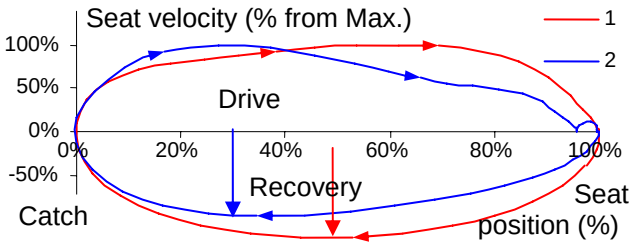
Q&A

? We receive many questions from coaches about legs movement during recovery. Here are some of them: Coach Dmitry Streltsov from Saratov, Russia asked: "What leg movement during recovery is better: accelerating, decelerating or with even speed?" Coach Bob Becht from West Side Rowing Club, Buffalo, USA asked: "At what part of the recovery (cm/in before full compression) do you start to accelerate into the foot stretcher to create the momentum for the trampoline effect"?

✓ First of all, there is no such a thing as pure accelerating, decelerating or even speed of the seat movement during recovery. Both the rower and boat-oars components of the system have a certain mass. Their relative velocity can not be changed instantly from zero at release to a certain speed and then stopped suddenly to zero again at catch. They have to accelerate, maintain an even speed (if it is provided) and then decelerate.

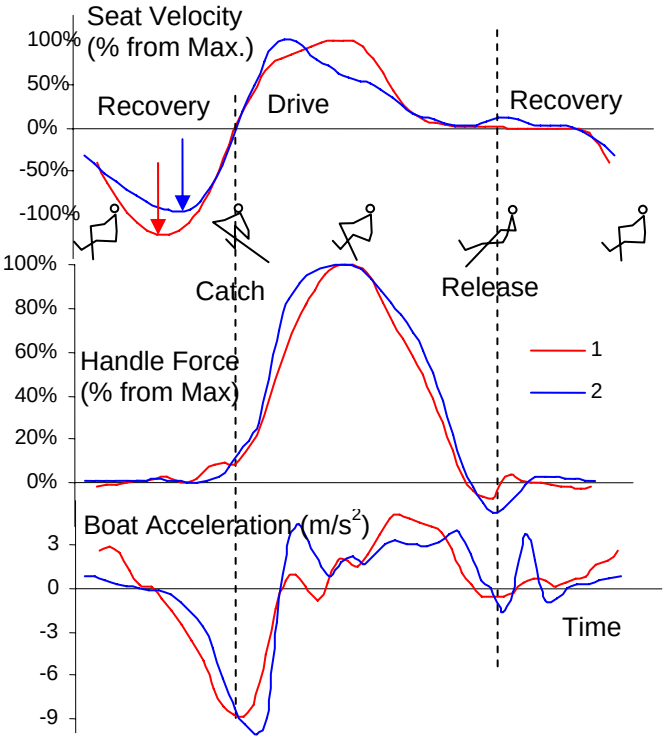
We would rephrase both questions in the following biomechanically correct way: "**At what point of recovery should the highest seat velocity be achieved to provide the most efficient catch and drive?**"

As example, we selected from our database two samples of single scullers at stroke rate 32str/min: the first rower achieved the peak seat velocity at the middle of recovery, and the second one had it at about 25% of total seat travel before catch. Their seat velocities plotted against seat position are shown below:



The second graph below represents the data of the sullers plotted against time. The second rower starts pushing the stretcher later before the catch, which creates deeper, but narrower gap of the boat acceleration. This sharp negative force/acceleration pushes the oar sleeve backward through the rigger and pin, which has a double effect:

- Firstly, it helps oar change direction quicker from recovery to drive. In this case, the oar works as II type lever with the pivot point at the handle. This is about 40% more efficient for the blade velocity, than pulling the handle with the same speed with the pivot point at the pin.
- Secondly, when the blade is inserted into the water, it creates an impact at the pin, quickly increases the forces, bends the oar and creates the "trampolining effect" described in RBN N59/2006. The second sculler achieves maximal seat velocity earlier during the drive, increases the force faster and accelerates the boat quicker.



Statistical analysis has show that on average the position of the peak leg velocity (PPLV) during recovery increases with the stroke rate (r=0.56, n=4626) from 33% at 20 up to 48% at 40str/min, i.e. usually at higher rate rowers start pushing the stretcher earlier. On the contrary, PPLV during the drive gets slightly closer to the catch (r=-0.28): from 45% down to 37%, correspondingly. For this reason there is no correlation between these two variables. To eliminate influence of the stroke rate, we took residuals from the trend lines and found a moderate correlation (r=0.38). This confirms our hypothesis mentioned in RBN N60/2006 about the tendency of mirror matching of the drive-recovery velocity patterns. Also, we have found a moderate correlation of PPLVrecovery residuals with the time to increase force up to 70% (r=0.34) and duration of initial boat acceleration micro-phase D3 (r=0.31).

Concluding, **the later peak of the seat velocity during recovery can help to achieve a quicker catch and more dynamic drive**.

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