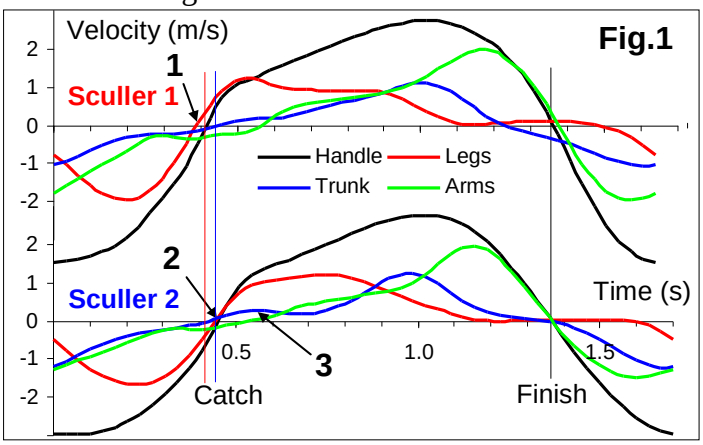
Catch "through the stretcher"

In RBN 2006/09 we have described a concept of "catch through the stretcher" and now will give more data and analysis to prove the fact that this idea really works. Fig. 1 shows handle and body segment velocities of two single scullers measured at 36 str/min.

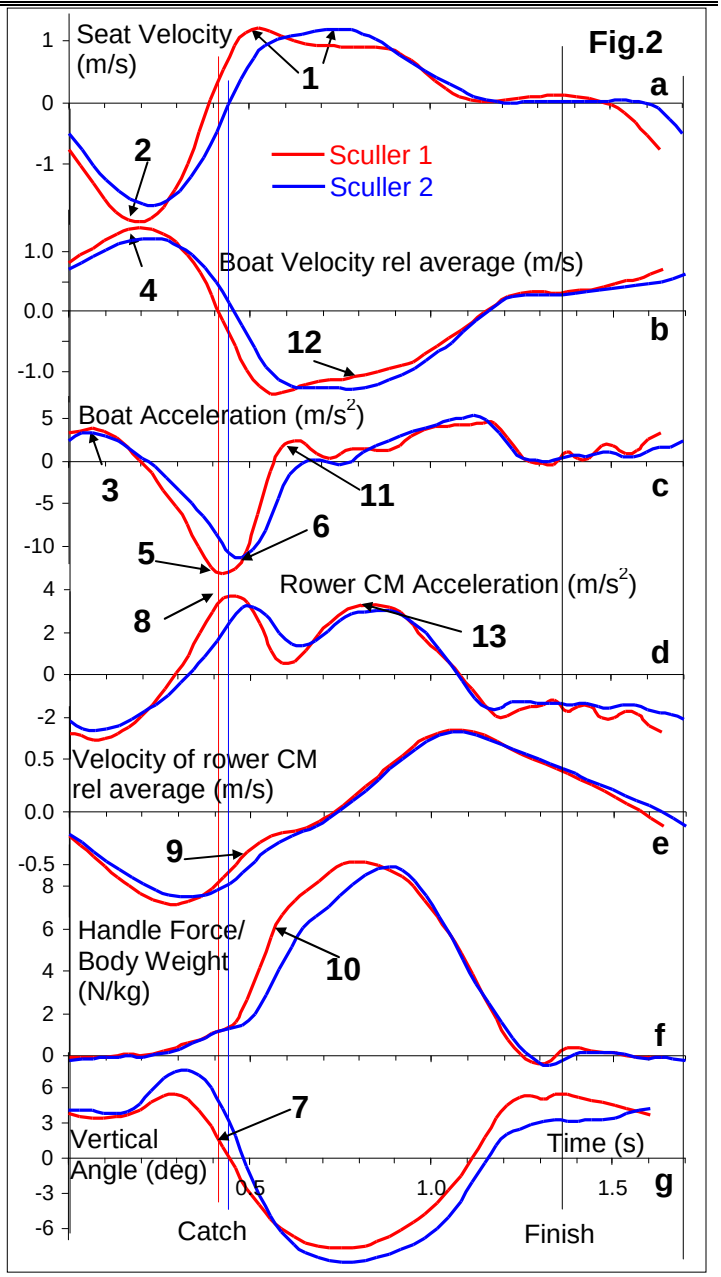


Sculler 1 (Olympic medallist) changes direction of the seat movement (1) 0.26s before the handle changes its direction (catch), so at the catch his seat already moves to the bow at a speed of ~0.4m/s. Sculler 2 (Olympic B finalist) changes direction of the seat (2) practically at the same time with the handle (only 0.003s before) and his seat achieves a speed of only 0.06m/s at the catch. Instead of legs, sculler 2 uses trunk (3) after catch.

Fig.2 shows main biomechanical variables of these scullers overlapped. The maximal legs speed during the drive (1) was very similar in these two scullers (1.22 and 1.20m/s), but was achieved much earlier by the sculler 1. Also, he has a much faster approach to the catch: his maximal leg speed during recovery was -1.95m/s (2) compare to -1.68m/s in sculler 2. Therefore, boat 1 receives much higher acceleration during recovery (3) and achieves higher maximal velocity before the catch (4).

The negative peak of the boat acceleration was deeper in sculler 1, occurs earlier and coincides with the catch (5), which is related to earlier "kick" to the stretcher to change direction of the seat movement. Sculler 2 has later and shallower negative peak (6). Sculler 1's boat speed at the catch was relatively slower, which helps to make changing the direction of the oar movement easier and insertion of the blade into the water earlier (7) without back splash.

Acceleration of the rower's mass is also earlier and higher in sculler 1 (8), which mean his CM moves much faster after the catch (9). This helps sculler 1 to increase force much quicker (10): it grows up to 70% of the maximum in just 10deg of oar travel, while it takes more than 16deg for sculler 2. Then, this force is transferred through the gate to the boat and creates the first peak of the boat acceleration (11), which rapidly increases the boat velocity (12) and was called the "trampoline effect" (RBN 2006/02).



"The main rower's acceleration" was also more significant in the sculler 1 (13), even his legs velocity was slower during this micro-phase. This caused accumulation of higher kinetic energy in sculler 1's mass (737J), even though he was lighter (95kg) than sculler 2 (660J and 100kg). As a result, sculler 1 produced 10.5% more power and his boat speed was 3.9% faster, although even the weather conditions were worse.

Concluding, **"catch through the stretcher" technique has the following positive features:**

- **The rower approaches the catch faster and then earlier and sharper "bounces" (like a ball) from the stretcher, which makes catch and blade insertion more effective;**
- **Rower's mass accelerates earlier and more effectively, which causes a quicker force growth using the most powerful muscle groups.**

References: *Kleshnev, V. 2010. Boat acceleration, temporal structure of the stroke cycle, and effectiveness in rowing. Journal of Sports Engineering and Technology, 233, 63-73.*