Efficiency vs Effectiveness in Fly Casting

Sometimes I read a comment like this: „As I'm able to cast further with an (almost) rigid fly rod, this one must be more efficient than a higher flexible one". Obviously a lot of people are focussing on the casting distance only to make a statement on efficiency and this is absolutely understandable because in contrast to the effort, input energy respectively the casting distance of the cast is easy to measure. But the casting distance solely could basically tell something about the effectiveness, because for effectiveness only the result, casting distance, output respectively counts and not what input is needed to reach the result[1].

To estimate the efficiency the amount of the input energy is required too since efficiency is defined as the ratio of the output and the input. The higher the output generated with less input, the more efficient. Our economy is based on efficiency, companies that only focus on effectiveness are at risk of going bankrupt sooner or later (because their output, their product respectively might be too expensive). So a little more economic thoughts in fly casting can't hurt. To me efficiency plays an important role in common fly casting as it allows to reduce the effort the caster needs to bring the fly to the target.

The optimal efficiency can be reached neither by a rigid nor by a flabby fly rod. The optimum in efficiency lies in between these two borderline assumed fly rod types, hence the efficiency consequently depends on the deflection. In this paper I won't go into the reasons why efficiency depends on the deflection, in case of further interests in this topic, section F of my "Experimental investigations on the fly rod deflection" is a good starting point[2].

Of course there are other aspects on efficiency depending on the casters ability like minimizing the false casts, a proper grip tension, a small counterflex, a perfect haul and so on and I'm sure a lot of advanced fly casters have intuitively efficiency with on board – but talking about efficiency always means to take the deflection into account too.

In terms of competition fly casting my view on efficiency is a bit different. In this sport only the score decides on the success, hence the caster is basically focused on the best possible output, effectiveness respectively. Efficiency tend to be a bit subordinated as the competition caster is willing to put all his effort into the cast in order to win the contest - no matter what it "costs". So in competition casting less deflection that causes a longer lever arm that in turn results basically in a higher effectiveness could be the key for success. Primarily high leverage (in combination with perfect hauling of course) takes the competition caster on top of the ranking.

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1 The opening comment would be correct if the term "more efficient" was replaced by "more **effective**".

2 Just the hint that the fly rod not only provides the spring effect but further more redistributes the angular momentum (redistribution effect), which causes a shift / concentration of some angular momentum towards the tip of the fly rod resulting in a better energy transfer along the fly rod shaft.

Years ago I had my personal heureka effect regarding the difference between efficiency and effectiveness during fly fishing at the coast. For this kind of fishing I usually use 10 feed long class 6 fly rods. Some days before fishing I bought a new and very stiff “ultra fast” fly rod with an extreme tip action and expected my distance will increase. In fact it did, I was able to cast a bit further by using my brand new ultra fast fly rod (in comparison to my softer fly rod about 1 Meter more in average, not really much but however this further distance could sometimes be important to reach the fish). But after a short period of time (about 15 minutes) I was not able to keep the distance since my casting arm, especially my forearm, weakens and was aching. I had to reduce my casting distance significantly (in average more than 8 meters for sure) to avoid this. Than I switched to my softer fly rod (which is not a noodle at all). With this softer fly rod my casts were almost as far as the farthest possible with the ultra fast rod, but I was able to keep my casting distance uniform up to the same high distance. There was no need to reduce the casting distance since all casts were very comfortable requiring a significant smaller effort and even after a whole day long of casting my casting arm didn’t weaken.

For the stiffer fly rod dropping to a lower carry of elbow could help on the forward cast to avoid to weaken the castin12g arm, but this will not change the tendency that a softer fly rod basically provides a better energy transfer along the fly rod shaft compared to an (almost) rigid one. If this dropping movement relieves the casting arm when casting a stiffer fly rod, then it will relieve the casting arm even more when casting a softer one.

To me this example is a very practical fishing situation holding true not only for coastal fly fishing and my experiences match my investigation as well as 2D modelling.

There is a quite nice analogy suitable to work out the difference between effectiveness and efficiency: The car race !

In this analogy a formula 1 car and a sports car (e.g. Porsche)[3] is compared. The formula 1 car will always win a race (***output energy***), since it was developed to gain the highest speed. But the price is a very high gasoline consumption (***input energy***), lacking comfort and a consumed engine after the race (***aching casting arm***). If the formula 1 car drives the same speed as the sports car is able to drive maximal (same output energy), then the gasoline consumption of the formula 1 car will be still significant higher compared to the sports car. Hence for the same output, speed respectively of both racing cars the sports car needs significant less input. Further more the sports car comes along with a higher driving comfort due to a better damping and its engine is designed to keep the high speed for a significant longer period of time[4]. In terms of efficiency the sports car will always win the comparison – like the flexible fly rod does in comparison to the rigid one !

Back to fly casting. Due to the foregoing reasons my comparison between the rigid (~ultra fast) and the softer fly rod results in the following tendency:

3 The formula 1 car represents the rigid fly rod, the sports car the flexible one.
4 At the end of a race the engine of a formula 1 car is usually consumed and needs to be replaced.

a) To achieve maximal casting distance for a shorter period of time (like competition casting) I will always choose the stiffer fly rod in order to cast “the one meter further” to reach the fish or to win the contest.
b) To achieve a high casting distance over a very long period of time, the whole day long respectively, I will always choose the softer fly rod (since I’m aware that it supports the energy transfer from the butt towards the tip). The more as I know that after a short period of time I will cast further as I would do using the stiffer fly rod because the softer fly rod won’t weaken my casting arm.

Tobias Hinzmann, Potsdam in September 2020