crew A	Crew B	Corr.DF
1	Seat on Recovery	20.4	36.1	0.60
2	Catch	5.9	25.7	0.64
3	Seat at Catch	11.7	41.4	0.65
4	Vert. at Catch	23.1	50.2	-0.25
5	Entry Force	4.7	69.7	0.42
6	Force up to 70%	66.4	95.1	0.52
7	Max.Vseat	101.9	110.3	0.31
8	Peak Force	123.9	191.0	0.31
9	Force from 70%	58.1	57.9	0.38
10	Vert. at Finish	4.6	17.0	0.48
11	Force at Finish	22.5	47.0	0.36
12	Finish	20.8	41.0	0.27
	Average	**38.7**	**65.2**	**0.60**

The correlation between ***DF*** and average synchronisation over 12 points was found very high (r=0.60). **This confirms the high importance of good synchronisation in a crew for achieving the best result.**