Why Tour de France champs dance with their bikes

*Study shows side-to-side sway can boost performance*

On July 9, as Mark Cavendish, a.k.a. the Manx Missile, approached the final straightaway on Stage 13 of the Tour de France, the British cyclist rose out of his saddle, pushed through a gap in the pack and began to vigorously rock his bike from side to side, tying the record for the most stages ever won (34).

The graceful rocking motion, known as en danseuse (to dance on the pedals) in French, is a common one among both elite cyclists and weekend warriors attacking hills or sprinting toward a finish.

But whether it actually boosts performance, or could even hinder it, has been a matter of some debate.

A new CU Boulder study published online this month in the [Journal of Biomechanics](https://www.sciencedirect.com/science/article/pii/S0021929021003730?dgcid=coauthor#b0045) aims to set the record straight.

“We found that, on average, maximal power output was 5% higher when our subjects leaned the bike as they pleased, compared to when trying to minimize lean,” said lead author Ross Wilkinson, a postdoctoral researcher in the Department of Integrative Physiology.

While 5% may not seem like much, increased power can mean increased speed, making the difference between first and second place at photo finishes where victors win by the width of a tire.

“In a race like the Tour, riders will spend the vast majority of their time seated. But in the last few hundred meters of a stage, standing up and rocking the bike can give you that little bit of extra power,” said senior author Rodger Kram, professor emeritus of integrative physiology and director of the Locomotion Laboratory. “It’s a small but critical piece of bike racing.”

Wilkinson dreamed up the study while watching a previous Tour de France back home in Australia. He noticed that some cyclists, like Cavendish, attacked hills and sprint finishes with the bike swinging at sharp angles. Others, like Australian cyclist Caleb Ewan, seemed to deliberately minimize lean when sprinting out of the saddle.

Which is best? Both research and coaching advice has been mixed.

Some argued that rocking the bike wasted energy and deformed tires, increasing resistance and impairing performance. “Cyclists should decrease bicycle sways,” one 2018 study proclaimed.

But many coaches recommend it and cyclists often say it just comes naturally.

For the study, Kram and Wilkinson rigged up a stationary bike in the lab so it could lean from side to side or be locked in place and brought 19 recreational cyclists in for a series of nine 5-second, all-out sprints: For three, they could lean the bike as much as they pleased; for three the bike was locked in and couldn’t lean at all; for three they were asked to minimize lean.

When they measured maximum power output, they found it did not differ between the locked in position (which, realistically, couldn’t be achieved on a bike moving overground outside) and the sway-as-you-like option.

But when cyclists deliberately tried to prevent sway, their power decreased by an average of 5%.

“Swaying the bike doesn’t necessarily enhance the power you are capable of producing,” says Kram. “It just allows you to achieve the same peak power over ground as you could locked in during a spinning class.”

Meanwhile, fighting the sway – as cyclists are often forced to do in a packed finish at a race — slows you down, the study suggests.

The researchers suspect that swaying allows the upper body to contribute more power, with skilled riders transferring it from their arms through to the pedal as they ‘dance.’ They also suspect that elites like those in the Tour get an even bigger boost than the 5% experienced by mere mortals in the lab.

Aside from giving fans one more thing to watch for in the final days of the tour, as Cavendish seeks to break the record for most stages ever won, they say the research could provide insight to bike designers (should high-end bikes be made with this benefit of rocking in mind?)

For recreational cyclists who train on stationary bikes indoors in the winter, they recommend practicing en danseuse if the bike allows you to rock it at an angle.

And when tackling hills or closing in on a finish: Don’t fight the bike. Dance away.

“It feels very rhythmic, like your arms and legs and the bike are all in sync,” said Wilkinson. “When people like Mark Cavendish get it right, it’s really beautiful to watch.”