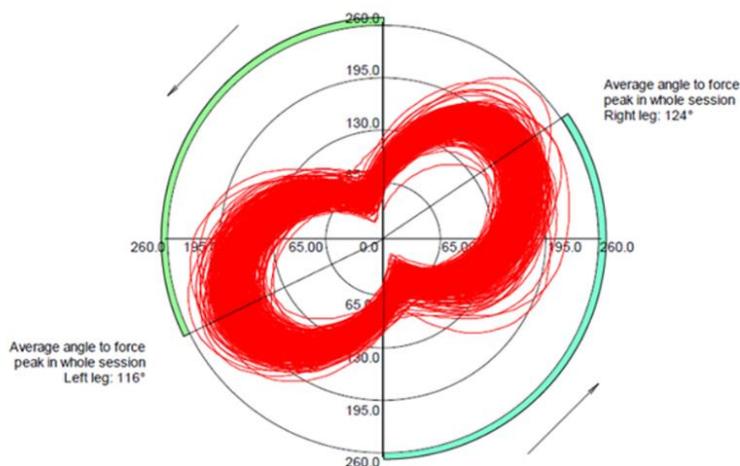




Efficient Technique – the grand old art of Pedalling in circles

On the surface, the action of pedalling a bicycle appears to be straightforward, simply push the pedals around and the bike goes forward. It is however, a little more complicated and the notion of “pushing” the pedals is where an inefficient pedal stroke begins. Most cyclists have a “mind image” that the legs kind of act like pistons, pushing the pedals down, thus generating force. The “up and down” action of pistons is rather counter-productive however when applied to bicycle pedals that MUST travel in a circle, given they are attached to a fixed axis (the cranks). This results in force being applied at all the wrong angles and is an extremely ineffective way to cycle. So much of the rider’s energy is wasted by applying a downward force to a pedal that is NOT moving down.



The diagram above shows force vectors forming a polar curve, with obvious weaker points in the pedal stroke (where the red shape comes closer to the centre). Top-level pro cyclists produce a shape that is close to oval. The picture on the right is how we may think we pedal but all have work to do in this regard.

Ideally the rider should be applying a more circular force to the pedals and one which mimics as closely as possible, the circular path created by the crank arm. Sounds easy, right? The truth is that NO cyclists produce a perfectly circular force when riding. Experienced and high level cyclists to however have force patterns that are much closer to circular, whilst most recreational cyclists, well, do not. A pedalling force pattern that is not even close to circular (truth is even the best show an "oval" force pattern) contains significant "dead spots" where there is no propulsive force being applied at all and worse still, sometimes even a counter-force.

Improving pedal stroke takes practice and patience as the instruction will usually include some drills and/or pedalling at quite low intensities for a few rides. The rewards however are well worth it because the better the pedalling technique the more of the rider's energy is used to move the bike forward. This means you go faster for the same energy cost or travel the same speeds with less energy.

Modern power meters (some but not all) will provide information about pedalling efficiency. These numbers; Torque Effectiveness (TE) and Pedalling Smoothness (PS) will show how efficient a rider is (higher numbers are better) and can also be used as immediate feedback (when displayed on a device) when the rider is on the bike. This feedback allows riders to, make adjustments, change position or modify action and see immediately whether things have improved.

Torque Effectiveness Left (%)	Torque Effectiveness Right (%)	Pedal Smoothness Left (%)	Pedal Smoothness Right (%)
72	81	21	26
80	87	23	28
64	71	18	23
81	87	23	27
70	79	20	25
79	87	22	28
72	75	20	23
80	88	22	28
69	80	19	25
79	87	22	28
73	82	20	26
75	83	21	27

Stages of the pedal stroke

1. The through stroke, is from around 10 o'clock to 2 o'clock
2. The down stroke, is from 2 o'clock to 5 o'clock
3. The drag, is from 5 o'clock to 7 o'clock
4. The up stroke, is from 7 o'clock to 10 o'clock

Some General Rules for Improving Efficiency

- It often helps to try to de-emphasise the down stroke and focus more on the through, drag and up strokes
- Coaches also suggest the notion of "lifting the knees" in the up stroke, which tends to ensure that the down stroke force does not begin too early (a common fault)
- Focus on a pedalling image that feels "ovalized" horizontally. This means really concentrating on the through stroke and the drag (or the forwards / backwards parts) rather than the down and up strokes.
- Try to get a sense that the feet are making BIG circles. This image is kind of like sensing that the feet are making bigger circles than the cranks allow. This tends to create a delay in the downstroke force and is often referred to a "patient" pedal stroke.

Improving the pedal stroke usually comes down to de-emphasising the downstroke and allowing each component of force to contribute as fully as possible. Keeping the ankle supple can also help, the French call this "pedaller avec souplesse" or pedalling with suppleness.

Improving technique is one way to improve your riding without having to build any fitness, do both of course and the benefits will be significant.