

# Drafting: The Great Equalizer

People who don't follow cycling closely are surprised that the Tour de France winner is often determined by minutes or perhaps even seconds after racing three weeks, covering more than 2000 miles and more than 80 hours. Is it really that these riders are that closely matched? Not exactly. While they are all very elite athletes and very fit, there are more differences in ability than is shown in their overall time. Much of the difference in ability is masked by drafting that takes place in cycling. In cycling, air resistance causes the most resistance a cyclist must overcome, except when riding up hills, where gravity takes over. As cyclists are traveling along at 23 mph, they are generating a 23 mph headwind. When a cyclist rides directly behind another, the wind resistance is about 30% less than that faced by the rider in front. This is why you almost always see cyclists riding together in packs and rarely see them riding alone. It is very difficult to ride alone in a bike race and hold off a pack of riders, who can share the work shielding the wind for each other. A solo rider must be very strong to finish alone out front. This explains why races often finish in pack finishes. It also explains why races, including the Tour de France, finish with the top places separated only by a few seconds.

So drafting is critical in cycling and really defines it and gives it its unique characteristics. Compare it to running races. In running, drafting is much less of a factor. Running behind another runner really is more about pacing. But eventually in a running race, one runner will pull ahead and win alone. How often do you see a sprint finish in a marathon? Just imagine if there was a 'Tour de France' for marathoners – three weeks of a marathon a day. The ultimate winner, if anyone survived, would win by hours most likely, because there wouldn't be bunch finishes most days. The winner would pull ahead and gain several minutes a day, because there isn't drafting. So you can see how drafting makes the sport of cycling very different.

Let's take a closer look at the impact of drafting on the Tour de France. The winner of the Tour each year is determined by a 3-5 key stages; those with mountaintop finishes and time trials. Large gaps do occur on flat stages but the pack only allows non-contenders to get away and stay away. The pack will never let an overall contender go out front very far on a flat stage. The pack uses its drafting power to reel in riders out front that are threats to overall victory. However, in the mountains gravity becomes the number one force to overcome, not the wind. The power of the pack loses its punch when the road tilts up and the pack loses its ability to reel in riders at will. Instead, those who are good at climbing have the advantage which is why in mountain-top finishes, the leading riders usually come across single file or in small groups. Drafting uphill is not a factor because of the slower speed while power-to-weight ratio becomes the determinant of the winner. Drafting is also why you are more likely to see a bunch finish in a mountainous stage when there is a downhill finish. Riders regroup after the top of the last climb and again rely on drafting to outpace individual riders on the downhill section. This is why uphill mountain finishes usually go a long way towards determining the overall winner of the Tour, but mountain stages with a downhill finish typically do not contribute to the overall

victor. If a rider gains a minute over rivals on a mountaintop finish, that is a minute that is impossible to overcome on flat stages.

The other critical stages of the Tour are the time trials. In time trials, the riders go off one at a time and race against the clock. They are not allowed to draft. So the true abilities of the riders comes through. There is no hiding in the pack in a time trial. This is why these races are called 'the race of truth'. In time trials, even fairly short ones, you will see fairly large time differences even among the leaders. These stages are more representative of the riders' true ability and again demonstrate the neutralizing effect of drafting.

So if you look at this year's Tour, or Tours from past years, you will see the time advantage the ultimate victor gains comes from a couple of mountaintop finishes and the time trials. As a matter of fact, last year Sastre gained his winning advantage in one powerful attack on a mountaintop finish and held on to it in the time trial. Miguel Indurain gained his advantage in time trials and maintained in the mountains. In this year's tour, current leader Alberto Contador has gained his 1:30 advantage on the two mountaintop finishes and opening time trial. This is why everyone is anticipating the Mt Ventoux stage on the next to last stage of this year's Tour. It's the last chance to gain time on rivals.

I'm not saying that the other stages aren't important in determining the overall victor, they just don't contribute a lot to the overall time advantages. Racing for three weeks takes its toll on the riders and only the fittest have the strength to gain time on these key stages. There are always mountains and a fairly long time trial in the final week. If you are tired after two weeks of racing, you won't win the Tour.

By the way, the final stage of the Tour de France finishes on the Champs Elysees in Paris. It is often referred to as a 'ceremonial' stage, meaning that the overall standings are usually not contested on the final day. This is due partly to tradition (you don't attack the yellow jersey on the final day), but again is really due to the fact that this is a very flat stage and the power of the pack through drafting is very difficult to break away from. Winning the sprint on the Champs Elysees is a big honor and teams work hard to keep the riders together to force a pack sprint at the end. If a break does get away on the final stage, it is usually a fairly large group of 10 or so riders who have a good drafting advantage which can hold off the charging pack.

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