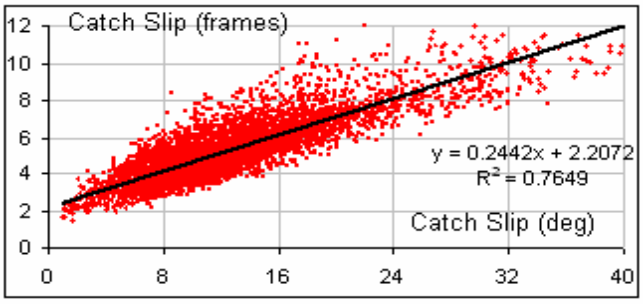
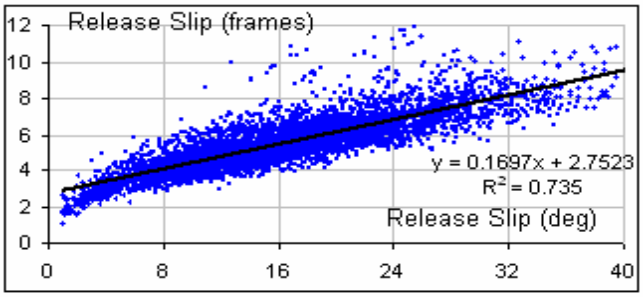
Q&A

Q: GB Senior Women coach Ron Needs asked: "How can you correlate angle data on catch and release slip (RBN 2007/4) to the number of video frames for respectively covering/uncovering the blade?"

A: We correlated catch and release slips measured in degrees (of horizontal oar movement) and in time (seconds converted to frames). The slips were derived from the catch (point where the oar changes direction) to the point, where the vertical angle reaches -3 deg (blade is fully covered).





The trend lines show that every video frame (0.04s) equates approximately to 4 deg of the catch slip and 6 deg of release slip. The difference can be explained by the fact that the blade moves faster at the finish of the drive.

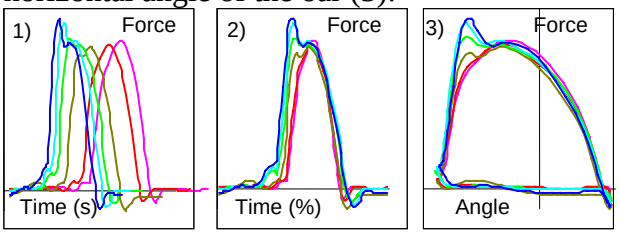
These are quite rough estimates: on the charts you can see that e.g. 8 deg slip can take time from 3 to 6 frames. The difference depends on the velocity of the oar movement, which is determined by stroke rate, boat speed and oar angle at catch. Higher rate, faster boat speed and shorter catch angles make the blade movement faster, so the same slip in degrees takes less time (fewer frames).

Also, from the charts you can see that both trend lines start from about 2 frames on the Y axis at nearly zero degrees on the X axis. This means nobody has a slip faster than two frames. The blade can move a very small distance horizontally, but the period can't be decreased because it takes time to accelerate the blade and move it to a specific vertical angle. Below is the table of normative values expressed in video frames:

Catch Slip (frames)					
	Very Good	Good	Average	Bad	Very Bad
Sweep	3	4	6	7	9
Scull	2	3	5	6	7
Release Slip (frames)					
Sweep	2	4	5	7	8
Scull	3	4	6	7	8

Ideas. What if…

…we look at the above example in a more general manner? As we saw, the results of analysis and normative values depend significantly on usage of time or oar angle as an independent variable. Three charts below present force curves of the same rower at stroke rates from 21 to 38 using various units of X axis: time in seconds (1), time as a percentage of the stroke cycle time (2) and horizontal angle of the oar (3):



As you may see, it is difficult to compare curves on Chart 1, because the durations of the stroke cycle are very different. Chart 2 is better for comparison, but width of the drive phase is quite different. Using Chart 3 we can perfectly compare force curves at different stroke rates.

Another aspect is the physical meaning of the area under the force curve: on Chart 1**,** it represents impulse; on Chart 2**,** it has no physical meaning; on Chart 3 it equal to the work per stroke. Impulse of the force and work (energy, power) correlate providing the velocity of movement is similar. Impulse can be high, but work is low in slow motions and vice versa in fast motions. At static efforts (velocity is zero) the impulse can be very high, but work equal to zero. Work and power are more informative variables in rowing than impulse. Concluding:

- Using time as the X axis is a simpler, more practical method of analysis. It can be easy linked with video**,** and define synchronisation in a crew.
- Using oar angle as the X axis works well in comparing data at different stroke rates. It represents visually the work done per stroke

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