



2013 (6th) Edition

Strategy & Tactics for Cyclists

AB
Arnie Baker
C·Y·C·L·I·N·G

Arnie Baker, MD

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“There are three kinds of riders at the end of a race.
Those who say: ‘What happened?’
Those who let it happen.
And those who make it happen.”

—John M. Richardson, Jr., professor and Tommy Lasorda,
former manager for the Los Angeles Dodgers, paraphrased.

*“I don’t understand this sport. Why is the 200-meter sprint
1,000 meters long? What’s the other 800 meters for? And
why can’t someone in the Tour de France make up five
seconds in a stage that is ninety-seven miles long?”*

—John Scherwa, sportswriter, quoted by Bill Strickland in
The Quotable Cyclist.

**“Use jungle skills:
Watch your back.
Build loyalty.
Keep quiet until you are ready to move.”**

—Retired Army General Hugh Shelton, quoted by Susan Stamberg,
National Public Radio interview, October 14, 2003.

Also by Arnie Baker, MD

- [Altitude-Climbing-Endurance \(ACE\) Training for Cyclists](#)
- [Bicycling Medicine—Cycling Nutrition, Physiology and Injury Prevention and Treatment](#)
- [Bike Fit](#)
- [High-Intensity Training \(HIT\) for Cyclists](#)
- [Nutrition for Sports](#)
- [Psyching Psychology—Mind Training for Cyclists](#)
- [Skills Training for Cyclists](#)
- [Smart Cycling—Successful Training & Racing](#)
- [Smart Coaching](#)
- [The Essential Cyclist \(out of print\)](#)
- [USCF: Essentials of Bicycle Training & Racing \(out of print\)](#)

Coach and Author

Arnie Baker, MD

Dr. Arnie Baker has been coaching since 1987. A professional, licensed Level 1 USCF coach, he has coached racers to several Olympic Games, more than 120 U.S. National Championships, and 30 U.S. records. He is the National Cycling Coach for Team in Training. This endurance-training program of more than 800 coaches and 30,000 participants raises more than \$80,000,000 each year for the Leukemia & Lymphoma Society.



Arnie has a Category 1 USCF racing license. He has held eight U.S. 40-K time trial records, has won six national championships, and has won more than 200 races. An all-round racer, he was the first to medal in every championship event in his district in a single year.

Dr. Baker is a licensed physician in San Diego, California. He obtained his M.D. as well as a master's degree in surgery from McGill University, Montreal. He is a board-certified family practitioner. Before retiring to ride, coach, and write, he devoted approximately half of his medical practice to bicyclists. He has served on the fitness board of *Bicycling* magazine as a bicycling-physician consultant. He has been a medical consultant to *USA Cycling* and the *International Olympic Committee*.

Arnie has authored or co-authored 16 books and more than 1,000 articles on bicycling and bicycling-related subjects.

Table of Contents

Cover, Front Material	1	Be Aggressive, Not Passive	66	<i>Part 5 Primes & Finishes</i>	126
Foreword.....	8	Anticipate, Don't React	69	Prime Hunting.....	126
Racing Recipe	9	Miscellaneous Style.....	70	Sprinting—Overview	128
Goals, Strategy, Tactics, Moves, and Skills	10	<i>Part 3 Specific Tactics</i>	72	Plan to Win a Sprint	133
<i>Part 1 Energy</i>	14	The “Matchbook” Analogy.....	72	Train to Sprint.....	134
Energy: The Currency of Racing	14	Pre-Race Questions.....	72	Leadouts	138
Work for a Reason	16	During-The-Race Questions	73	Endgame: One-on-One	140
Drafting	19	Attacking: Introduction	75	Endgame: Two-on-One	141
Pacelines	22	Wind, Corner & Climb Attacks.....	84	<i>Part 6 Event-Specific Tactics</i>	143
Echelons	23	Countering Attacks.....	89	Race Selection.....	143
Wheelsucking.....	26	Blocking.....	91	Road Race & Criterium	147
Warm-Up	30	Gapping	96	Time Trial (Solo)	147
Pacing	31	Breakaways	101	Team Time Trial	150
Keep Momentum	43	Working a Breakaway.....	104	Stage Race	152
Arrive at Obstacles Near the Front...	44	Tracking Breakaways	112	Final Words.....	161
Event Energy Conservation	45	Chasing a Breakaway.....	113	Glossary	162
Make Rivals Use Energy.....	50	Criterium Solo Breakaway	114	<i>ABC Publications</i>	170
Isolation	51	<i>Part 4 Teamwork</i>	117		
Equipment	52	Teamwork Theory	117		
<i>Part 2 Psychology & Style</i>	56	Managing Your Team	119		
Body Language	56	Basic Race Teamwork.....	121		
Mind Games.....	62	Advanced Teamwork.....	123		
		Teamwork Without Teammates.....	124		
		Non-Team Alliances	125		

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Feedback Please

Arnie Baker Cycling is not a large company. Apart from Gero, my partner, who helps out when she can, I, Arnie, am the sole employee of all the ABC departments: the coach, the author, and the webmaster. If you notice that there is anything missing that you would like added, typos, other errors, or if you just want to say hello, send me an e-mail: arnie@arniebakercycling.com. Thank you.

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Foreword

The strongest does not always win.

Just like it is not automatic that the person with the highest salary ends up with the most money. It is how you use your abilities. How and when you conserve your energy. How and when you spend your reserves.

Strategy and tactics are about doing more with less as well as doing more with more. Allowing what you have to show through. Not being frustrated. Getting the results, or better results, than your fitness alone deserves.

This book is not only for racers: Spectators will learn to better appreciate the sport.

Although the principles discussed in this book apply to all forms of bicycle racing, the emphasis and examples deal mostly with road racing.

This book will help you learn about strategy and tactics more quickly than you can acquire this knowledge through racing. Nevertheless, there is no substitute for race experience.

Whether you have the opportunity to race frequently or not, you can learn by watching races. Watch professional races on TV or buy racing videos. If you have a local velodrome, go and watch. In just one evening, you can generally observe more than a dozen short races.

Take time to consider strategy and tactics before and after races. What did you learn?

Read this book. Watch races. Read this book again. Watch more races. It will all become a lot clearer.

Review the material in this book periodically. Although some of the information will make sense immediately, after gaining race experience, you will find you have missed many points that are now helpful to you in upcoming races.

The book is divided into six parts.

- Part 1 deals with the concept of energy: Saving your own energy and using up the energy of rivals. How well you do has to do with how much energy you have and need relative to your rivals.
- Part 2 discusses racing psychology and style. How to read the energy levels of your rivals, how riders bluff (misrepresent their energy levels), and how to benefit from this information.
- Part 3 is all about the important specific tactics of attacking and blocking, the building blocks of most race strategies. Part 3 also provides detailed information about establishing and working in breakaways.
- Part 4 elaborates on how teams function well, both theoretically and tactically in races.
- Part 5 is about tactics and strategies for intermediate sprints (primes) and finishes.
- Part 6 deals with the special tactics of time trialing and stage races.

Throughout this book, references are made to additional published sources of information. For example, read about cycling fitness and interval training in the *ABC (Arnie Baker Cycling)* book *HIT (High-Intensity Training) for Cyclists*.

ABC handouts, books, and slide shows referred to in this book are available where you purchased this electronic book or at <http://arniebakercycling.com>.

Context

Racing Recipe

Many riders simplistically think that all you need is to be strong. There is a lot more to it. The following information places the strategic and tactical elements in perspective.

The major elements of successful riding and racing can be dissected. Consider each ingredient. Train each one—the right amount at the right time. Put the ingredients together. You will go a long way toward optimizing your potential.

In addition to strategy and tactics, including pacing and energy conservation, some of these elements are:

- Fitness, including
 - Aerobic fitness
 - Muscle-strength fitness
 - Endurance fitness
 - Metabolic fitness
 - Anaerobic fitness
 - Power
 - Neuromuscular (leg-speed) fitness
 - Neurohormonal fitness
- Nutrition, including
 - Diet
 - Body composition
 - Ergogenics
- Equipment
 - Bicycle fit
 - Bicycle geometry, aerodynamics, weight, and other specifications
 - Bicycle maintenance

- Skills
 - Bike handling, including proximity, descending, and cornering
- Mental attitude, goal setting, and sport psychology
- Physical health
- Rest-recovery-sleep

Strategy & Tactics for Cyclists is about achieving results on event day with the fitness you already have. Other *ABC (Arnie Baker Cycling)* publications provide more information about other elements of successful riding and racing:

- Fitness is discussed in *High-Intensity Training for Cyclists*.
- Diet, body composition, and ergogenics are discussed in *Nutrition for Cyclists*.
- Equipment, in terms of aerodynamics and weight, is discussed on page 52. Equipment, in terms of bicycle positioning, is discussed in *Bike Fit*.
- Bike handling and other skills are discussed in *Skills Training for Cyclists*.
- Mental attitude, goal setting, sport psychology, and goal setting are discussed in *Psychling Psychology*.
- Physical health issues are discussed in *Bicycling Medicine*.
- Rest, recovery, sleep, and overtraining are discussed in *Smart Cycling, High-Intensity Training for Cyclists, Bicycling Medicine*.

Introduction

Goals, Strategy, Tactics, Moves, and Skills

GOAL: A desired state of affairs, vision, or objective.

STRATEGY: A plan or method for achieving a goal.

TACTIC; TACTICS. Action taken to further an overall strategy; the building blocks of strategy; the maneuvers.

Within the context of your overall long-term cycling goals, short-term goals may include specific events or races.

A strategy is a plan or method for achieving a goal. Tactics are actions taken to further a strategy. Tactics are the building blocks of strategy, the maneuvers.

Those goals lead to strategies, which can be broken down to tactics.

Carrying out those tactics involve moves or skills.

Overview

Consider the overall strategy and tactics of Freddie Rodriguez for an upcoming US Professional Championships, an event he has won three times, more than any other racer:¹

“I follow a plan... I have to play my card, and that's it.

If another card comes out, and I pull out my ace, then I could lose the whole event, so I have to play the ace when... I'm supposed to play it, and hope all the other guys play their cards first.

There's a lot of strategy, and the race could be lost in just a moment like that, so it's a gamble.

There's certain risk involved in the way I race the event, but on the other hand, it's the only way I can assure myself the possibility of winning, more than playing for just a result.

It's a race of attrition. I let the attrition take place, and then I play my cards at the end.

The day that doesn't happen is the day I'll lose. It might happen this time - an early breakaway, or an attack that I don't cover, but if I cover all those moves?

I have one game plan... I stick to it.”

Assume Success

Goal setting and planning help.

Game theory often holds that if it will take a specific set of circumstances to achieve your goals, assume those circumstances will take place.

If you need to make an attack, cover a breakaway, have teammates control the tempo, or be first to that corner—visualizing those circumstances and assuming they will take place, helps.

That is not to say you are rigid to changing conditions, adopt false confidence, or are overly disappointed if events do not play out.

“If you need to find a specific lie of the cards to make or defeat a contract, play as if that is indeed the position.”

Goren Bridge by Omar Sharif and Tannah Hirsch

Read more about motivation, confidence, and other sport psychology topics in the *ABC* book *Psychling Psychology*.

¹ Daily Peloton. Jaime Nichols interview, June 6, 2004.
<http://www.dailypeloton.com/displayarticle.asp?pk=6350>. Accessed 12/24/2005.

Goals

For each event, your goals for that event may be individual or team related.

Events may be single or multi-day.

The initial goal of most beginning racers is survival: participation, not crashing, and finishing all or part of an event.

Long-time professionals may be event beginners entering what is for them a new event, for example, an Olympics, World Cup, or major Tour. Process familiarization is often a short-term goal, part of a long-term plan. A new relatively young pro may enter her first Olympics for the experience, planning to medal 4 years later.

Many riders enter events to hone fitness or skills, in preparation for more important events later in the season. Fitness building may be for endurance, aerobic, or anaerobic fitness. Examples of skills building include proximity and cornering for criteriums; descending for mountainous road races; and dirt, root, or mud riding for cross-country mountain bikers.

Finally, the traditional result-based goals: Winning prizes and capturing medals, for self or teammates.

Strategies

Using energy wisely—conserving, pacing, and wasting rivals' energy—should be a key strategy for almost every rider in every race.

Plans for achieving event goals may be simple or complex.

If the goal is survival, the only strategies may be to use energy-saving tactics to finish.

If the goal is winning, the strategy may be to establish an early breakaway, force a chase and selection of riders to reduce the field, and then a small group sprint.

In a team event, one domestique's strategy may be to ride tempo early to discourage early breakaways, set up a teammate in a breakaway halfway through the race who will go on to help the team leader, when on the last climb, there are only a few riders left, and proffer a leadout.

Tactics

ATTACK: An aggressive high-speed jump away from other riders. A sudden acceleration to move ahead of another rider or group of riders.

BLOCK: Physically or psychologically impede or slow down an individual or group of riders. Most commonly, when a teammate is in a breakaway.

GAPPING: Letting some space open up between you and the rider in front of you.

DRAFT, DRAFTING: Riding behind one or more riders; saving energy in the slipstream. Drafting is illegal in individual time trials.

LEADOUT: A rider, often a teammate, provides the benefit of a draft to better position another rider, generally before a sprint.

The basic tactics are attacking and blocking. Gapping is an important type of blocking. Drafting, in its many forms (large group, small group, paceline, echelon, marking a rider, and leadout) is a key tactic in mass-start races.

Moves

Carrying out a tactic may require a move, or series of moves.

For example:

- Attacking requires an acceleration, perhaps by shifting to an easier gear and placing ones hands in the drops
- Blocking may require sitting in the front of the pack
- Gapping may require easing off the pedals, not matching an acceleration, or pulling off wide in a corner
- Drafting requires getting on a wheel
- Leading out a teammate may require finding that teammate and getting ahead of him

Skills

Skills may be determinant in many events. For example:

- Proximity skills (riding close to others) are required for track events and criteriums.
- Cornering skills are required for criteriums.
- Descending skills are required for many road races.
- Balance and technical skills are required for almost all mountain bike events.

Putting it Together

Here are a few possible goals-strategies-tactics-moves-skills situations:

Goals	Strategies	Tactics	Moves	Skills
Individual				
Survive Finish 5 laps Finish	Energy conservation	Draft Arrive at obstacles near front	Get on wheels Move up in anticipation of obstacles	Draft Proximity
Fitness, aerobic	Fit rider: Time trial off front Less-fit rider: Enter race	Attack in lull after prime Survive	Jump and TT	Draft Shift and accelerate Ride low
Prizes/points	Go for primes	Mark riders Follow teammates Attack early	Get on wheels Jump	Draft Proximity Shift and accelerate
Win or place	Breakaway Field sprint	Attack Mark riders	Jump and work breakaway	Shift, accelerate, TT Proximity
Team				
Domestique	Shelter leader Tempo ride Defend attacks Leadout Feed leader Mechanical support Breakaway early for later role	Mark rivals	Wheelsuck	Draft

Table 1. Examples of goals, strategies, tactics, moves, and skills.

This book focuses on two columns of Table 1: Strategy and tactics.

Race selection is discussed in detail on page 143.

Goals setting for more than one race is discussed in detail in *Psychling Psychology*.

Moves and skills, including bike handling, are discussed in *Skills Training for Cyclists*.

Summary

Strategy and tactics, along with fitness, nutrition, equipment, physical and psychological health determines race-day success.

Goals lead to plans (strategies), and actions (tactics and moves) to achieve those plans.

At first, this process is conscious, and sometimes overwhelming. With practice, it becomes more automatic and reflexive, giving thoughtful and experienced racers an advantage.

Part 1

Energy

“Cycling is such a long endurance sport in terms of hours but it’s also such a tactical sport that there are times when you could be just strolling along. But it can also be very intense, like a 3,000-meter run.”

—Greg LeMond, three-time Tour de France winner (1986, 1989-90), two-time world champion (1983, 1989).

Energy: The Currency of Racing

Racers want to race, and beginning racers are often eager to go hard from the gun.

However, that is not necessarily the best strategy, and generally is a hard way to win a bike race.

You start out a race with a certain level of fitness. Other riders have their levels of fitness. You can do more with less if you are thrifty, and spend your fitness wisely. You can also do more with less if you can induce your rivals to waste their fitness. Moreover, if you have more to start with and play it smart—you are unstoppable.

Consider this analogy². Every rider that rolls up to the start line has a “little pocket of change” to use as spending money during the race. Based on ability, preparation, and training a thrifty rider’s “little pocket of change” holds \$4.00. The strongest (wealthiest) rider has 25 percent more, \$5.00.

Neither rider has teammates. An hour criterium has just started and the thrifty \$4.00 rider maintains a position in the top quarter of the field. The \$5.00 rider immediately goes to the front, trading pulls and making jumps.

The thrifty \$4.00 rider is spending the equivalent of 3 cents a minute. The stronger profligate \$5.00 rider is spending 5 cents a minute when pulling and 10 cents a minute when attacking. After about 40 minutes, the thrifty rider has \$2.80 left. The initially stronger, but more profligate rider now has \$2.20 left.

Now a prime is called and a big acceleration occurs as riders ante up 20 cents in a dash for the line.

After the prime, a split occurs and it has the potential to be a strong breakaway.

² Adapted from Team X Strategy by Steve Rouff and Jim Whittaker.

Now the thrifty rider has more money left and has a better chance of getting into the breakaway, sticking with it, and winning.

A racer on a well-organized team? Well, it is like having several like-minded investors pooling their money together for a purchase.

Don't Just Slug Away

Home run hitters get noticed, and bring fans to the ballpark. However, the top sluggers are rare, expensive, and do not necessarily win games that often.

Billy Beane's small-budget baseball success as general manager with the Oakland A's³ was principally due to the realization that winning ball games came not from slugging at the ball, but by getting on base. Moreover, getting on base had to do with patience: tiring out pitchers, swinging at good pitches, not slugging away at poor pitches, and getting a fair share of walks.

Further, Billy's success came principally in the second half of each season. The first halves of most of the A's seasons were modest. It was during the second half of the season that they played like a new team—because they often were a new team. As the mid-season trade deadlines loomed, other teams would allow Billy to acquire players for modest amounts of money.

Similarly, although there are some exceptionally strong riders who can slug/attack from the gun and win, most success in bicycle racing requires patience and thoughtfulness: waiting for riders to tire, swinging at moves likely to work, not slugging away at poor pitches, and letting others give you an occasional free ride.

Moreover, as long as you can stay in contention in the first half of the bicycle race, the first half does not matter much—it is the second half of the bike race that is decisive.

You do not win the race in the first half of a race, although you may lose it; you win it in the second half.

Riders often tell me they were every break except the one that ultimately mattered. Play the odds. The early breaks without the strong riders or the strong teams do not matter.

Racing is not about machismo; it is about winning the race.

³ Moneyball—The Art of Winning an Unfair Game, Michael Lewis, Norton, 2003.

Work for a Reason

Many athletes train and race, working hard, without considering when and why they are working. It is not necessary to train hard all the time, indeed it is counterproductive. Recovery is an important part of training.

Similarly, it is not necessary to race hard all the time—it is also often counterproductive. Pacing and tactics generally play a crucial role in racing success.

A breakaway group makes an escape and gains 30 seconds on the pack. Should you chase to catch up? Beginning racers often do, towing everyone in the rest of the field back up to the breakaway. Unless you have a good reason for chasing, this is usually a mistake, and you should not. Bridge maybe; chase rarely⁴.

Here are some reasons to work:

1. Before racing: Test equipment or bicycle position
2. For training
3. To keep up
4. Warm-up for later efforts
5. To win, place, or gain a time bonus at the finish of a race, or intermediate point, e.g. prime
6. Break away or create strategic gap
7. Bridge to a break
8. To contribute to a break
9. Chase down a break
10. Test others
11. Force others to work, weakening them
12. Reduce the number of opponents; split the field
13. Capitalize on the weaknesses of others
14. Gain a time or positional advantage before an obstacle, such as a climb, intermediate point, or finish.
15. When you have the element of surprise, with the right timing
16. When you can carry it through
17. Misdirection; to establish a pattern of behavior that you will later break.
18. To bluff; to appear stronger than you are
19. When there is no other choice to preserve your chances
20. When there is no other option
21. When you are just about done, for one last hurrah
22. When there is TV coverage
23. Help teammates
 - Chase down a break
 - Prevent attacks
 - Get teammate to an obstacle (hill, crosswind section) protected or relatively fresh compared with rivals
 - Prevent a teammate's rivals from winning, placing, or gaining a time bonus at the finish of a race or intermediate point
24. For the sheer joy

Before Racing: Test Equipment or Bicycle Position

Riders need to work hard to test equipment or bicycle position.

Riders frequently unpack their gear just before a race and test equipment during warm-up. Occasional racers commonly use their race wheels for the first time in several weeks only minutes before a race.

⁴ Bridge, Bridge a gap: To join a rider or group of riders ahead. Bridging usually implies a tactical effort in which only a rider or small group reaches the group ahead. If the whole pack rejoins it is not a bridge; it is a chase or the group ahead was merely caught.

Testing during race warm-up is better than during the race, but is a little late. Better to use race equipment occasionally during training and test the day before racing.

A new chain may skip on worn cogs, but only under heavy pressure. After testing a new chain at low power outputs, test the chain cogs at controlled, progressively higher outputs before using a new combination in a race.

Bicycle position may seem right at low power outputs, but at high power, position changes. For example, riders commonly move forward on their saddles as effort increases toward time-trial power output. Without hard riding, what initially may seem to be a satisfactory seat height in casual riding may prove to be too low in competition.

Again, hard-work testing during training is best.

Training

As stated above, it is not necessary to train hard all the time, indeed it is counterproductive.

Riders without the time to train properly for a given race, or with broader goals, may enter a race without any plans for finishing well.

They may race to increase fitness either by entering harder races than they are ready for, working harder than they otherwise tactically should, or as part of block training⁵.

At the finish line, riders who enter races with the expectation of not doing well need to remember why they entered the race when they do not do well.

⁵ Block training: Consecutive days of interval work or stage racing. Incomplete recovery between sessions may raise overall fitness as long as commensurate recovery is postponed, not omitted.

Keep Up

Most riders ride defensively, using energy when it is necessary to keep up, chase down others, or during the final sprint.

Attack

Proactive riders use energy at opportune times—when it improves their chances for success by reducing the field size or otherwise weakens their opponents. Opportune times generally are when there is an element of surprise, when others are weak or otherwise vulnerable, and when the energy reserves of the rider are sufficient for the time remaining in the race.

Misdirection

By consciously establishing a pattern of working with a race, or series of races, you may fool your rivals into expecting the same behavior again—only to change it.

Bluffing

Riders may try to appear stronger than they really are in order to avoid being attacked. For a fully discussion of bluffing tactics, see page 61.

Limited Options

Riders may also use energy when there are no viable options for success.

For example:

A good, but not great climber might try an early breakaway in order to get over a climb before or with the best climbers in a race.

A good time trialist may try to solo away early knowing that otherwise the sprinters or climbers will win.

A weak sprinter may attack a three-person breakaway early if that is the only way in which victory is possible.

Limelight

Some professional riders commonly ride for personal and sponsor exposure when television cameras are present.

Exhausted riders sometimes make a last-ditch effort for exposure, one last hurrah, before sitting up, their race over.

Teamwork

Teammates often work hard to protect their team leader, whether it is to set up a breakaway, toughen a climb, leadout a sprint, or protect him in a stage race.

Hard steady riding discourages other teams from attacking; near the end of a race, hard team riding also helps to lead out the team sprinter.

Pull

Leading the peloton in a non-team situation is rarely a useful tactic. Pulling to toughen the race, making it harder for everyone, is discussed on page 50.

Drafting

Drafting is the elemental component of energy conservation.

Factors to be considered in the benefit of drafting include:

- Number of riders
- Gap between riders
- Size and position of riders
- Wind, including headwinds, tailwinds, and crosswinds
- Speed of the group
- Steadiness of the person being drafted

The bigger the group, the closer the rider drafts, the greater the surface area of the person being drafted, and the greater the speed, the more the benefit from drafting.

The effect of group size and gap distance is detailed below.

Crosswinds affect drafting tactics; knowledge of echelons is important.

Big riders (those with more surface area) provide a better draft than smaller riders do. A wider rider generally provides a better draft than a tall, thin rider does.

In a group that will likely stay together, energy is conserved riding behind a steady rider rather than a rider who accelerates and decelerates within the paceline.

Number of Riders

Here is one estimate of how power is saved, dependent upon speed, drafting a single rider at 3 feet:

- 6 mph 2%
- 12 mph 7%
- 18 mph 18%

- 25 mph 25%
- 30 mph 28%

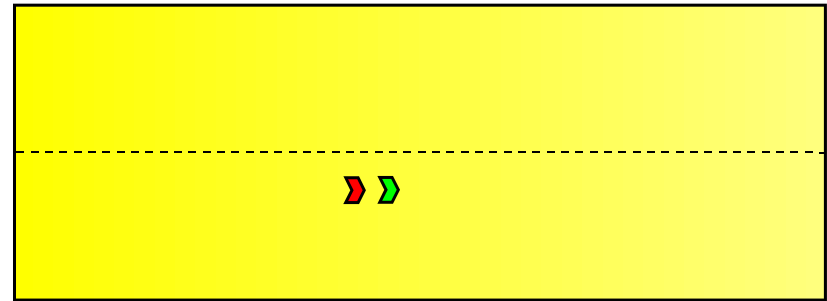


Figure 1. Drafting a single rider. Moving from left to right, RED drafts GREEN.

Drafting two or three riders at 25 mph at 3 feet saves about 30% energy.

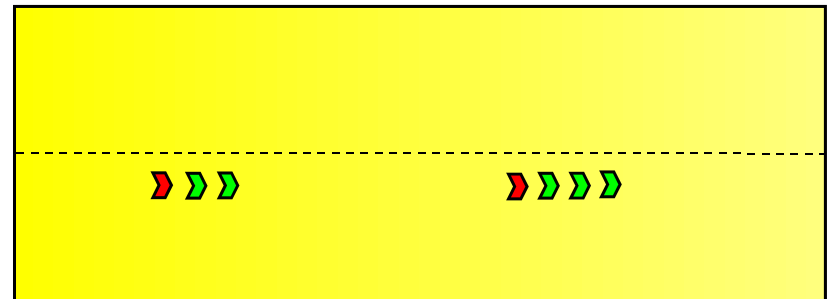


Figure 2. Drafting two or three riders. Moving from left to right, RED drafts GREENS.

Drafting within a small group at 25 mph at 3 feet saves about 40% energy.

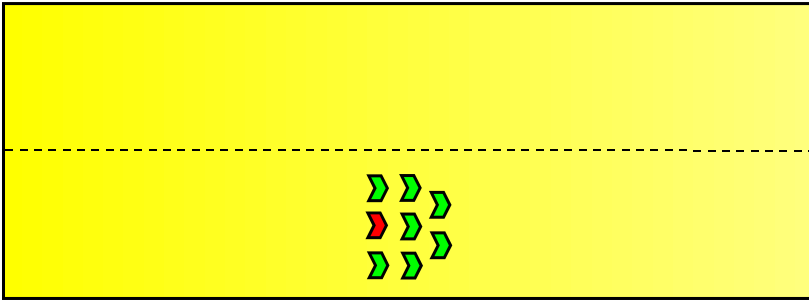


Figure 3. Drafting with a small group of riders. Moving from left to right, RED drafts GREENS.

Gap Distance

The closer the drafter follows the rider in front of him, the more energy is saved.

Here is one estimate of how power is saved, dependent upon gap distance, drafting a single rider at 25 mph:

- 6 inches 35%
- 12 inches 30%
- 18 inches 30%
- 3 feet 25%
- 4.5 feet 22%
- 6 feet 20%

Drafting Technique

Although a smaller gap provides more energy conservation, drafting so closely that you are uncomfortable wastes mental energy.

Just as tailgating in a motor vehicle may require sudden braking, drafting too closely increases the need for braking, which causes a yo-yo effect, wastes energy, and increases the risk of crashing.

Riding slightly to one side, rather than directly behind a rider, allows you to see hazards ahead and gives you an out if the rider ahead of you slows.

Learning to follow another rider closely and safely requires practice. For more information about this skill, see the *ABC* book *Skills Training for Cyclists*.

Overall Benefit

Domestique (team worker) riders commonly use twice as much energy, put out twice as much power, as their protected teammates in stage races.

When the crunch comes, riders who have saved energy have the crucial reserves for attacks, climbs, or sprints.

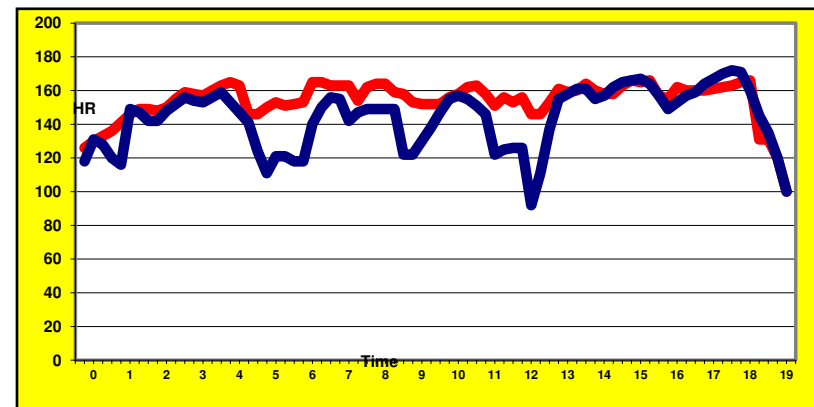


Figure 4. Drafting benefit. Less work, lower heart rate. BLACK, drafting, saves energy on flatter course sections.

Figure 4 shows the superimposed heart rate recordings of two riders over a 10-mile rolling road ride. Both riders have about the same max heart rates. The RED rider is a fitter and faster rider.

The RED rider is assigned to ride at 80% of max heart rate. The BLACK rider drafts.

The BLACK rider works at a lower percentage of his maximum except for last long-climbing section. He struggles, but is able to keep up on that final climbing section. Without the benefit of the draft, BLACK would probably be dropped by RED. IF the overall pace had been higher before the final climb, BLACK probably would have been dropped.

Pacelines

Drafting safely and efficiently behind other riders increases riding speed and pleasure. Your speed may pick up 5 to 10 mph.

A rotating paceline is a group of riders in a line, alternating turns pulling at the front and sitting in.

Drafting Is Efficient

Riding behind another rider takes less energy than “breaking the wind.” At 25 mph, about 20% less energy is required riding behind another rider when compared to riding on one’s own.

Learn the Right Techniques

Certain principles of riding in a group allow not only for increased efficiency of travel, but also for increased safety. Learn how to ride with a group of riders at moderate speed. You will be able to better anticipate what happens when riding in fast packs. For more information, read the *ABC* handout *Riding Etiquette, Groups*.

Pacelines

Follow the five riders riding across the page in the figures below:



Figure 5. Drafting riders start a paceline.



Figure 6. Rider A, finishing a turn at the front, swings to the left, slows down, and rider B takes the lead. Rider A drops in behind rider E.

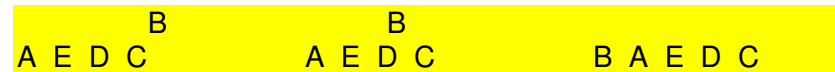


Figure 7. Shortly thereafter rider B does the same thing. And so on.

Advanced Paceline Techniques and Tactics

For more information about paceline techniques and tactics read about team time trialing on page 150 and breakaway tactics on page 104.

Read about pacelines in crosswinds (echelons) next.

Echelons

Echelons may form when there is a crosswind.

An echelon is a group of staggered riders drafting in a crosswind.

Drafting is now no longer best directly behind another rider, but staggered to the lee side, overlapping the rider ahead.

Ride echelons only when you and your riding group are experienced in pacelines. Be careful to avoid pulling off the wrong way or you may find that overlapped wheels will result in a crash.

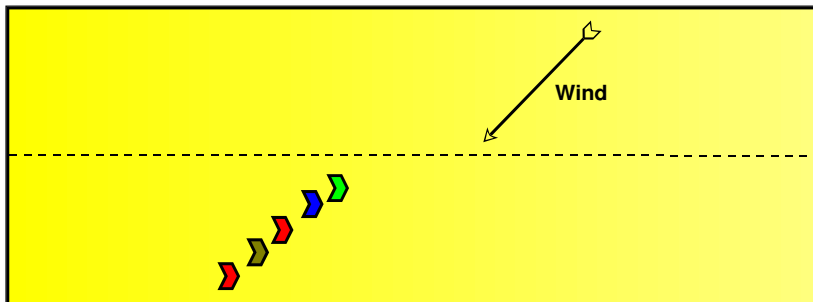


Figure 8. A side wind typical cause and results in an echelon.

Since the rider behind you is overlapping your rear wheel, pull off away from that rider, into the wind, drop back, and get back in the echelon.

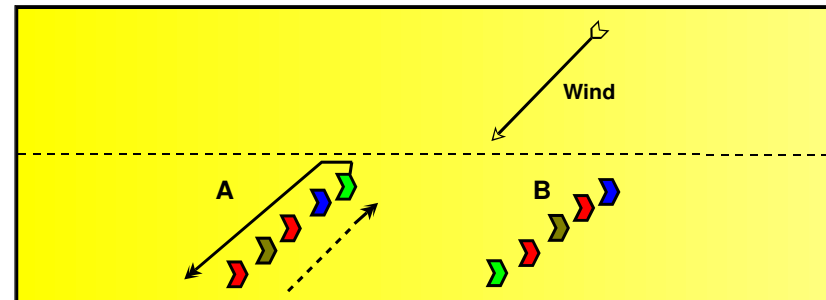


Figure 9. Standard echelon rotation. Lead rider pulls off into the wind. In diagram A, the lead GREEN rider is about to pull off into the wind. In diagram B, GREEN has attached to the rear of the echelon and BLUE is now leading.

Establishing the Echelon

With a Gatekeeper

With more riders than the width of the roadway can accommodate, a gatekeeper can keep other riders from entering the protection of the echelon.

Otherwise, the rider pulling off must drop back all the way to the end of the group and ride unprotected in the gutter.

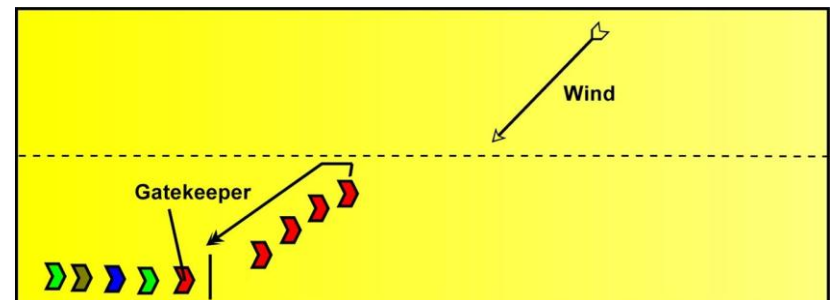


Figure 10. Team's gatekeeper keeps others from entering the echelon rotation and allows rotating riders to pull off into the wind. The RED gatekeeper lets a small gap open to allow his pulling-off RED teammate to tuck into the echelon just ahead of him.

No Gatekeeper

Without a gatekeeper, to avoid riding unprotected in the gutter after pulling at the front, accelerate briefly and come over the front of the overlapping rider.

As this requires clearing an overlapping wheel, this rotation is more dangerous than the more usual rotation backward on the windward side, shown on the previous page.

In such a situation, the lead riders may form a successful breakaway.

Once the breakaway is established, riders can rotate normally—away from the overlapping wheel.

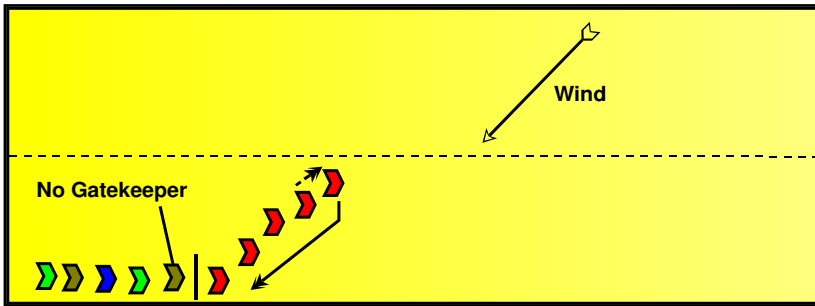


Figure 11. No gatekeeper. To rotate, accelerate off the drafting rider to the lee of the wind.

With fewer key riders in the echelon, tactically astute riders move the echelon toward the side of the road. Fewer riders will be able to find protection; trailing riders will be squeezed into the gutter and only key participating riders will be protected.

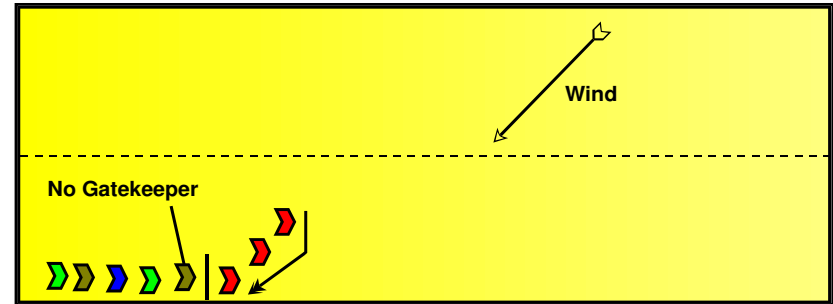


Figure 12. No gatekeeper. Small group. Squeeze toward the gutter to allow only a few riders protection.

Multiple Echelons

Seasoned riders used to crosswinds will quickly form second, third, etc. echelons.

Otherwise, the riders not in the first echelon gain no protection and will be off the back quickly.

Crosswinds are common in many European road races, especially in Belgium and the Netherlands where long, flat, unprotected roads are frequent. European pro racers have experience riding in crosswinds.

Echelons are less common in the US.

In the US, although riders at the front will form an echelon, those in the gutter often do not get organized into second, third, or more echelons. If you are not in the first echelon, it may be impossible to organize a second or third echelon.

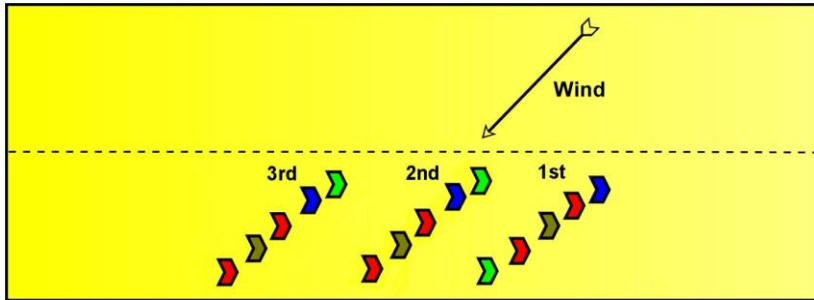


Figure 13. Riders not in the first echelon must continue to form multiple echelons to keep relative position and remain in contention.



Figure 14. 57th Vuelta España - GT, Spain, September 7-29, 2002. iBanesto.com leads the second echelon. The Spanish squad had their work cut out to try to bridge the gap to the lead echelon that contained most of the race favorites. Photo © www.lavuelta.com.

Wheelsucking

“Perhaps the best example of good tactical racing on my part came when I won the 1983 world championship. I stayed with the lead men throughout the race, never going back more than ten places from the front. I watched all the breaks cautiously, but I let them go, judging them to be too weak or too early in the race to stay away until the finish. Because my team had vanished from the race my only strategy was to ride piggyback on the efforts of the Italians and the Dutch. I had been riding piggyback, hiding my game...As we neared the finish I had to use a little tactical bluffing to gauge the condition of my two opponents. Only a few miles from the finish, I remained only with Faustino Ruperez of Spain. I pretended that I was tired. I asked him to share the pace. Ruperez agreed to pull at the front.”

—Greg LeMond, three-time Tour de France winner (1986, 1989-90), two-time world champion (1983, 1989). Piggybacker = wheelsucker.

There is a great deal of admiration for the strongest one in the group, the one who can time-trial faster than anyone else does. There is glory in being able to climb and climb, dropping your rivals one by one. Some folks castigate the wheelsucker, believing that racer to be the basest form of lowlife on the planet—it is an unfair rap!

Yelling in the Peloton

Ever notice how much yelling and screaming go on in a pack? When yells are directed at novices, it is usually because they are riding dangerously with respect to codes of pack safety. When shouting to teammates, it is usually a request for help. When yelling at rivals, it is usually not because anyone is doing anything wrong. It

is because someone is doing something different than the yeller wants.

“People yell at me in a race when I don’t do enough to help *them* win!” said Nelson Cronyn, one of the country’s best time trialists.

Climbers

Ever notice how climbers always want the group to ride steadily on the flats? “Hey, keep it smooth,” they shout. It is not really that the ride should necessarily be smooth; it is that they, the climbers, want the group to stay intact until the hills, when they can say, “See ya!”

Time Trialists

Notice how the time trialists say to the climbers, “Keep it together on the hills. When we get to the flats, we can really work together.” Of course, after the climb they can show off, towing the group at warp speed, and gloating at their strength. Alternatively, they can time trial off into the distance.

One of the legends of our club was a time trialist extraordinaire, and a good climber to boot. He would ride away from fields and never be seen again. If there was a sprint finish, he was dead meat. Naturally enough he hated wheelsuckers and swore at them every chance he got.

Pack Fodder

The majority of riders are neither great climbers nor great time trialists. They ride club rides, rolling road races, and criteriums. As long as they have the basic fitness to be with the pack, they can be “boxed in,” have a “bad day,” or who knows what in the final few laps—but hey, they were there!

Sprinters

Then there is that ability to sprint. To go warp speed for 200 to 1,000 meters and win races. Fast finishers. Maybe not great climbers, maybe not good time trialists. There is more to winning sprints than speed. A crucial asset of a winning sprinter is positioning—that is sucking on the right wheels until the last possible moment. Professional sprinters often have riders whose sole job is to get them positioned correctly of the final sprint.

Climbers dislike wheelsuckers who beat them in the sprint. Riders with strong time-trialing ability dislike wheelsuckers who come around them at will (though ever so briefly). Pack riders dislike wheelsuckers because they show them up at the end of races.

Wheelsuckers are Position Specialists

The wheelsucker gets a bad rap, but what a talent! A talent different from time trialing, different from hill climbing, but talent!

Successful Wheelsucking Examples

I remember a Wednesday coast ride with a bunch of exceptionally strong local racers. I sat in all the way and beat them all in the sprint. “My mother could have won that sprint with all your wheelsucking,” yelled one of them. “Hey,” I said under my breath, “if you’ve got a mother with genes like that, what are you yelling about!”

Then there was a World Week Handicap Race in Austria, where I wheelsucked behind a National Champion all the way to the front of the race and then beat him in the sprint. Boy, was he sore! However, hey, he was motivated and motoring and I just tagged along for the ride. He never pulled over for me to lead—what did he expect me to do? Say “Thanks,” and then let him win?

The Big Names Wheelsuck Too

Andy Hampsten rode a magnificent finish to win Alp d’Huez back in the 1992 Tour de France—a climber’s lifelong dream. What did he say? “I did as little work as possible on the days leading up, letting myself rest as much as possible to give everything to this stage.” That is to say, he wheelsucked ad nauseam until his moment of glory.

Look at old footage of Davis Phinney and Ron Kiefel. Phinney, the cash register, winning more primes and finishes than any other racer. Does he go out alone time trialing with 20 laps to go? Does he win King of the Mountain points? Of course not. He lets his teammates guard for breaks, works in breakaways when needed, but sucks on Kiefel’s wheel until the time is right to make his move.

Cipollini? Attack? Breakaway? No. Wheelsuck until the last 200 meters.

Lance Armstrong? He relies on his team to pull him along on most Tour de France stages, often working barely half as hard as his domestiques. Sure, he works hard in the time trial and some mountain stages. Generally, though, he wheelsucks whenever tactically smart to do so.

The Best Wheelsuckers Are Not Noticed

Remember only the engine, that one person at the front, is working. Everyone else is sucking.

A local club racer tears up the criterium circuit, and few notice he hardly ever pulls when not needed. He is a wheelsucker par excellence. Others are often noticed wheelsucking and are yelled at. Try and wheelsuck without notoriety!

Don't Take Wheelsuckers Personally

Yelling at wheelsuckers may be a valid tactic, and occasionally it works. Do not let them get to you, though, and do not take it personally.

Truthfully, a wheelsucker should be admired. Wheelsucking is a real talent, and one that can be as valuable as time trialing or climbing. A good wheelsucker is an invaluable teammate in almost any race.

Wheelsuckers, Take Care

If you are a wheelsucker, be aware that others may be annoyed by you. Wheelsuckers have a habit of being ridden into the gutter, or worse. Dangerous riding is always unacceptable, but wheelsuckers frustrate many riders into doing unacceptable things.

Frustrated by Wheelsuckers?

Frustrated by riders who seem to have average fitness but sit in the group and enjoy the glory of winning the sprint without doing any real sustained work?

Many riders who complain about wheelsuckers are reticent to compete in time trials—"the race of truth."—where they really have to work themselves. Why do you suppose that is the case?

Criteriums and many road races are not about the clock or about fitness, but are about who gets across the finish line first.

What is wrong with sitting in? It is a tactic, like any other. If it is not one that you are comfortable with, there is a good chance it is because you are not a great sprinter.

Reevaluate your sprint training and consider your options, below.

Getting Rid of a Wheelsucker Safely

Sweep a Rider off Your Wheel

If you slow just a little, a wheelsucker may come around you. In a sprint situation, this is part of double sprinting: Accelerate, pause slightly, and accelerate again. Timed right, the pause will induce the rider drafting on your wheel to come around into the wind.

Leave the Wheelsucker Blowing in the Wind

If in a group, move over to the side; the wheelsucker will probably move with you. As a third rider comes up to fill the hole left by the rider drafting you, move back. Timed subtly and safely, the rider on your wheel, blocked by the third rider, will not be able to move back with you.

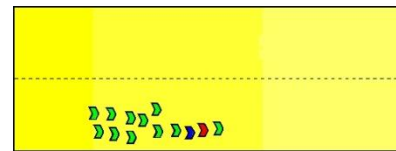


Figure 15. RED does not want BLUE on his wheel.

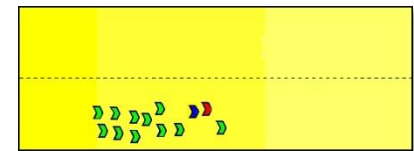


Figure 16. RED moves over. BLUE wheelsucks with him.

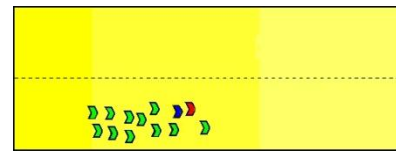


Figure 17. The GREEN rider following starts to fill in the hole.

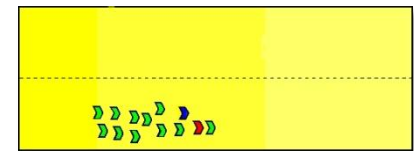


Figure 18. RED slots back in, leaving BLUE out in the wind.

Use Your Strengths

When you are a good climber or time trialist, how do you get rid of a wheelsucker?

- Out-climb them.
- Attack them and out-time-trial them.
- Work with others, block, and let gaps open, and trap them on the wrong end of those gaps.
- Use mind games—psychological tactics and smarts—to outwit them.

If you are dealing with a smart wheelsucker who can sprint, climb and time-trial too—you may be beat!

Gapping to Discourage or Get Rid of a Wheelsucker

The classic method for a group to deal with a wheelsucker. Read about this method on page 98.

Warm-Up

What Is a Warm-Up?

A warm-up is a moderated and progressive increase in effort in preparation for heavy exertion.

In preparation for almost all racing, warm up to race speed, heart rate, or power and work at this level for at least several minutes. The shortest, most intense events require the longest warm-ups.

For more information, read the *ABC* handout *Warm-Ups*.

Why Warm Up?

Warm-ups help:

- Increase blood flow to muscles
- Protect against injury
- Sharpen skills, tactics
- Increase arousal
- Mechanical check

Stationary Trainer

A stationary trainer may be necessary. Stationary trainers provide the most controlled warm-ups. In inclement weather, or with limited warm-up terrain, they may be the only practical option.

However, when the weather is hot, stationary trainers increase thermal stress and dehydration and may be a poor choice.

Pacing

Pacing may be required when what will limit your performance later does not limit you now.

Pacing means going more slowly at the beginning so that you can go faster at the end. Pacing also means going more slowly at the beginning so that you can reach the end.

Years ago, runners used to run the mile by starting out almost as fast as they could go. They invariably pooped out at the end. Roger Bannister broke the four-minute barrier for the mile back in the 1950's by planning to run each quarter mile in just under one minute. That planning allowed him to become one of the most famous athletes of all time.

Why Pace?

Because You Will Finish Faster

Figuring out at what pace you should ride is crucial to great performance in events where the aim is to cover a set distance in the shortest time. This is an essential strategy in track and road time-trial events. It is also very important in cross-country mountain biking. In mass-start cycling events where drafting and tactics play important roles, pacing is a less important component of racing success—but even here, it often makes or breaks a race.

Pacing commonly improves finishing times in such events by 1% to 3%. Very fast starts may worsen finishing times even more.

At many levels of competition, there are often very small differences between winning and losing. At the highest levels—the Olympic Games or World Championships—the margin between the glory of a top-three medal and anonymity is often less than 1%.

The difference between going out too hard and pacing yourself well can cost 10 seconds in a 3-K track event, a minute in 10-mile road time trial, and several minutes in a pro cross-country mountain bike race. In mass start events, a lack of pacing can drop a rider who otherwise might win!

Because You Will Finish!

In all-day century and ultra-distance events, pacing can play an even greater role. Finishing such events may not even be possible for some participants without pacing.

Sooner or Later We All Slow Down

Whether you plan on pacing or not, eventually, we all slow down. The question is, is it planned? What strategy provides the best chance of finishing? What strategy provides the best finishing time? In a group, or mass start event, what strategy gives the best place finish?

Why Pacing Works

Pacing works because you ration resources that will be needed later, now. Common resources are fuel (usually glycogen), fluids, and heat regulation.

- A simplistic explanation of the pacing principle may be the following:
- Go out too slowly and you never have the time to catch up.
- Go out too fast and you run out of energy.
- Go out too fast and your lactic acid levels zoom up too quickly.

It is easier to tolerate high lactic acid levels for short periods of time rather than longer ones.

If high lactic acid levels must be endured, it is easier to tolerate them at the end rather than at the beginning of a race.

Psychologically, the natural tendency of many athletes is to get excited at big competitions and go out too hard. By consciously backing off just a little this risk is reduced. Build to a crescendo rather than start with a bang and fizzle.

There are other benefits to pacing. For example, in a longer event, starting out more slowly will allow you to drink and eat more easily, and so have more energy for the end of the ride.

Why We Slow Down

There are a number of physiological reasons why we slow down: The main reason is that we run out of fuel energy. Dehydration, overheating, and muscle and neurohormonal fatigue can also contribute.

Dehydration

Consider dehydration in ultra-endurance cyclists as an example why pacing is required:

Suppose an athlete can work reasonably well until 3% dehydrated. Suppose at 6% dehydration health is threatened. Suppose an athlete weighs 140 pounds. Suppose it is a hot and humid day. Suppose working hard, an athlete loses 2.5 quarts (5 pounds) of fluids per hour. Suppose working moderately an athlete loses 1 quart per hour. Suppose the maximum rate of fluid intake is 1.5 quarts per hour. After two hours of hard work, the athlete will be performance impaired. After four hours, general health will be threatened.

The only options are to slow down early (pace) or stop when fatigued or exhausted. Pacing results in a higher overall speed.

Fuel Energy

Efforts up to about 10 seconds can be performed “all-out.” Pacing allows efforts of all other lengths to apportion higher-energy producing fuels over longer periods. Pacing results in overall total work and better overall times.

Fuel energy exists in several forms:

Anaerobic energy fuel sources include ATP, which supplies energy for just a few seconds, and CP—creatine phosphate, which helps supply energy for up to 30 seconds.

Aerobic energy fuel sources include carbohydrates and fats.

Glycogen, a form of carbohydrate stored in muscle, allows prolonged work at relatively high energy levels, associated with high heart rates. We are able to store a maximum of only about 2,000 calories of glycogen. After that stored glycogen runs out, we are basically burning fat.

That may sound great to those trying to lose weight, but it means that you cannot ride hard and that you generally feel terrible. Regardless of how hard you ride, you will burn about the same amount of fat. At higher intensities, you burn carbohydrates as well.

Running out of glycogen means we operate at less than 60% of maximum heart rate. That is what happens to ultra-distance cyclists after their first 24 hours of competition.

A 25-mile time trial, performed at 92+% of maximum heart rate, may exhaust almost all of our glycogen. A two-hour mountain bike race certainly will. It is simply not possible to continue at a pace of 90% of maximum heart rate for more than about two hours—one runs out of glycogen.

Glycogen is also stored in the liver. Liver glycogen helps keep the blood sugar level up, which can help spare the glycogen in the muscles. When the muscle glycogen is gone, blood sugar can be converted to useful energy, but not as efficiently.

By maintaining blood sugar with the ingestion of fuels—sugary drinks or carbohydrate solids—we can spare our stored glycogen and ride strongly longer. Consuming calories while riding will allow you to ride comfortably for many more hours than is otherwise possible.

Temperature Regulation

On hot and humid days, athletes may need to reduce workload in order to keep from overheating.

Overheating not only reduces power output, it can risk heat cramps, heat exhaustion, and heat stroke.

Overweight athletes are more subject to overheating.

Athletes occasionally pace up long climbs in order to keep their clothes dry and so prevent wind-chill from contributing to hypothermia on subsequent descents.

Neuromuscular (Skill) Control

Racing all-out to the top of a climb is frequently a poor tactic for mountain bike racers. Exhaustion at the top of climbs contributes to loss of neuromuscular control and overbraking on descents—resulting in slower overall times.

Heart Rate on Long Rides

Consider a racer with a maximum heart rate of 200 beats per minute, who performs the following events by himself, without the benefit of slipstreaming or drafting a group of riders.

25-mile time trial: It takes 60 minutes. The athlete can maintain 25 miles an hour, with a heart rate of 185 beats-per-minute or about 92% of his maximum.

100 miles: It takes 4.5 hours. The athlete can maintain 22 miles an hour. The heart rate is 160 bpm, or about 80% of maximum.

200 miles: It takes 10 hours. The athlete can maintain 20 miles an hour. The heart rate is 140 or about 70% of maximum.

2500 miles: It takes eight days. The athlete can maintain 13 miles an hour. The heart rate is 120 or about 60% of max.

As a beginning racer, your times will be slower, but your percentage of maximum heart rate will be similar.

Power vs. Heart Rate Pacing

In the final analysis, riders often need to rely on feel, intuition, and experience in calculating the best pacing strategy for a situation.

To help accelerate the learning curve, heart rate monitors or power meters can help.

For many reasons, power is a better indicator than heart rate for pacing. The main drawback to using power is expense: power meters (which include heart rate monitors) are much more expensive than dedicated heart rate monitors.

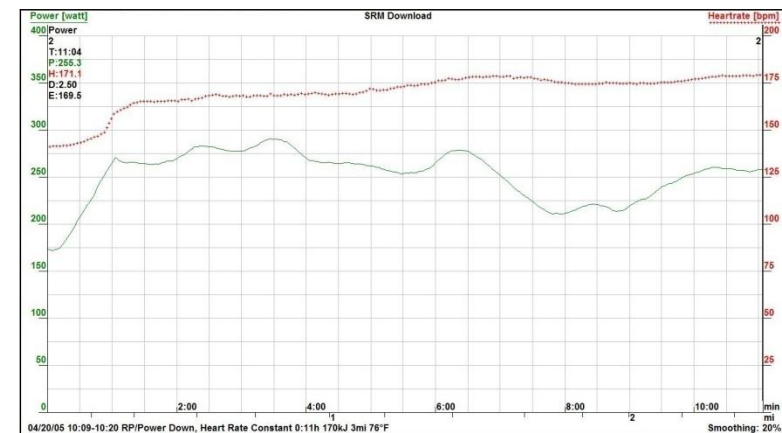


Figure 19. Pacing: Power is a better pacing indicator. Heart rate, red, above. Power, green, below. During this 10-minute effort, heart rate rises and stays up. Power of 260 watts is not held, and falls after a few minutes.

For more information on pacing and the use of heart rate monitors and power meters, see the ABC book *High-Intensity Training (HIT) for Cyclists*.

Pacing Exceptions

Drafting

Cycling is different from running in the sense that drafting, or riding in another's slipstream, is much more important. Since you can use more than 20% less energy riding behind another rider, or group of riders, a fast-paced group provides enormous benefit in overall time.

It is possible to draft within a group at a heart rate 30 or more beats per minute below what would be required to ride alone at the same speed. Therefore, it might be worth it to exert yourself a little bit more than your pacing strategy allows to reap the enormous benefits of group travel.

On long, steady climbs, amateurs often do best/are wise to ride hard-steady, and climb back up to the surges. Pros almost always have to respond to the surges of a couple of riders (though not necessarily individual attacks). Even though climbing, at pro-level power outputs speeds are high enough that those who surge can then draft each other and work together to stay away.

For almost all riders, it is worth working hard over the top of a hill, to be able to stay with the group down the hill and along the flats.

Other Strategies and Tactics

Sprints or finishing kicks, hill-climbing ability, and other tactical considerations often affect race strategy in mass start events as much as pacing.

Prove the Value of Pacing

It is easy to prove the importance of pacing, on your own, with a simple test:

Perform the test on a stationary trainer, in a hard gear, riding with one leg, using a cadence computer.

Let us assume that you find the perfect gear for which 55 rpm is the most rpm you can maintain at a steady cadence for 4 minutes. After several weeks, try this experiment: Ride a cadence of 53 for the first 2 minutes, and then try to ride 57 rpm for the last 2 minutes. At your next workout session, try riding at a cadence of 57 for the first 2 minutes, and 53 for the last 2 minutes.

Which way was harder? The vast majority of riders find the slow-start strategy much easier.

Events to 15 Minutes: 51/49 Principle

In its most basic, simplistic form, pacing usually means even effort throughout the event.

Reports from many coaches and studies confirm that in events of up to 15 minutes, going at about 98% race pace the first half and 102% race pace the second half is the best strategy. That is, the first half takes about 51% of elapsed time, the second half 49%.

Longer Rides: Even Pacing

The longer the ride, the closer the overall half splits are to 50/50.

A 40K championship TT might have nearly even splits. If the 40K were to be divided into 4-kilometer tenths, however, the first tenth might be at 49% race pace, and the last tenth at 51%. This means that most of the race might be paced at 6 minutes per 4-kilometers. The first 4K might be paced 5 to 10 seconds slower, the last 4K that much faster.

2-1/2-Hour Mountain Bike Race

Let us consider pacing and a pro mountain bike race. The value of pacing here is doubly apparent because riders start together, yet drafting usually plays only a minor role. Watch good pacers:

Typically, you will see them hang in 10th to 20th place the first lap and rise to the top 5 or 10 at the end of the race—passing many riders who do not pace well.

It is common to see the very best racers in a pro field riding together for the first half of an event. Although somewhat ahead of the rest, in the last half of the race the gaps grow much larger as the best test themselves and their competition by riding closer to their physiologic limits.

A possible perfect pacing might be to ride 96% of overall average pace in the first half hour, 98% of overall average pace in the second half hour, average pace in the third half hour, 102% of overall average pace in the fourth half hour, and 104% of overall average pace in the fifth half hour. This method has many theoretical and practical advantages. For example, it allows fuel and fluid consumption early in the race—where it can do the most good.

Pacing strategy A in Table 2 depicts this strategy.

Starting out too fast, the most common error, might result in finishing times 1% to 3% slower than optimal. These strategies are depicted on rows B, C, and D.

Strategy	Description	Race Quintile—Half-hour fifths %Average Optimal Pace					Time %Best
		1st	2nd	3rd	4th	5th	
A	Optimal, perfect	96	98	100	102	104	Best
B	Too fast start, poor	100	100	100	99	96	1% Worse
C	Too fast start, worse	102	102	98	96	92	2% Worse
D	Too fast start, worst	105	100	96	94	90	3% Worse
E	Too slow start, poor	91	98	100	102	104	1% Worse

Table 2. Pacing strategies, theoretical model. Percent of overall average pace and resulting times.

Occasionally, riders who are not warmed up, or for other reasons, start out too slowly. This also results in a loss of optimal finishing time, and is depicted in row E. Note that even starting out at almost 10% below your optimal overall average pace may result only in a 1% loss in optimal finishing time. Consider that you are in a mountain-bike race. Riders range in ability from 2% faster to 2% slower than you are. In a 2½-hour mountain bike race without pacing, their finishing times are therefore from 3 minutes faster to 3 minutes slower than yours are.

Naturally, if faster competitors adopt a perfect pacing strategy, they will do better than you will. However, if they have suboptimal pacing and yours is perfect, consider how you will fare.

Table 3 shows a matrix of finishing times of 39 competitors. They are of 13 ability levels ranging from 2% faster to 2% slower than you are. There is a competitor in each level who adopts one of the three pacing strategies B, C, or D above. We will ignore strategy A because riders who pace perfectly will finish according to their fitness. We will also ignore strategy E because it is rare for racers to start so slowly; you will never see these riders again after the start of the race unless they are a lot fitter than you are.

Of your 39 competitors, without pacing, on average, you will be in the middle, faster than 18, slower than 18, the same as 3. On average, you will finish about 20th.

With a perfect pacing strategy, you will finish faster than all riders except five. Three will beat you and you will tie with two. On average, you will finish 5th. That is 15 places better!

Competitor: Fitness Rank	Ability: Mins Different Than You	Finish Time Strategy B Poor	Finish Time Strategy C Worse	Finish Time Strategy D Worst
1-3	3.0—Faster	1.5—Faster	0.0—Equal	1.5—Slower
4-6	2.5—Faster	1.0—Faster	0.5—Slower	2.0—Slower
7-9	2.0—Faster	0.5—Faster	1.0—Slower	2.5—Slower
10-12	1.5—Faster	0.0—Equal	1.5—Slower	3.0—Slower
13-15	1.0—Faster	0.5—Slower	2.0—Slower	3.5—Slower
16-18	0.5—Faster	1.0—Slower	2.5—Slower	4.0—Slower
19-21	0.0—Equal	1.5—Slower	3.0—Slower	4.5—Slower
22-24	0.5—Slower	2.0—Slower	3.5—Slower	5.0—Slower
25-27	1.0—Slower	2.5—Slower	4.0—Slower	5.5—Slower
28-30	1.5—Slower	3.0—Slower	4.5—Slower	6.0—Slower
31-33	2.0—Slower	3.5—Slower	5.0—Slower	6.5—Slower
34-36	2.5—Slower	4.0—Slower	5.5—Slower	7.0—Slower
37-39	3.0—Slower	4.5—Slower	6.0—Slower	7.5—Slower

Table 3. Finishing times in a 2-1/2 hour mountain-bike race with selected fitness abilities and pacing strategies. The pacing strategies depicted are described in Table 2 and in the text. Shaded boxes: Riders finishing with equal or faster times than you. All other riders will finish with a slower time than you will.

When Will You Catch Riders?

If you pace, and your competitors do not, even the worst rider in the group will jump ahead of you near the start line, to an early lead.

Of course, with pacing, you will catch all the riders whose ability level is below yours.

It is surprising to many riders how long it takes to catch poorly pacing riders. In a 2½-hour event, for riders equal to you in ability, you will catch the worst pacing rider only near the end of the second hour.

Of the 18 riders faster than you, you will catch 15. You will catch these riders only in the last half hour of the race.

Other Mountain Bike Considerations

In a real race, racing abilities will be greater than plus or minus 2% of your fitness.

You may need to consider the effects of single track and work slightly harder than optimal to gain a good position when strategically important.

Road or Track Time Trial Pacing

The same principles discussed in the mountain bike example above apply to shorter and longer time trials.

Even in events as short as the kilo—1-kilometer on the track—an event just over 1 minute, a pacing strategy is helpful.

Although some riders insist that the correct way to ride the kilo is flat out from the gun, we know no riders really do this. There is a subconscious pacing, even if riders believe otherwise. How can I say this?

Because of the many track riders who have been tested at the Olympic training center, in an anaerobic test called the “Wingate.” In this test, a bicycle ergometer is slowed by a set of weights. An

athlete's power output is recorded by a computer during a 15- or 30-second test.

Athletes are instructed to work as hard as they can from the beginning of the test—they are told to immediately reach peak power—and to keep going as best they can for the 15 or 30 seconds.

When athletes know ahead of time that the test will last 30 seconds, they inevitably do not listen to their instructions. The same athletes have lower peak powers for 30-second tests than they do for 15-second tests.

When athletes don't know ahead of time how long they will pedal, they have a lower overall power output when they ride as if the test will last only 15 seconds—but it lasts 30.

These athletes frequently deny that they are pacing—but their power outputs belie their deeds. Moreover, they have done the right thing—because their overall power output for 30 seconds is greater with pacing.

At the other end of the racing spectrum, I coached a Race Across AMerica (RAAM) Team that wanted to reach the Arizona border first—because every team that previously won had reached that border first.

I advised the team: "Pace." I convinced the members that reaching the border first worked either because the winning team was that much stronger, or because no other competitive teams were pacing either. (They paced. They reached the border first. They won. They set a RAAM record.)

When Will You Catch Riders?

Consider a roughly 4-minute 3-kilometer track pursuit event in which your competition is a rider of equal ability.

It may be that your competition has the reasonable strategy of riding each kilometer in 1:20 for a total time of 4 minutes.

Following the 51/49 principle described above, you may be able to finish the 3-kilometer event in 3:59. Taking into account the several seconds needed to start, perhaps your splits will be 1:23, 1:19, 1:17.

In this scenario, you will pass your competition with about 20 seconds to go.

Criterion and Road Race Pacing

Most of the time, it pays to be an odds player. That does not mean gamble. To the contrary. It means, understand the likelihood of success in a variety of racing circumstances, and consider your actions accordingly.

In roughly uniform fields, at the beginning of almost all mass start races, breakaways are unlikely to be successful because everyone is fresh, no one has yet been dropped because of mechanical or other problems, and sharply varying energy rates early are likely to result in lower power outputs later in the race.

By riding smoothly and conserving energy early in mass start events, studies and experience show you are likely to have the reserves for the inevitable crunch that occurs later.

Century Pacing

You can quickly exhaust your glycogen stores by starting out quickly on a century. Why care?

Because you might not finish. Or, you will finish with a slower time than you could otherwise achieve.

Riding speed does not increase proportionally to energy output. Since air resistance increases at more than the square of energy output, you will get a faster overall speed by pacing.

Consider this simple example: Riding a fast downhill. You might marginally increase your speed by pedaling furiously in a big gear—

but the speed improvement is slight. You would probably do much better coasting and resting.

Working at 75% of your max? You will spread out your glycogen stores for many hours. Work at 90% and you might go a few miles an hour faster. However, when you are out of glycogen, the difference between speed at 60% and 75% of max is a lot more than a few miles per hour!

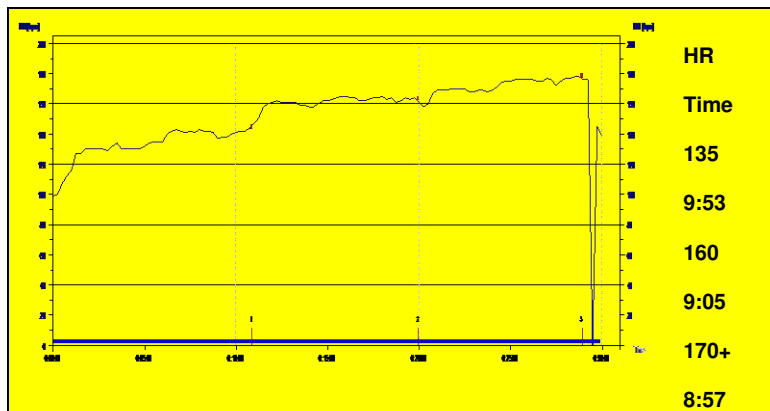


Figure 20. Heart rate vs. time. Pacing trial showing that for considerable change in heart rate (and perceived exertion) time gains are marginal. The athlete rides three 4-mile repeats at heart rates of 135, 160, and 170+ bpm. The time difference between repeats performed at 160 bpm and 170+ bpm is 8 seconds in 9 minutes.

Ultra Pacing: 12 Hours to RAAM (Race Across AMerica)

As in century pacing, spreading out your glycogen stores over many hours will result in a better overall time.

After 12 hours almost all stored glycogen is gone. Your power output depends upon fat stores and the amount of fuel you can ingest. Riders can typically ingest 250 calories of carbohydrates per hour to fuel themselves while riding.

With gastrointestinal tract training, riders can teach their bodies to tolerate twice as many calories and accept more fluids.

Studies have shown that at least 200 fat calories per hour can be obtained from fat stores, transported via the blood stream.⁶

If 200 calories per hour are obtained from fat stores, that would amount to about 5,000 calories in a 24-hour event, or result in about a pound and a half of fat loss a day.

Although a pound or two of fat loss (3,500 to 7,000 calories) might be reasonable for a 24-hour event, 10 to 20 pounds of fat loss during RAAM might not be reasonable. There are sound physiological reasons why rapid fat loss might contribute to hypothyroidism (low thyroid) or SIADH (syndrome of inappropriate diuretic hormone, a pituitary condition associated with fluid retention. Swelling is a common problem in ultra-endurance athletes.) Both of these endocrine conditions might severely limit performance or result in a DNF. (I know of no studies of endurance riders that have studied these hormones during rides.)

⁶ Romijn, JA, Coyle EF, Sidossis LS, Gastaldelli A, Horowitz JF, Endert E, Wolfe, RR (1993). *Regulation of endogenous fat and carbohydrate metabolism in relation to exercise intensity and duration.* Am J Physiol. 265:380-391.

Ultra-event pace is often limited by the rate of caloric ingestion or heat and fluid loss.

For each 100 watts averaged per hour, 400 calories are required.

If your pace is too high, you will be too tired to eat or the blood flow to your gastrointestinal tract will be too restricted; you may not be able to consume even 100 calories per hour.

In conditions of heat and humidity, you may not be able to keep up with sweat and other fluid losses, which can exceed six standard pint (16-ounces or 500 milliliter) bottles per hour. Few riders can consistently drink even half that amount—three bottles per hour.

Vicious downward spirals often result.

Your best choice in these circumstances is to choose a slower pace. With a slower pace, you can (1) ingest more calories, (2) drink more, and (3) you sweat less.

When it is hot and humid a slower pace also helps prevent hyperthermia (overheating).

Pacing Example: 24-Hour Event Pacing, Three Athletes

Three athletes competed in a 24-hour event that began with two 121-mile loops followed by 15.8-mile loops.

The event began at 6:00 PM.

Temperatures ranged from the mid-50s °F at night to the mid-90s °F in the afternoon.

From the downloads, it appears we have examples of good, great, and poor pacing.

Descriptions are found in the figure captions. The details in the figures can be read by zooming in on the images.

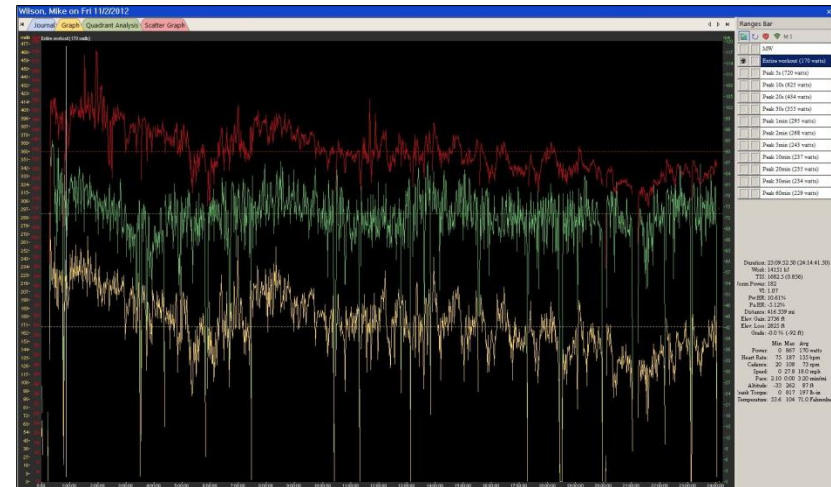


Figure 21. Good, but imperfect pacing. Sixth place rider.

From top to bottom: Heart rate, red; cadence, green; power, yellow. Overall average power 170 watts. Last two-hour average power 146 watts, or 86% of overall average power.

Normalized power, an estimate of the best average power achievable with steady pacing, is 182 watts, or 7% higher than overall average power. You can read normalized power as Norm Power in the table at the lower right. You can read the ratio of normalized power to average power as variability index, VI in the table at the lower right.

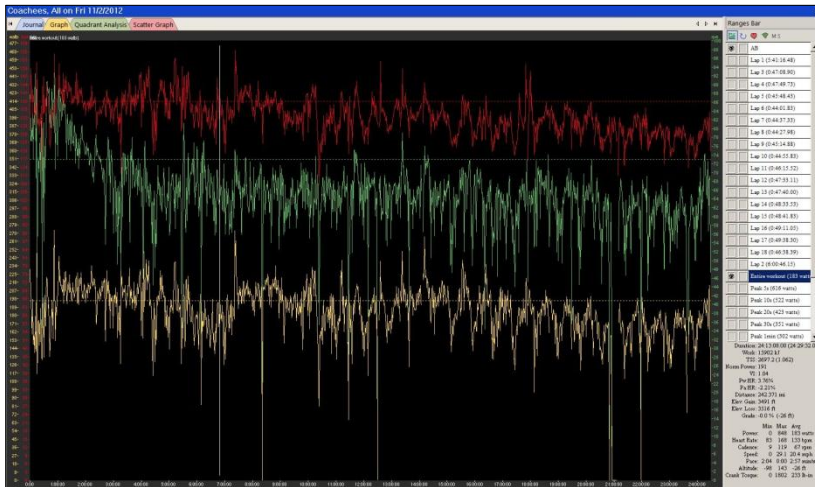


Figure 22. The best pacer. Second place.

From top to bottom: Heart rate, red; cadence, green; power, yellow.

Power and heart rate reasonably steady throughout.

Overall average power, 183 watts. Last two-hour average power 168 watts, or 92% of overall average power.

Normalized power is 191 watts, or 4% higher than overall average power.

Room for improvement: This rider started with a relatively high cadence. Higher cadences often give better performance in races of six hours or less. However, higher cadences are less efficient (they burn more calories for the power generated). When calories are going to be a limiter, cadences of 75 to 80 rpm, or even lower, often work best.

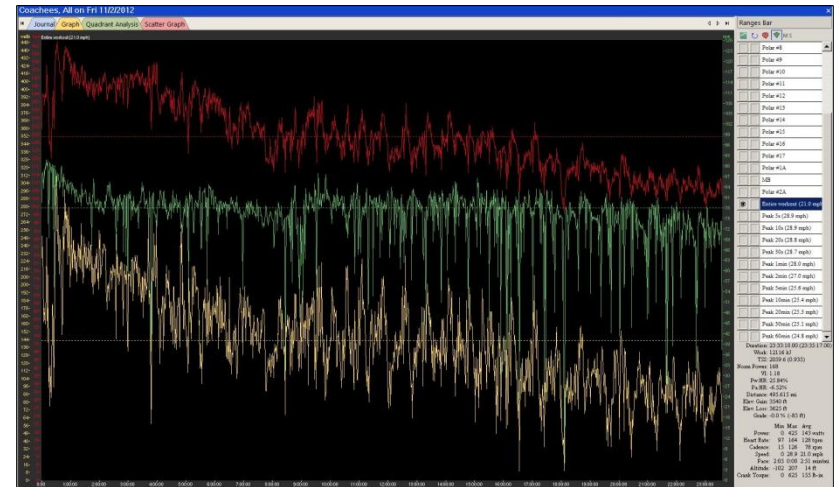


Figure 23. Worst pacing? Top finisher!

From top to bottom: Heart rate, red; cadence, green; power, yellow.

Overall average power 143 watts. Last two-hour average power 85 watts, or 59% of overall average power.

Normalized power is 168 watts, or 18% higher than overall average power.

One might guess that a strategy of this rider might have been: "I am the fittest. I am going to burn everyone off my wheel from the start."

If so, perhaps it worked. This rider rode 495 miles and won the race by 10 miles over the best pacer, the rider in the previous figure, Figure 22.

Although this rider won with apparently poor pacing, in a more competitive field he might have sacrificed his placing with this approach. With steadier pacing, he might have had a significantly higher overall average power. He might have improved his mileage from 495 miles to well over 500 miles.

However, the data is suspect. Read the main text.

Caveat: Don't Overly Rely on computer Data

Bicycle computer data is often inaccurate. Devices may be miscalibrated. Downloads and program analysis may have faults.⁷

The download of the winner, Figure 23, is likely incorrect.

There may be problems with relative and well as with absolute power values.

The principles of pacing outlined in the caption of Figure 23 apply regardless of the accuracy of the download. However, the specific numerical values and comments may not apply to this particular rider or this particular ride.

This rider clicked off his short (15.8-mile) laps; the device and program captured this data from the first nine short laps. Times and average power are listed in Table 4.

Short Lap	Time	Average Watts
1	44:55	151
2	45:40	138
3	45:40	138
4	45:05	143
5	43:15	142
6	43:40	133
7	44:35	121
8	45:30	115
9	45:30	109

Table 4. Selected lap times and average watts, race winner.

Overall, power shows a steady decline; lap times hardly change. For example, laps 2 and 3 both have power averages of 138 bpm and lap times of 45 minutes and 40 seconds. When power falls to 115 watts in lap 8, the time is 10 seconds faster.

This is not expected and is unexplained. Times are riding times, not elapsed times; breaks in riding are not an explanation. However, change in riding position, or wind conditions could explain why decreasing average-lap power is not associated with expected increased lap times.

Moreover, this winning rider's overall average of 143 watts is likely too low:

- He is taller and heavier than the sixth-place rider, shown in Figure 21, who averaged 170 watts and rode about 80 fewer miles.
- He is at least several inches taller and 12 pounds heavier than the second-place rider, shown in Figure 22, who averaged 183 watts and rode 10 fewer miles.

Although considerably superior aerodynamics could explain this, the winner did not have superior aerodynamics.

⁷ For information about bicycle computer calibration, as well as more discussion of difficulties and inaccuracies, see *High-Intensity Training for Cyclists*, <http://www.arniebakercycling.com/>.

Pacing Not Everything

Pacing is a very important strategy. In time trials and mountain bike racing, it is crucial. Several of the pro mountain bikers I coach have had their best races after learning patience and pacing. Even in mass start events, it can be very valuable.

On the other hand, it is not everything. At a recent road race in Arizona, I and three other teammates in four separate races broke away solo from our respective fields with 10 to 90 miles left. Our fields could have caught us had they been organized.

Mass start racing is much more than pacing: It's feints, it's who has the best sprint, it's who wants not to work thinking someone else will, it's who wants to help someone, and it's who can't stand a rival being off the front.

Sometimes, it is "No guts, no glory." Three out of the four of us stayed away and won our races.

Pacing Strategy Studies

For more information on scientific studies of pacing strategy, while connected to the internet, click on the link <http://www.sportsci.org/news/trainagain/pacing.html>.

What You Need to Pace

- Self-knowledge. You need to know your limits. Based on past performance, you need to know how hard you can go.
- Self-control. You must not let others dictate your pace.
- Correct equipment. You may need:
 - The right gears. If you have a straight block 12-21 cogset and want to climb a 10% grade at 70 rpm and at less than 75% of maximum heart rate, you may need easier gears.
 - A heart-rate monitor.
 - A power meter.
- Warm-up. The shorter and more intense the event, the more important it is to warm up. For more information, read the *ABC* handout *Warm-Ups*.
- Nutrition. Food and fluids will help you maintain target pace.

The Bottom Line

Learning to pace is a hard lesson for many riders to learn. It is so very tempting to take off from the start at too fast a pace—there is all the excitement and enthusiasm, and you certainly do not want to look like the slowest person there!

However, if you start at a reasonable pace, at the halfway point or later you will be passing many people who thought they left you in the dust at the beginning.

Keep Momentum

Keeping momentum is a powerful tool in saving energy.

Here are just a few suggestions on how to maintain momentum:

- Around corners. It is exit speed, not entrance speed that is critical. Brake early, not late. Read more about corners on page 45.
- Up and down rollers. Riding at the very front of the pack generally requires more energy. Riding about 10 to 20 places back can help you use less energy as you roll up on the leaders.
- Brake as little as possible. If the rider in front of you slows,
- Move a little to the side to let the wind slow you down.
 - On a velodrome, move up the banking to let gravity slow you down.
 - If you need to use the brakes, feather them and keep pedaling. As in 1 and 2, this keeps muscular tension and your legs moving.
 - When you come up on a rider or breakaway, modulate your effort. Ease up just a little before you catch, or you may have to brake and lose momentum.

Arrive at Obstacles Near the Front

Riding near the front of the group when obstacles loom can save energy later.

Obstacles include climbs, corners, narrowing roads, irregular surfaces such as cobblestones, intermediate sprints (primes), and race finishes. Weather can be an obstacle: inclement weather, wind, or even sun in the eyes.

Whenever obstacles are imminent, being near the front may prove crucial.

Groups of riders generally string out near obstacles, and advancing may be impossible. If the group splits on a climb, through a chicane, or if a crash occurs on cobblestones—it may be impossible to ever regain the front of the bicycle race no matter how much energy you later expend.

Although drafting is the principle means by which cyclists conserve energy, drafting at the back of 100 riders is often no more efficient than drafting 10 riders back.

The larger the group, the more important is this principle. In fields of more than 100 riders, this may prove pivotal. In a Masters field of 20 riders, this is of less importance.

Read more about this principle and technical courses on page 45.

Advantages of the Back

In the back of small groups, you can see everything, get a good draft, and avoid the argy-bargy that often goes on in the fight for the front positions. The back may be less psychologically demanding.

The back is often safer if the pace is steady. If there is a crash, you will certainly be behind it. However, you may have more

maneuverability and be able to avoid falling. Although you may have more time to react to a crash, you may be delayed by it.

In small fields, you may be able to launch a surprise attack from the back. In large fields, attack at the back and your energy may run out before you make it to the front.



Figure 24. Stage 11, La Vuelta a España, 2002. A rainy descent. The riders in the front of the pack are making the race happen. If the group splits or if there is a crash, the riders in the back may be out of contention. Photo © www.lavuelta.com.

Event Energy Conservation

Technical Courses

The more technical the course, the more important it is to be in the first 20 riders.

Twisty descents make courses technical.

Road width contributes to the technical aspect. The narrower the road, the more technical the race. In many races, road width changes. Where roads narrow, bottlenecks form.

The quality of the road surface (potholes, speed bumps, box dots) contributes to the technical demands of a course.

Weather conditions such as rain may also contribute to increasing technical demands.

As most criteriums are flat, the technical aspect of criteriums generally refers to the number of corners. Very technical criteriums have more than one corner every tenth of a mile.

Non-technical criteriums have wide roads and less than one corner every two-tenths of a mile.

Review the principle of arriving at obstacles near the front discussed on page 44.

In technical conditions, the front part of the field is often accelerating while the back part of the field is decelerating.

If the front of the field is accelerating while the back is decelerating, the effort required to hold position, never mind advance, is disproportionably large at the back of the field. This is known as the accordion effect.

In non-technical criteriums with riders with similar fitness and a field size of less than 50 riders, the least work may be accomplished at the very back of the field. However, this position is generally a poor tactical choice, especially in the last third of a race—at any time, an important breakaway might be missed.

Position Right on the Front

Energy is often wasted in fighting for position at the immediate front of the pack. Considerable mental as well as physical energy is needed to be right at the front. It is generally smoother to be positioned 10 or 20 riders back

Corners

Although average cornering speed is important, keep in mind that exit speed is more important than entrance speed.

Many riders brake in a corner and must accelerate as they exit.

It is a subtle skill, but slightly decelerating before corners and accelerating into the draft of riders ahead through the corners results in overall energy conservation.

Braking in corners results in a greater loss of momentum and less bike control.

The inside or outside line to any corner may be faster depending upon the line of the pack.

Read more about cornering and attacking on page 85.

Climbing Energy Conservation

Start climbs at the front of the pack.

Slip-sliding is an effective way to climb more slowly, and hence use less energy. If there is no danger of a breakaway getting away, start the climb at the front of pack, slip slide to back of pack. The more riders there are in the pack, the more energy you can save. Generally, slide later toward the end of the climb, rather than earlier. If you start the climb at the front of a group and finish the climb at the back, you have lowered your overall pace or watts output up the climb. As long as you are still in contact, you have saved high-intensity energy resources.

Generally use small gears in climbing and save the big gears for when there is no alternative. Small gears rely more on aerobic

metabolism and save fast-twitch muscle fibers for later surges and sprints.

Steady climbing uses much less energy than surging.

If it is a long climb without a headwind or appreciable drafting, you need not respond immediately to every surge. Keep in mind that riders often sit up after surging on a climb, or at the top of the climb if level ground follows. Keep a steady or gradually increasing pace. Close gaps slowly. In other words: If you can surge now or later, surge later. In this way, you work if necessary; not if not.

Near the top of a climb, you may need to be more aggressive in staying with riders. Be especially vigilant if the finish, intermediate sprint, or other obstacle occurs soon after the top of the climb.

Feed zones may run a considerable distance. Why carry heavy fluids all the way up a hill? Get your feed at the top of the feed zone.

Making Time Downhill

Although descending risks may be significant when a race victory is at stake, safety is generally paramount. Keep in mind that the pack often sits up and does not pedal hard at the foot of a descent. Letting small gaps open is often a safe strategy that does not risk race outcome.

Positioning near the back of small groups can save energy as momentum and drafting can carry you up rollers.

Following other riders saves mental energy; you can follow the lines of others and see how they approach corners, and how their approach works. However, you must be mentally alert for dangerous situations caused by riders ahead of you.

The fastest descent strategy is to accelerate out of corners, then tuck, corner, and accelerate again.

An aero tuck is an advantage. An aero tuck uses upper body and back energy. Riders usually tire of an aero position after a few miles of such descending.

Some riders use an extreme aero position with hands in the center of the tops and rear-end off the back of the saddle. Generally, the advantages of extreme aero positions are outweighed by the instability and reduced safety of such positions.

Unless you are leading solo or in a small group, an aero tuck is not generally needed.

Which Breakaway to Join?

If the breakaway is likely to be successful, you probably want to be in it. If it is unlikely to work, you probably do not.

Do not waste energy in breakaways doomed to failure.

Keep in mind that what happens in the field behind the breakaway is as important to the breakaways success as what happens in the breakaway itself.

Recognize that potentially successful breakaways generally have strong riders. If the breakaway does not have strong riders, it will not be able to stay away. If all the strong riders are in the field, they will chase down the breakaway.

In many race categories, especially Cat 1-2, Pro, and Masters with team riders, the breakaway should contain important team representation in order to be successful. When this is the case, those teams will work from behind to slow the progress of the field. If important teams are not present, those teams will work to chase down the break.

Even for the most tactically astute racers, breakaway success prediction is not ideal.

Experience helps in being able to recognize which ones are likely to work.

Sometimes it is a matter of persistence. Forming a successful breakaway may take several attempts.

Read more about breakaways beginning on page 101.

Breakaway Energy Conservation

Review the general principles of drafting discussed above.

The most work in a breakaway occurs when leading or drafting just one rider.

If you draft the strongest rider, you will generally work harder than any other rider in second position.

Consider also the energy needed to reattach to the back of a fast moving paceline: being in front of the strongest rider is also generally unwise.

Generally, the best place is behind the steadiest slowest rider who takes the shortest pulls and who will not be dropped.

Keeping a low profile in a breakaway generally allows you to use less energy than your breakaway companions. Generally, do not point to yourself by taking charge of the group unless necessary for the group's success. Snappy accelerations make you a marked rider.

Unless crucial for the breakaway's success, keep something in reserve for attacks within the breakaway group, counterattacks if you get caught, or obstacles including climbs, intermediate sprints, or the race finish.

For more details about breakaway tactics, see *Breakaways* on page 101.

Moving Up

Advance when it costs you the least amount of energy. It is generally best to advance when there is:

- A lull
- Another rider to carry you up to the front
- Momentum
- An opening on the lee side of the field
- A shorter line

In criteriums, depending upon your abilities, you may want to use:

- Long straightaways
- Corners

Finally, when the way is blocked, you can always

- Ask for help or permission.

Lull

Most criteriums have a rhythm: They are fast for a few laps, and then settle down until the finishing laps. If there is no immediate reason to do so, do not fight to move up if the speed is high.

Although pro teams may set up early breakaways, most fields stay intact or come back together for at least the first half of the race.

On the straight sections of a criterium course, the pack typically sets up on one side of road. During a lull, it is often relatively easy to attack on the other side of the road and go all the way to front. A less than committed partial move may evaporate and not gain anything if the pack moves over.

Another Rider Carries You Forward

Why work to get further forward on your own when someone else will do the job for you? Keep your eyes and ears open for another advancing rider to take you forward.

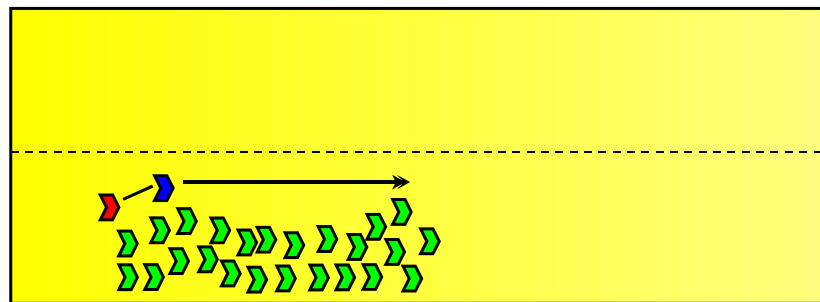


Figure 25. Advancing on another rider. Here RED uses BLUE to tow him up to the front of the pack.

Momentum

You may have momentum when the pack slows and you are in a position to accelerate as they slow. For example, around a corner or on rolling terrain.

Short Line

You may have a shorter line around a corner or other obstacle. When you do choose a shorter line, advance quickly or the shorter line may vanish.

Long Straightway in Criteriums

Strong, but relatively pack- or corner-shy riders may be willing to mix it up for a few laps at the end, but often are squeezed to the back of the pack for most of a criterium.

These riders may do well if they make a special effort to get almost all the way to the front on a long straightway a lap or two before the end of the race.

If you make such a move, tuck into the pack before the corner, or you will find yourself on a bad line, braking, and at the back again.

Corners

Skilled technical riders can often advance a place or two every corner, diving into the small gaps that less skilled riders always leave.

On courses with left and right hand turns, taking the inside line on one corner may allow you to advance on the outside of a group of riders as they brake for what will be for them the inside of the next corner.

Ask for Help or Permission

Many riders never think of this option. Of course, a teammate may help. You can also ask a non-teammate to help take you to the front, perhaps promising to attack and pull them away from the field or to lead them out for a prime and split the prize.

You can also ask riders ahead of you who are blocking your way to move over. “Please, let me pass.” “Let me come by, please.” Not all riders will comply, and some will move to impede further your way. Nevertheless, many will allow you to pass.

In professional racing, domestiques travel to the back of the pack to service vehicles to pick up fluids and food. They will often ask riders to move over so that they can get back up to their team leaders, yelling “Service!” Professional riders usually allow this courtesy.

Wasting Energy Example

One of the first riders I coached was feeling great, racing a criterium in a pack at 26 mph. Feeling strong, this rider attacked and went off the front solo halfway through criterium. She was caught less than two laps later.

“What were you thinking?” I asked this rider.

“Well, I was feeling real good. I felt I had a lot of energy. I felt I could go a lot faster. I just took off.”

“How fast was the pack going?” I asked.

“26 miles per hour,” she answered.

“How much time was left in the race?”

“About 15 minutes.”

“How fast can you time-trial?”

“About 25 miles per hour.”

“So where were you going?” I asked.

“I see,” she said.

In order to successfully break away solo, most riders need to be riding below 80% of max HR when drafting within a group.

Classic Wastes of Energy

Although the situations below may work, the odds are against success. Here are classic energy-wasting moves:

- Pulling the pack into a headwind. Pulling the entire pack into a headwind might seem macho, but there are no prizes for the rider who pulls the most.
- Pulling the pack to the base of a climb. If a climb is coming up, pulling the pack to the base of it is likely to make the hill a whole lot harder for you. Jumping the pack, getting a good gap, and then climbing the hill at a more moderate pace is a different tactic that has occasional merit and is discussed on page 75.
- Drafting small riders. Riding behind small riders does not provide the same draft as sheltering in the wake of thunder-thighed giants.
- Attacking in the first half of a race. All riders are fresh at the start of the race. After the race is half over, some have had mechanical problems, some are spent, and most are tired. In the first half of the race, many people have the ability to stay with your efforts. In the last half, fewer can respond. Your efforts will then make more of a difference. If you are definitely one of the strongest, you may want to toughen the race from the start. Nevertheless, most early attacks are pointless, except for the desperate.

Make Rivals Use Energy

Eat off your competitors' plates before your own.

The corollary of saving energy is to make others use energy. Do you remember the two riders and the pocket of change story at the beginning of this book, on page 14? If the rider with more money had also been thrifty, he might have won.

You can improve your chances for success not only by using less energy than others do, but also by maneuvering others to use more than they otherwise would.

Gapping

A key method of making rivals use energy is gapping discussed in detail beginning on page 96.

Forcing the Pace

Forcing the pace, or toughening the race, is a tactic to tire opponents. However, as an individual, you do not want to give others a free ride. Force the pace when the cost of doing so does not result in an excessive energy penalty to you.

As a teammate you will sometimes give others, along with your team's protected riders, a relatively free ride but one that is equally hard for everyone.

In professional races, the domestiques often have this tempo-setting role; once their work is completed, they can drop out of the race, or in a stage race, wait for the grupetto.

Tailwind

For example, if you are a good time trialist, pulling in a tailwind will force everyone to work. Pulling into a headwind will generally only tire you and others will get a free ride.

Crosswind

Pulling on the leeward side of the road forces everyone to work, either in the gutter or along the centerline.

Climb

If you are a good aerobic climber, long steady climbs, especially with a tailwind, present tactical opportunities.

Teammates who keep the pace high before the climb effectively lengthen the climb and help toughen the race for the climbers.

Descent

Corners and cross winds where the speed with pedaling is greater than that of coasting present opportunities for good technical descenders and descending time trialists.

Sprint

To prevent swarming, teammates keep the pace high (leadout), to help keep their sprinter's position.

Isolation

A strategy going back to Caesar, the concept of dividing or separating your competitors, using them against one another, and then launching a conquering attack has been and is used in many fields of endeavor.

Consider a stage of the Tour de France. You are a great climber, a stronger climber than the GC leader. You are in second place. The GC leader is ahead of you because he is a better time trialist and has a stronger team. He has put two minutes on you in the individual and team time trials.

The standings are as follows:

1. GC leader Leading by 2 minutes
2. You Down on GC by 2 minutes
3. Third place Down on GC by 3 minutes
4. Fourth place Down on GC by 5 minutes

The finish line of today's stage is 20 miles after the summit of the last climb, a 1st category six-mile 8 percent grade. A tough one.

After one mile of climbing, you are in a select group of just five riders. The GC leader, the fourth place rider, and two of the GC leader's teammates. If you drop the GC leader and everyone else by three minutes on the climb, you might think you can win.

However, what will be going on behind you? The third place rider is having a bad day, was dropped early on the climb, and is already behind several minutes. If the GC leader summits the climb with the fourth place rider, as well as with his two teammates, the four of them can easily gain back those three minutes in the 20-mile finale.

The fourth place rider will be motivated to work with the GC leader because he is gaining time on third place, and might possibly be able to beat you and end up in second.

This might not be smart.

In order to win you need allies and you need others to work against the GC leader. You need to isolate the GC leader so that he alone, rather than his team, is left to chase you.

For example, what if early in the climb you gap off the fourth place rider? The GC leader might not care about him so much, being five minutes down. After say a one-minute gap is established, you ride hard, but not all out. You drop the GC leader's teammates one by one. Then you jump the GC leader and catch the fourth place rider near the summit of the climb. Perhaps you now have two minutes on the GC leader.

Now the fourth place rider wants to work with you to put time on third place, as before. He also wants to work with you because he too might eventually gain enough time on the GC leader and move into second. He might try to attack you near the end, or outsprint you. Since you will be happy with taking over the GC, you might even agree to give him the stage win if he cooperates to the finish line.

Now you have a gap, you have help, and the GC leader is chasing alone. You have divided the GC leader's resources and isolated him.

⁸ Divide and conquer. Julius Caesar. For a history lesson and the use of this tactic in non-war spheres, see <http://www.utdallas.edu/~lcherry/school/divconquer.doc>.

Equipment

Equipment selection can save energy and so has important tactical considerations.

Equipment should be sized properly, reliable, lightweight, aerodynamic, have minimal rolling-resistance, be easily serviced, standard-sized, and reasonable in cost.

Sometimes compromises are made in one area in order to augment performance in another area.

For example, time trial bikes may have cables routed inside the bicycle frame to improve aerodynamics. The marginal benefits of such routing may play a crucial role in time trials, but generally the increased cost and difficulty servicing internal cabling makes such a selection inappropriate for most road riding.

It is really only if there are tradeoffs that equipment selection is difficult. Otherwise, we should all use reliable, aerodynamic, lightweight, serviceable, inexpensive equipment.

This all might seem like a tall order, but it is not that difficult to achieve. Let us take a closer look.

Changing Equipment or Bicycle Position

Although specialized or race-day equipment may provide an edge, test it before use. For example, your training cogs and chain may have worn at the same rate and work well. However, your race wheels may have cogs of a different vintage. New cogs and worn chains, and vice versa, do not mix.

Comfort

Bicycle position and equipment must fit well and be comfortable. Some equipment that improves performance under some circumstances worsens it under others.

For example, stiff deep-dish radially-laced front wheels may currently be popular, but on harsh roads, they provide a rough ride.

Composite three-spoke wheels have aerodynamic advantages, but again, provide a very harsh ride. If you have to stand to relieve discomfort on your bike every few yards, you are not going to be able to pedal quickly.

If you are using a lot of energy just to control a difficult-to-ride but otherwise aerodynamic time trial bike, then this bike might not be a good choice for you.

Position

Position is a compromise. Raise the saddle and you will generally have more power. Lower it and you will be able to spin a faster cadence.

Shorten your stem and you will probably climb better. Lengthen it and you will be able to adopt a more aerodynamic position for time trialing off the front of a race.

For more information about bicycle fit and changing positions to favor different riding styles or needs, see the *ABC* book *Bicycle Fit*.

Stage Race

Some riders find that raising their handlebars a few millimeters and lowering their saddle a few millimeters makes for a more comfortable ride when racing day after day.

Gears

Riders commonly do not have enough gears. How often do you hear a rider after a race say: “I had more gears than I needed?” How often do you hear: “I didn’t have enough gears?”

Preparing your equipment with gearing that enables you to spin 70 rpm or more on climbs helps forestall muscular fatigue and allows for quicker accelerations in response to surges, jumps, and attacks.



Figure 26. Fillmore Climb, 2003 San Francisco Grand Prix. Even with 29-cogs, most riders were undergeared. Few riders, male or female, were smart enough to install triple chainrings for this 18% grade. Photo © Garrett Lau.

A common climbing situation: A rider slows in front of you; you soft-pedal or momentarily brake, and then have to regain climbing speed. Spinning a faster cadence allows you to more easily regain this lost momentum.

Even hilly criteriums can benefit from a 27-cog. Not that you may necessarily need a 27-cog in the small ring. However, a 12-27 cluster might allow you to spin up the hill in a 53-24—avoiding a dropped chain—a common shifting problem.

Weight

Light-Weight Bicycle Frame and Components

A pound is generally worth 20 seconds for every hour of climbing.

Although many riders could also improve their performance by shedding needless fat, for those with the financial ability, trimming bicycle weight can certainly help performance in hilly events, immediately.

Once at the standard race-worthy bicycle level, saving weight generally costs about \$1 for every gram of weight saved.

Light-Weight Wheels

A lightweight set of racing wheels is often a good investment.

Although one pound generally translates to 20 seconds for every hour of climbing, rotating weight is worth roughly twice that.

Current bicycle marketing is often aimed at improving aerodynamics. Beware of this current trend. Wheels with low-spoke counts are more aerodynamic, but require stronger rims—rims that are often heavier.

Although faster speed on level ground is important, road races are often won or lost on the climbs.

Aerodynamic Equipment

Position First

The biggest piece of aerodynamic machinery is your body. Position on the bike is the most important aerodynamic factor.

Other things being equal, a lower handlebar with longer stem improves aerodynamics, a higher handlebar with a shorter stem improves climbing. A higher saddle generally results in greater power, a lower saddle in greater high-end cadence.

For more information about position, see the *ABC* handout *Bicycle Position*.

Aero Wheels

Fast wheels can be worth more than one minute for every hour of riding.

Aero V-shaped rims are faster than box rims. However, V-shaped rims may present handling problems in crosswinds or especially on descents.

Fewer spokes are faster than many. Too few spokes risks wheel failure and handling instability. Bladed and radial front spokes have modest advantages if the wheel is well built.

Narrow tires, at most 3 millimeters wider than the rim, are faster than wider tires. Flimsy narrow tires risk punctures for heavy riders.

At speed, disc wheels are faster than almost all other types of wheels. On the front, they are very difficult to control. Many disc wheels are relatively heavy. Heavy solid wheels are a disadvantage on uphill time trials. Heavy wheels are also a disadvantage where repeated accelerations are required, as in technical criteriums. Disc wheels cost around \$1,000.

For more information about disc wheels and an analysis of the relative tradeoffs of weight and aerodynamics, read the *ABC* handout *Hill Time Trialing Disc*.

Skinsuit and Other Clothing

Time trialist or criterium rider? A skinsuit is 30 to 60 seconds faster per hour and relatively inexpensive—generally under \$100.

If you need a jacket or other extra clothing, keep in mind that clothing that is flapping in the breeze means that you are wasting energy or going more slowly.

Foregoing socks and gloves may save a second or two in a 40K time trial, but generally is not justified in mass-start races where comfort and safety are more important issues.

Booties

Time trialist or criterium rider? Wearing booties can save up to 30 seconds every hour or reduce the power required to ride in the pack. They are inexpensive—about \$25.

Aero Helmet

Time trialing? An aero helmet can save a minute every hour, and is relatively inexpensive—generally around \$100. Although some aero helmets are relatively heavy or have a shape that reduces general neck mobility, others are fine for criteriums.

Time Trial Bike

If you are serious about time trialing, a dedicated aero-frame bike may save two minutes for every hour of time trialing.

Aero bikes cost about the same as other high-end bicycles.

Numbers

There is a knack to pinning on numbers to minimize their aerodynamic resistance. Alone at a race, use your car's steering wheel to give shape to and support your jersey or skinsuit. Use six to eight safety pins. Make sure that the number is pinned all the way around. Pin in and out: pierce the number and your jersey and then go back through your jersey and number. Cost: nothing.

An advanced attachment method is to use a spray adhesive, such as 3M's ReMount or Super 77, to perfectly position and adhere your number.

Mechanical and Road Resistance

You will waste a great deal of energy if anything on your bike is rubbing or binding up.

In leading hundreds of rides of 20 or more riders, I usually find at least one rider's bicycle rim rubbing a brake shoe. Every ride and race, before starting to ride, check that your wheels are spinning easily and not rubbing the brakes.

Bottom brackets are commonly neglected and bind occasionally. They should be checked regularly.

Lubrication is vital. A well-lubricated chain can save half a minute over a poorly maintained one. A loose chain helps reduce chain friction; a very loose chain risks derailment.

Some riders use oil in their bearings, instead of grease, and if the bearings are sealed, remove the seals. I am not sure messing with your bearings is a good idea. There is a difference between bearing friction on the bike stand and friction with load. I am not sure using oil accomplishes anything.

Wheels are not weight balanced—the valve stem hole and valve stem unbalance most wheels. When allowed to move freely, from the heavier side up, they oscillate until the heavier side is down. Wheels should oscillate at least several times when clamped by their quick releases or bolts either on the bike or in a truing stand. Many hub bearing binding problems are uncovered only when under the load of quick release or bolted tension. Testing the freedom of your wheel bearings must be done under load.

In general, clinchers have less rolling resistance than sew-ups, especially sew-ups that are not well glued. Wider tires, up to 25mm, have less rolling resistance. Latex tubes usually improve rolling resistance over butyl tubes. Tires with more threads per inch, and fewer and thinner plies, generally have lower rolling resistance (though they may flat more often). Tires that can take higher pressures and are pumped to 160–180 psi lower road resistance. This may not be a good tradeoff if your ride is less comfortable or your cornering ability is diminished by higher pressures.

Part 2

Psychology & Style

“You can observe a lot by just watching.”
—Attributed to Yogi Berra.

Body Language

Body language plays an important role in all communication, although not all of us consciously interpret or appreciate its significance.

Body language is always contextual. Frequently the same behaviors can mean many different things.

Here are three familiar body-language behaviors.

- **Avoiding eye contact.** This can be associated with lying, devious behavior, unfriendliness, or a lack of social skills. It can also be purely cultural.
- **Crossing arms.** This can indicate unfriendliness, defensiveness, an unwillingness to be helpful, or feeling cold.
- **A genuine smile.** This can indicate warmth, openness, or happiness.

As you will see, bicycling body language can be interpreted to tactical advantage.

Assess Fellow Riders

What if your chief rival wore his heart rate monitor on his arm, giving his heart rate in percent of max? What if you looked over at his watch and saw that he was at 90% of max, and you looked at your own and saw you were at 80%? Might you think: “I’m doing great, he is in trouble. I am going to attack!”

You rarely see your rival’s heart rate monitor. By learning about body language, you may be able to read their efforts as if you could.

You want neither to over- or underestimate your rivals. You need to know how your teammates are doing and what they can and cannot do. Of course, you can ask your teammates. However, your rivals may or may not be willing to let you know about their fitness.

Questions to ask before the race include:

- Who is in the race? (Who do you need to watch?)
- Which are the strong teams? (You will need to watch their moves.)
- Who is talking to whom? (They may be forming alliances.)
- Who looks tired, or nervous? (They may be weak.)
- Who is loud, or obnoxious? (They may be dangerous.)
- In international races, who speaks the same language? (They may support each other.)

Questions to ask during the race include:

- Do they look tired?
- Are they breathing hard?
- How are they responding to attacks or other moves?
- Do they appear to be concentrating?
- Are they looking down at the ground, or are they focused ahead?
- Do they appear tense or tight?
- Are they stretching excessively?
- Do they appear to be struggling with attacks or on the climbs?
- Are they sweating?
- How is their form? Are they rocking their bikes?
- Are they out of fluids?
- Are they fumbling with their equipment?

Body language can be useful in predicting what tactics cyclists may try.

A minority of riders can camouflage their true intentions by consciously masking, faking, or changing their body language. Bluffing is discussed in more detail beginning on page 63.

Bicycling body language can tell you:

- What riders can and cannot do
- What riders might and might not do
- Which riders to watch

- That an attack is coming
- That a rider is tired
- Who is a dangerous rider

Riders to Watch

It is not usually possible to watch every rider.

In any given situation, target your attention on the riders likely to make a difference. For example, who are the previous winners or podium finishers? Which are the strong teams? Who seems to be talking to whom about race strategy?

In mountain bike races (and some road races), highly ranked riders are sometimes called to the start line first.



Figure 27. Chatting riders, especially those from different teams, may be planning to work together. Domo's Kevin Van Impe chats with Lotto's Scott Sunderland at the start of the 58th Nokere Koerse, Belgium, March 19, 2003. Photo © Sabine Sunderland.

11 Clues an Attack is Coming

Here are some characteristic body-language behaviors associated with riders preparing to attack.

1. Shifting a Gear and Looking Back

2. Hand Position to the Drops

Riders sprint better in the drops. Those who shift to the drops in road races may be planning an attack.

3. Changing Pack Position

After a race has progressed beyond the initial jockeying for position, generally after about 20% of its expected duration, riders generally accept and are relatively comfortable with their position.

Riders who spend energy in changing their position may be doing so for a tactical reason.

Be especially wary of riders who are giving up protected, sheltered positions, and those who turn their necks repeatedly, looking for a way out of a boxed-in situation.

4. Refastening / Tightening Shoe Straps

Riders who tighten their shoes may be seeking performance over comfort and planning an attack.

5. Tucking in Jersey / Jacket

Tucking in a jersey is generally less fashionable. Some riders believe a tucked-in jersey is more aerodynamic and may be planning an attack.

6. Hitting Hip

Hitting one's hip is a classic body language signal to a teammate to follow an acceleration. This action signals an attack or leadout.

7. Deep Breaths

Some riders consciously or unconsciously take deep breaths before a hard effort or attack.

8. Snappy Responses / Accelerations

Riders who are able to respond quickly are generally fitter than those whose responses are sluggish. If an attack is coming, it will probably be from an athlete who not only wants to attack, but *can* attack.

9. Casting / Emptying Waterbottles

Riders who cast off waterbottles may be looking for minor aerodynamic or weight advantages before an attack, climb, or sprint.

10. Slip-Sliders Climbing at Front

Riders who commonly use the tactic of slip-sliding in a group up a climb—to reduce the overall intensity of their climb—and do not, may be planning to attack on the climb.

11. Specialized Equipment

A good time trialist who shows up at a criterium in time trial gear may be planning an attack and a solo breakaway.

8 Clues a Rider is Weak or Tired

Here are some characteristic body-language behaviors associated with riders who are tired or weak.

1. Looking Down at Bottom Bracket

Tired riders commonly look down at their bottom bracket/gears. For an example of this, see the photo *Read the Picture* on page 61.

2. Lose Form

Tired riders commonly become sloppy in their form. Do not get trapped or gapped off behind these riders. Loss of form includes:

Choppy stroke / pedaling squares. Tired riders do not pedal smoothly.

Upper body use. Riders use their upper bodies to recruit accessory muscles in order to work harder. If they are going fast, they may be just working hard. If they are going the same speed as you, they may be tired. Tired riders tense their shoulders, and roll or droop them.

Seat squirming. Riders squirming on their seats on long riders may be uncomfortable and/or tired.

Standing and stretching. Riders may be fatigued and have tight or stiff backs or other muscles.

Elbows locked. Riders lock their elbows when the triceps or other muscles are fatigued.

Shifting frequently. Tired riders are not comfortable, and shift frequently to try to find a more comfortable gear.

Fumbling shifts. Muscle fatigue often goes hand in hand with psychological and neuromuscular fatigue.

3. Facial Expression

Tired riders look and act fatigued. See Figure 28.

4. Silent Talkative Riders

Talkative riders often become quiet when fatigued.

5. Labored Breathing

Some riders breathe hard all the time; most breathe hard only when their workload is relatively high.

6. Long Response Times

Fatigued riders are also mentally tired. Response times to needed efforts are slow because of both of these factors.



Figure 28. Jo Planckaert (Cofidis) suffers during 58th Nokere Koerse, Belgium, March 19, 2003. Photo ©: Nicolas Leroy/velophotos.free.fr.

7. Gaps on Hills

Fatigued riders do not have the mental or physical response times to close gaps quickly.

8. Weak Paceline Pulls

Fatigued riders start slowing down their pulls, or do not pull as long. Strong cagey riders sometimes also do this.

Need to Interpret

Rider behavior is contextual, and sometimes can be interpreted in different ways.

Looking Back

Riders look back when they want to know what is going on behind. This may be because they are fatigued and in trouble, because they want to do only what is necessary to maintain their lead, because they are waiting for a teammate or others to bridge, because they are planning an attack from their breakaway group, or for other tactical reasons.

Shifting Gears

It is sometimes hard to interpret the meaning of shifting gears. A bigger gear requires more muscular work and may be associated with an attack. On climbs, shifting to a harder gear usually means the rider is strong and feeling good. It is also associated with a lower heart rate for a given power output and may provide a cadence change for a fatigued rider.

Tired riders may shift to a smaller gear because they are tired or because smaller gears make for snappier accelerations.

Riders in Trouble

Riders who are in trouble can create gaps or be dangerous. Take care! Signs of riders in trouble include:

- Looking tired
- Stretching on the bike
- Out of water
- Mechanical trouble
- Not paying attention

Dangerous Riders

Some riders are frankly dangerous. Their riding style poses risks to themselves or to others. Sometimes it is fatigue. Sometimes adrenaline. Sometimes a lack of skill. Sometimes a rivalry with another rider or team.

Beware of and avoid riders with the following signs:

- Cutting each other off
- Returning foul language or hazardous behaviors
- Can't hold a straight line
- Problems shifting



Figure 29. Dangerous riders. Occasionally open fighting erupts between riders. Play the video at <http://www.youtube.com/watch?v=ET6QGBDzNkQ>.

Bluffing

Riders may act tired or strong when they are not. Read more about bluffing—feigning fatigue or strength—on page 63.

Read the Picture

Based on information contained in this article, look at the picture below and try to read the body language of the four marked riders.



Figure 30. Body language. Road field sprint, Masters 45+ US Nationals, 1998. Rider 1, Arnie Baker. Rider 2 Kalman Szkalak. Rider 3 Thomas Bain. Rider 4 Butch Stinton.

Rider 1, leading the group, is looking ahead, focused on the finish line. He looks determined and in good shape.

Rider 2, big muscled, in good position, but tired. He is looking down at his bottom bracket. He may let a gap open soon.

Rider 3, red stars on his jersey, is looking ahead. He should make his move and come around rider 2 now, if possible.

Rider 4. Look at his face. He has given up and too tired for the sprint.

Cipo's Body Language Says it All

Cipollini has said orally: "I am the world's greatest sprinter." His body language says the same thing.



Figure 31. Mario Cipollini (Acqua e Sapone) raises his arms as he wins. 85th Giro d'Italia (GT) Italy, May 11-June 2, 2002.

Mind Games

“You will lose more races with your head than you will lose with your legs.”

—Coach Carl Cantrell

Can & Can Not, Will & Will Not

The general tactical principles of *work for a reason* and *make rivals use energy* are known by many riders.

What happens when you get a tactically sophisticated group of rivals together in a breakaway?

If one attacks, which one of the others will chase?

The weakest rider may escape successfully while the remaining riders look to each other to do the work.

It is not only about ability. It is sometimes about preferring someone else to win, or more importantly, someone else *not* to win.

Motivation & Confidence

Motivation is something that causes a person to act. It is the ability to focus on a goal and work toward that goal, regardless of physical ability. It is willpower.

Motivation has two important elements: direction and intensity. *Direction* is the choice of goal. *Intensity* is how energized the individual is toward that goal. Intensity, which is related to psychic energy, is influenced by emotion.

Confidence is the realistic expectation of success or of achieving one's goals. It is what athletes reasonably hope to do, not what they dream of achieving.

Your tactics and those of others can increase or decrease your own motivation and confidence or the motivation and confidence of others.

For example, well-executed tactics that improve your chances tend to motivate you and discourage others. Attack in areas in which other riders are vulnerable to reduce their confidence and motivation.

Read more about motivation, confidence, and other sport psychology topics in the *ABC* book *Psychling Psychology*.

Intimidation and Invincibility

If you do not believe you can do it, you are right, you cannot. If you believe you can do it, it increases the probability that you can.

How would you feel at the starting line as a top 10 Tour de France GC contender knowing that the rider next to you can be three minutes faster in a 40K time trial than you?

Knowing that the rider next to you has won the Tour de France in each of the last five years?

How do you think Lance feels?

For someone to have the courage to challenge you, it does not matter whether they can beat you or whether you think they can beat you. The only thing that matters is whether they think they can beat you.

If they think that they can beat you, they will try. If they try, it will work, at least some of the time.

Would you feel like attacking Lance? Do you think if you expended your energy to escape him you would stay away and have a chance? Is it even worth trying?

Would you feel differently after Lance was attacked by someone else who did stay away and put two minutes into Lance—even though he chased hard? Of course you would.

You would feel like a weight was off your shoulders. Like Lance was not invincible. Like anything might be possible.

If you are not intimidated, if you are willing to try, you may find you can do more.

It is not only about what you are doing, it is how you are doing in relation to others.

It is much easier to ride at a heart rate of 80% of maximum in a group ride than it is on your own.

It is much easier to suffer at the front on a climb when you are leading, than at the back of the pack, getting dropped—even though you are physiologically working at the same intensity.

It is much easier to attack if you feel you have a chance to make it stick.

Frustration

This psychological term describes the failure to reach an expected goal or reward.

Frustration can cause riders to increase their motivation. It can also cause them to make ill-advised attacks, lose motivation, or react illogically.

As discussed elsewhere in this book, tactics, especially blocking, can increase frustration in others.

Try not to allow frustration to control you. Try to keep perspective. Opportunities may arise soon.

Bluffing

It is sometimes smart to have your competitors think that you are stronger or weaker than you are.

Bluffing is behavior or language that purposefully mischaracterizes your physical state or true intentions. It is acting.

Bluffing is looking or acting fresh when tired; or looking or acting tired when fresh.

Sometimes it is necessary to bluff when you are weak to prevent opponents from attacking you. If your competitors feel that an attack is pointless and a waste of their energy, they may not attack. If you appear stronger than you really are, riders may not pull as hard as

possible in a paceline, fearing that they will burn themselves out and have no chance in a sprint finish. This may allow you to stay with a group that otherwise might easily drop you. If your opponents feel they have no chance to match your efforts in an attack or sprint, they may not fully contest your efforts.

Sometimes it is advantageous to appear weaker than you really are. This may allow you to do less work in a group. Riders will worry less about you missing pulls or pulling for a shorter period of time. If you are perceived as a non-dangerous rider, your escape from the group will not raise any alarm bells. If you appear weaker than you really are, you may induce another rider to give you a leadout for an intermediate sprint or to the finish line. If you want another rider to attack, appearing weak may induce him to do so.

How to Appear Weaker than You Are

Riders look for signs of weakness in their competitors. By showing these signs, your competitors may think that you are vulnerable or not in contention. Common signs they may misinterpret include:

- Heavy breathing
- Slow response to accelerations
- Slowing in a paceline
- Letting little gaps open
- Looking down at your bottom bracket

How to Appear Stronger Than You Are

If you appear comfortable and in control, riders may think that you are stronger than you really are.

If you cannot do your share in the paceline, take shorter pulls but keep the pace up.

If you ride at the front on climbs at a pace just a little slower than the others are comfortable with, they may be content to let you set the pace.

If you make a few (pseudo) attacks, you may trick others into thinking you are more of a threat than you really are.

If you smile and look riders in the eye, perhaps after a hard effort and say something like: “How’s it going?” they may think you are feeling great.

If you whistle while riding up climbs, riders are likely to think you have energy to spare.

There is another good reason to act this way: You may find that it helps you psychologically, and that you *do* feel stronger.

Lull Your Opponents into a False Sense of Security

The Dangle

You want to ride away from your rivals in a race. If you say to them: “I want to ride up the road, let me go,” what do you think they would say in return? “No way. We’d prefer that you stay with us.”

Suppose you say: “Well, I am a little stronger than you, so please let me go.” They might say: “Stronger or not, we’ll fight to stay in your slipstream and keep you with us.”

The problem is that psychologically, you may have approached this situation all wrong.

Suppose, instead, you say: “I’m really no stronger than all of you. You can catch me any time you like. Let me sit out there and cook alone awhile. Then, when you feel like it, you can gobble me up and make me look foolish.” Your rivals are likely to say: “Sure. Go fry.”

There is a critical time gap in lots of criterium racing. About 15 seconds. Less than a 15-second gap and a single, determined rider can chase you down. More than 15 seconds and it usually takes a concerted effort to catch.

Suppose you sit out about 10 seconds. If you do not seem to be making any progress, the pack often does not care that much. They know that anytime they want, they can come up and get you.

It is a paradox. If you work harder, they will start chasing. Keep the same distance and they are content.

So keep the same distance and lull them into a false sense of security. Now at a turn or curve in the road, really punch it. Now you have more than 30 seconds on the pack, and may even be out of sight.

The leaders in the pack may be surprised—they cannot imagine that you have escaped. Others may think you have been caught. Even if you can be seen, now the gap is too large for an individual to bridge and so a chase is less likely.

This also works on road races. Consider a climb. Break away and dangle just 15 seconds up the road. The group figures: “He’s not too far ahead; we’ll catch on the descent.”

After settling the group into a dangle scenario, start *really* working. The riders in the group behind, set in their rhythm, still believe they can catch you. They have become convinced that you are “just there” even though you have actually left them far behind.

We Could Always Chase Him Down

How often have you heard riders say: “We stayed with every attack, until the very last one?” Of course. They succeeded until they failed.

Attack a number of times, without complete commitment, at less than maximum pace. Let yourself be caught.

If you attack half-heartedly a few times, and you are caught easily, your rivals may get lazy and let out your leash a little.

The one time they fail to respond, you go, but this time you are committed.

The Counterpunch

Someone else is forcing the race. This rider is saying: "I am the strongest." He attacks repeatedly, you let the group respond. You respond with submaximum efforts. The group catches. You are apparently just hanging on.

Now make an apparently wild attack yourself. The group all knows you cannot keep it up. Besides, they are all watching the strongman.

However, you are strong. Moreover, you do keep it up.

Keep Out of Sight

Breakaway? Out of sight, out of mind. If riders cannot see you, they may be less motivated to chase you down.

Consider that the edge of road may act as camouflage. Consider that the inside line of roadway around corners puts you out of sight sooner.

Lose Chasers

Although steady power output generally results in the fastest progress, if you are being chased by an individual who is just a little faster than you are, properly timed surges may demoralize your rival.

Be Aggressive, Not Passive

“As long as I breathe, I attack.”

—Bernard Hinault, five-time Tour de France winner. (1978-79, 1981-82, 1985)

Aggressive riding is taking the initiative; it is proactive racing.

Aggressive riding is not dangerous riding. It is not pushing or shoving.

Generally, be decisive in your actions. Occasionally non-decisive-type tactics can work: For example, rolling off the front.

Personal Experience

Depending upon the race, I may make 20 or more attacks. It is a rare race where I sit in and just wait for the finale.

If I feel that I am the strongest, or one of the strongest, I may repeatedly attack to shake things up, sometimes from the start line.

If riders are drafting, those drafting save energy.

If I jump, and everyone jumps with me, then everyone has expended about the same amount of energy as I have.

If riders jump repeatedly, and you are able to read the race correctly, and *NOT* jump, because after each jump the group slows and gets back together, then you have saved more energy and are in better shape at the end.

It is how and when you use energy that determines whether its use was wise or not.

Although saving energy is a valuable approach, I have won many more races with aggressive riding than with passive riding.

Aggression Example

In this example of aggressive riding, imagine a club racing exercise. Two teams each have five riders of equal ability. Let us call them the RED and the GREEN team.

The object for each team is to get one of their team members to be the first to cross the finish line 10 miles down the road.

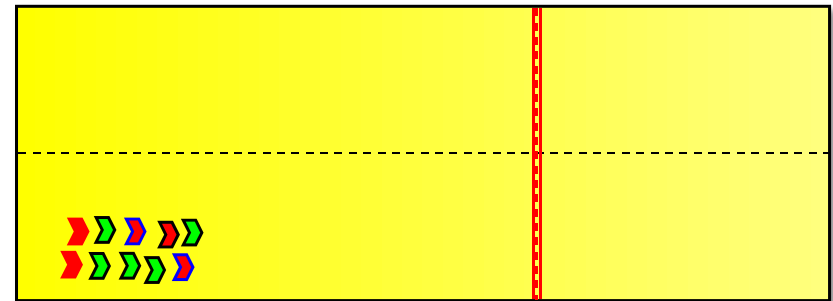


Figure 32. Aggressive style set-up. Two teams of five riders.

First Attack Doesn't Work

The RED team launches rider off the front. Before anyone can react, he has a gap of 30 seconds. Since they have a rider off the front of the race, the RED team stops riding hard. Now the GREEN team must work and chase the RED rider. They do so.

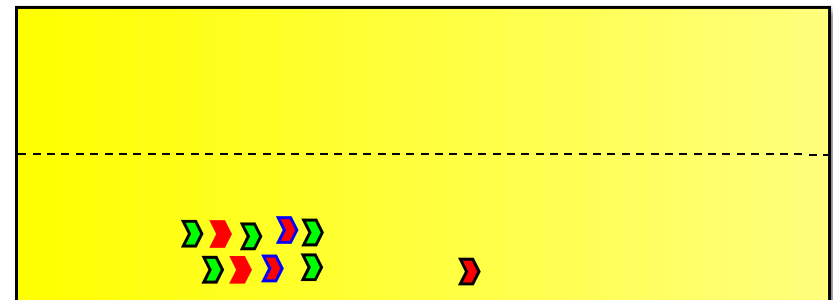


Figure 33. A RED team member attacks.

Second Attack Doesn't Work

Because the GREEN team chased, its members are relatively tired.

The RED team members all had the benefit of working relatively less hard in the slipstream of the GREEN team.

As the group catches, two other REDs break, and work together. Again, the GREEN team has to work and chase.

As their RED teammates are caught, two RED riders launch an attack, working together.

Again, the GREEN team is forced to chase.

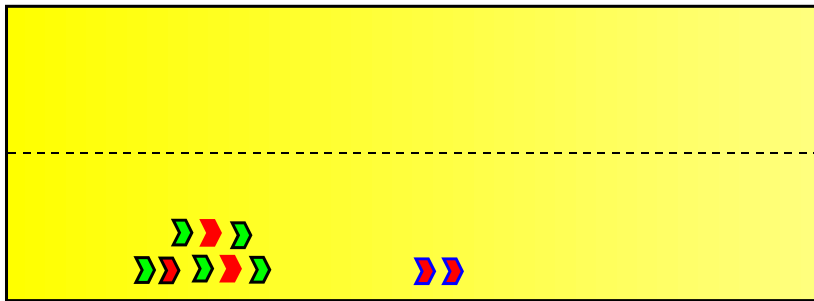


Figure 34. Two RED teammates counterattack and lead the field

Third Attack Works

Finally, two relatively fresh RED riders launch.

The GREENS are now pooped.

These two RED riders come in hand-in-hand across the finish line. The RED team wins.

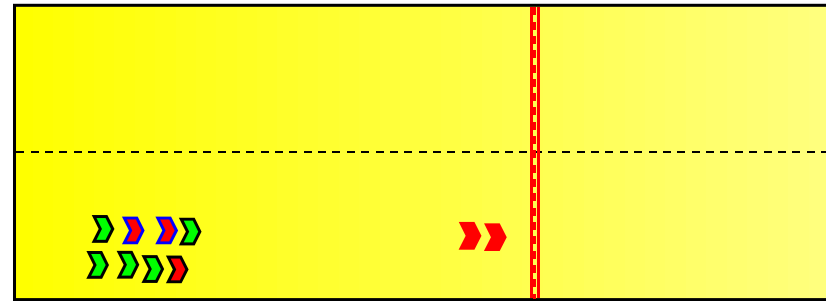


Figure 35. RED teammates win together.

Review

Both teams worked hard. All riders had to work. Team RED had the advantage. It spent its time being aggressive, and its moves counted. Team GREEN was passive. They had to work to chase. There is just as much work in chasing, but less glory.

Team GREEN was always behind Team RED, always playing catch-up. The winner is the team whose rider crossed the line first, not the team that chased the most. Who worked the most is irrelevant.

If you looked at the workloads of the two teams, you might find that both teams did the same amount of work.

The RED team won because it was aggressive, not passive; not because it was stronger.

Strong Rider Aggression

If you are a strong rider in a race, make others work hard to weaken them.

Are you one of strongest riders? Feel like making others hurt? Try jumping up little rises and making attacks off the front. Everyone else has to react, or they will be left behind. If your efforts are relatively short and the group is not working well, they work just as hard as you do—only they are behind and you are ahead.

Weak Rider Aggression

If you are a relatively weak rider in some ways, there is also a role for aggression.

If you are intimidated by other racers and let them jump and dictate the race, they will control you and force you to react. You will have to work just as hard or be left behind.

It is more fun and often easier if you take charge.

Choices

“Somebody has to make the race,” he later explains, “and I’d rather be the guy that opens the race up and is aggressive, attacks and gets fourth than the guy that sits on the whole day and wins. That’s not my style...Never was, never will be.”

—Lance Armstrong, after placing 4th in the 1998 World Championships, quoted in VeloNews, Nov 16, 1998, page 25.

Although an aggressive style is often admirable, it is not always the best or winning strategy. Keep in mind that sometimes it is just plain foolish to waste your energy and help someone else win.

Sergey Lagutin Aggression Story

For an example of aggressive riding winning a world championship race, see <http://www.velonews.com/race/int/articles/5101.0.html>.

Try Aggressive Riding

Even though some aggressive moves may have a limited chance for success, play the odds.

Riders must often be aggressive to maximize their chances.

For example, riders who cannot sprint should not wait for the sprint to happen. It will not work in every race, maybe not even 25% of the races, but if you are a strong time trialist and poor sprinter, try jumping as the pace lulls a few miles from the finish or with a lap or two to go in a criterium as riders jockey for position. So what if you end up with egg on your face? You did not have a chance in that sprint, no matter what you told your friends. Maybe you can win a criterium!

Anticipate, Don't React

“He who hesitates is lost⁹.”

Riders Are Predictable

Have you ever been near the front of a group, feeling ready to make a move? Perhaps just as you were ready to jump, someone just ahead of you jumped right in front of you.

You had the perfect timing and position to jump on their wheel—no gaps to close, no wind to fight, and no extra effort required. It was so easy!

One rider exclaimed: “For the first time in my life, I felt like I had everything going for me, and could win the race!”

Another rider wins criteriums all the time. Riders always jump that split second before he does, pull him off to victory time and time again.

Although such experiences are infrequent for most riders, they are routine for others who anticipate the moves and reactions of others.

Anticipating the moves of others can provide a crucial difference. Not having to close that 0.5- to 1-second gap due to late reaction, or, worse, too much of a delay, and then no possible reaction.

Riders are predictable, and anticipation can be easy.

Beginning racers think about what they need to do. Experienced racers think about what their rivals need to do and anticipate their actions.

Packs also have a predictable fluidity. You can learn to predict and anticipate the moves of groups as well as of individuals.

Read about body language on page 56 for more information about this topic.

Accordion Effect

Driving your car, you get to a stoplight. If there are 10 cars ahead of you, it takes a long time after the light changes to green before you get to move. Each car is reacting not to the green light but to the movement of the car directly in front. The delay can take a half minute or longer. If the light changes back to red again in that half minute, you have lost several more minutes.

What if every driver started at precisely the same time. Sure, they would be a lot closer to each other, and driving insanely, but they would all get through. You get the concept.

This is called the accordion effect. It is most pronounced at the back of the field in a technical criterium and spells disaster for most riders because it can cause them to be separated, to get dropped out of the pack's draft, and hence out of the race. Each rider goes through the corner. Between each rider, a little gap opens. Each little gap has to be closed.

It is easier to ride the front. However, it really is not necessarily that hard in the back—if you anticipate the slowing of the riders in front of you and have no gaps to close.

⁹ This quote reportedly evolved from Joseph Addison's 1713 play, *Cato*. The original quote was: “The woman that deliberates is lost.”

Miscellaneous Style

Lurk

Generally, do not draw attention to yourself. Keep quiet until you are ready to move. Even then, move stealthily when possible. By all means, attack strongly.

Don't Panic

Race situations may not be going your way. Opportunities that are more favorable may develop. Panic wastes needless psychic and physical energy, worsens skills, and decreases overall performance.

Do what you can. Wait for developments. Look for changing situations and opportunities.

Big Picture

See the race. Do not just look at the wheel in front of you. Look for the overall race rhythm. Look at the faces and body positions of other riders. Look and see who is riding where. Who is behind you? Use peripheral vision. Listen for gear changes. If you are in a break, who is chasing, and how far back are they?

Roll Your Snowball Down the Hill

Save, conserve. Do not work until exhausted, except for the finish line. Plan for things to get faster toward the end.

Never Give Up

There is a good chance that if you are suffering, so are others, and that the pace will soon slow down. You may be surprised what might happen if you stick it out. You may find that if you push just a little longer, the group ahead slows and you are fine again.

When you start quitting, you train to quit. It becomes easier to quit when you are dropped up a climb, when you are in a breakaway, to sit up in the final sprint.

Never give up. I do not mean this literally. Just as when riders say they gave it 110%, it is logical nonsense. There is no point in pushing on doing yourself physical or physiological harm when today really is not your day; when you are digging yourself a deeper overtraining hole.

However, next time you are in a criterium and the pace is high, instead of thinking about dropping out, consider riding just one more lap. Maybe you will then be able to ride yet another.

In your next road race, if you are dropped on the climb, ride another 10 minutes. See if the group ahead slows, or if a group comes up from behind to carry you back up to the lead.

What if a wave comes by you in the finale and you think your chances in the sprint have evaporated? Keep going, perhaps there will be a short lull, a hole will open up, and you can win.

Although the suffering may be real, it is generally temporary. The rewards of perseverance are often longer lasting. Train yourself to be willing to accept 15 seconds of all-out effort or suffering. That is often all that is needed.

Here is a little insight into Sean Kelly, the world's number one all-round road racer for six years between 1984 and 1989. It is from a story written by Paul Kimmage, a much less accomplished Irish rider¹⁰:

“One night we went for a sauna in a health club in Volvoorde. I never liked saunas, and Kelly insisted on rising the temperature by throwing water on the stones. We lasted fifteen minutes but had to get out. It had been incredibly hot and we were both so drained that we could hardly stand.

¹⁰ Paul Kimmage in *Rough Ride*.

‘Jaysus, Kelly, you looked like death warmed up.’

And he laughed, but then said:

‘Did you never feel this tired after finishing a race?’

I thought about it. Yes, I had, but only once. It was in a prologue time trial of the Coors Classic in Boulder, Colorado a few weeks before the Olympic road race in L.A. The finish was at the top of a hard climb, and I remember losing consciousness about 50 meters before the line and waking up with a blanket around me five minutes later. It was the only time in my life I ever pushed myself beyond my limits.

‘No, Sean, I can’t remember ever being this tired. What about you?’

‘Yes, regularly.’

I looked at him: he wasn’t lying.”

Part 3

Specific Tactics

The “Matchbook” Analogy¹¹

There is a hobo freezing at the beginning of a cold winter night. He is walking down a dark alley and finds a book of matches. He is so excited to have found the book of matches that he strikes them all at once and he is able to warm his hands for a few seconds before the matches all burn out. By morning, the hobo is frozen dead in the alley.

Another hobo is freezing at the beginning of the same night, is walking down a different alley, and also finds a book of matches. He too is excited to have found the matches but decides to only strike one in order to get a better idea of what is around him so that he can see if there is enough garbage and trash to build a fire. He only lights one match at a time and with the light of each match, he is able to gather more materials until he feels confident that he can get a good fire going. He takes out another match and lights the fire. He is able to stay warm with this fire but knows that if this does not get him through the night he still has more matches and he can repeat this over and over again.

How would you apply what these two hobos do to a bicycle race?

¹¹ Adapted from Team X Strategy by Steve Rouff and Jim Whittaker.

Pre-Race Questions

Smart riders do more than just show up and race. They evaluate before they start.

As a beginning racer, you will want to review many questions and their answers before and during races.

As you gain experience, such questions and their answers will become like peripheral vision: present, but almost subconscious.

Your actions will become more fluid, responsive, and decisive.

Pre-race questions include:

- How will I get there and back?
- What is the course like? What are the obstacles? What is the terrain? What is the road surface?
- What is the length of the race?
- How many laps are there?
- Is there a lap counter? Where is it?
- How will the bell lap be announced?
- What is the weather going to be like? Will there be crosswinds? Will the weather be different in different areas of the course?
- How much warm-up will I need?
- Do I need a trainer to warm-up?
- Do I have a checklist of equipment I will need?
- Do I need to make any equipment changes for the race? Should I emphasize aerodynamics or lightweight equipment? Do I need additional equipment such as extra wheels for a service car or pit?
- If I did this course before, how did I do? What favors me? Where might I get into trouble?
- Relative to the course, what are my strengths and weaknesses? Am I relatively a good/poor sprinter, time trialist, climber, pack rider, cornerer, descender?

- Who are my teammates? How can I help them? How can they help me? What are their abilities? How are they feeling today?
- Do I have non-teammate friends in the pack?
- Who are my rivals? Who are the other teams?
- What are my rivals likely to do? What do they see as their strengths and weakness, opportunities and weak points in the race?
- Am I likely to be a marked rider? Who will watch me?
- Where is the pack likely to go hard?
- Will I want to attack, or sit in? Where might I plan to attack?
- What type of pre-race, intra-race, and post-race nutrition will I need?
- Is there a feed zone? Where are the feed zones? Do I need a feeder? Who will be my feeder?
- Where is the race start?
- Where are the intermediate sprints or primes likely to be?
- Where is the finish? What is the finale leading up to it like? How far is the last corner from the end? Is there a hill near the end? Does the roadway open up or close down toward the end?
- How far can I sprint?
- At what point must I start my sprint?
- Where are the porta-potties?

Preview the Course at Home

Even before you travel to the course to pre-ride it, you may be able to preview the course and answer many pre-race questions.

On the race website, race organizers may provide not only verbal description, but also maps and course profiles.

You may also glean valuable information from computer programs with imagery, such as [Google Earth](#) or [Google Street View](#).

Consider how, with the tilt and ruler functions of Google Earth, you can determine that the Huennekens Criterium course in San Diego (Figure 36, below) is a non-technical course, with just a little bit of roll, about 1.2 kilometers per lap, and that the finish line is 200 meters from the last corner.

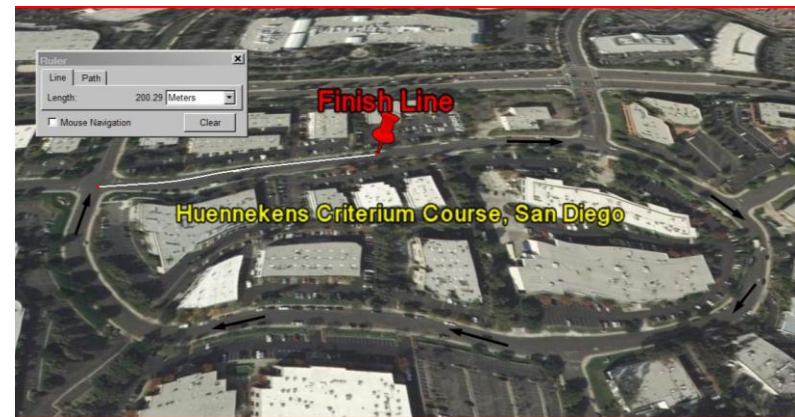


Figure 36. Google Earth view of the Huennekens Criterium course, San Diego. It is easy to determine the non-technical nature of the course, that it is about 1.2 kilometers per lap, and that the finish line is about 200 meters from the last corner.

During-The-Race Questions

- How am I doing?
- How are my teammates doing?
- How are my rivals doing? Are they getting nutrition? Are they tired? How are they recovering from attacks? From climbs?
- How far have we gone?
- In a circuit race or criterium: Where does the pack slow down or speed up?
- Who is being noticed? Am I being marked?

Specific questions to consider before attacking are on page 76.

Attacking: Introduction

“You lose 100% of the shots you don’t take.”
—Attributed to hockey great Wayne Gretzky.

Attacking vs. Pulling

An attack is a sudden energy burst or sharp speed increase off the front of a group. Attacking usually involves a hard, anaerobic effort. Its purpose is usually to leave behind or weaken others.

Attacks are at an intensity level below that of a final sprint. Sometimes they are at the same level as that of an intermediate or prime sprint.

Not all attacks are made at full-attack intensity. Attacks meant to weaken or discourage others, deceive others about your strength, or set up teammates may be made at less than full-attack intensity.

Consider a road race with a climb a few miles from the finish line. A super-strong climber may not want to attack strongly and go it alone for fear of being swallowed back up by a chasing pack. A winning tactic might be to pull off several riders with a more modest attack up the climb and establish a breakaway.

In contrast to riding steadily as a group or working together, attacking is generally working independently to achieve an individual or team goal.

Pulling is a more gradual effort increase, which may or may not drop riders off the back.

Pulling riders allows others to travel at the same speed with less work—due to the effects of drafting.

Pulling as an individual is usually illogical in an intact pack. It may be an appropriate team tactic.

If your teammate is off the front and you are in the pack you may or may not want to attack to join him. You do not want to pull the pack up to him.

19 Reasons to Attack

The question is not if you *can* attack, it is if you *should* attack. If you do attack, there should be a purpose. Here are 19 possible reasons:

1. Get away solo
2. Separate riders
3. Weaken riders
4. Race for a prime or the finish line
5. Join a break
6. Get the group excited and encourage them to pick up the pace
7. Instigate group chase of a break
8. Set up a counter-attack
 - a. For self
 - b. For teammate
9. Give a teammate a legitimate reason to sit on
10. Intimidate: destroy or weaken opponent’s morale
11. Test yourself and see how you are feeling
12. Test others and see who and how they respond
13. Warm yourself up for later effort
14. Safety
 - a. Arrive first at a technical section to control it
 - b. Shed a dangerous rider
15. Deceptive
 - a. So later attacks will not be taken seriously
 - b. To bluff that you are fitter than you are
 - c. To call attention to yourself and away from a teammate
16. TV coverage
17. Fitness

18. Practice
19. Position
 - a. Road: Set up for a sprint, climb, corner, or technical section
 - b. Mountain bike: At the start, before a descent or technical section, before dusty sections, or for a sprint finish

Attacking Questions

As discussed in the introduction to Part 3, Specific Tactics, as you gain experience, such questions and their answers will become like peripheral vision: present, but almost subconscious.

Questions to consider before attacking include:

- Who can respond?
- What are the best locations?
- What has happened with previous attacks?
- Who do you want with you in the attack?
- Who do you not want with you?
- What is the distance to the finish line?
- What is the terrain ahead?
- What is the road surface like?
- What are the wind conditions?
- Are there turns?
- Will a breakaway group work together?
- Can one recover if caught?
- What is the current speed of the field?
- If attacking a breakaway, what is the distance to the field?

Timing

Timing is crucial. As in gymnastics, it is not only strength; it is how you use strength that is important.

By observing and practicing attacks, you will realize that timing, as much as fitness, is needed for success in attacking.

After You Attack, Check How You are Doing

You have attacked. Do not just keep on working without checking how you are doing, perhaps after 10-15 seconds. Do you have a good size gap? Perhaps surprisingly, beginning racers frequently wait too long before checking. In many races, I have glued-up to an attacking rider who did not find out I was right on his wheel for more than two minutes.

If you have separated yourself well from the group, by all means go into time-trial mode.

If you have two or three other riders with you, pull over and let someone help form a breakaway.

If you have the entire field on your wheel, pull over. Be ready for someone to counterattack, and possibly, to respond. Alternatively, let the field follow the counterattack, and be ready to go again.

18 Predictable Attacks

In this section, I will discuss 18 common situations in which attacks occur.

Although attacks may be expected, they may still be effective—because expected attacks generally occur when others are vulnerable physically or psychologically.

Attacking is generally unsuccessful when it costs little for others to respond.

Riders predictably attack when using their strength means that those who respond must use their energy as well. For example, climbers attack on hills and strong time trialists attack and form echelons in crosswinds.

Riders predictably attack at obstacles: These include climbs, corners, narrowing roads, irregular surfaces such as cobblestones, changing weather (for example, rain, wind, or sun in the eyes), intermediate sprints (primes), and race finishes.

Even if the attack is unsuccessful, your rivals will have used up energy. If you attack when your rivals can draft chasers, you will have used up your energy while your rivals have conserved theirs.

Riders also predictably attack when others have worked hard and they have not, as in a counter attack—after an attack has been caught or after a prime in a criterium.

Even though predictable, such attacks may be effective because they occur when others are tired and must match the effort of the attack to respond. If riders are not strong, they will fail to neutralize the attack.

Classic attacking situations include the following:

1. From a Few Riders From the Front

Attacking from near the front, but not at the front, sets the timing and momentum to surprise most of the riders in the group with the least effort. In this case, the two front riders serve as unwitting blocks.

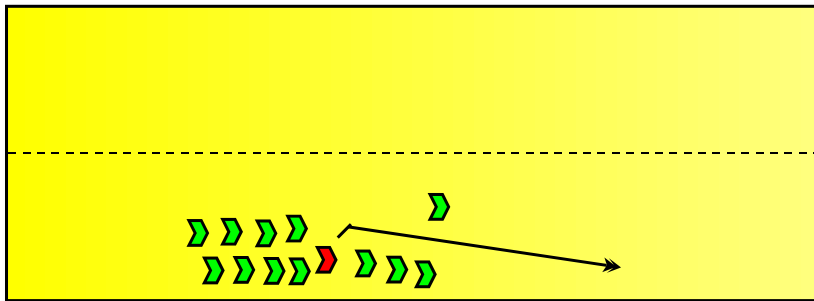


Figure 37. Attacking from a few riders back. RED attacks as the lead rider pulls off wide. The lead riders help serve as unwitting blockers.

2. Trapped Opponent

If you have one chief rival, one threatening rider, or one rider who might be expected to lead a chase, attacking when that opponent is physically trapped in the group may prevent a chase.

This can be particularly effective when you attack on the lee side of the pack and chasers are forced to take the windward side.

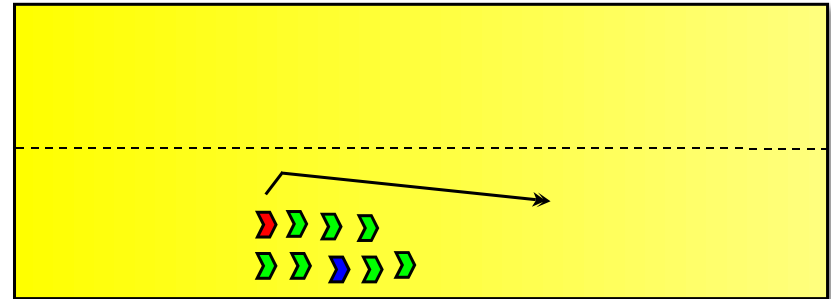


Figure 38. Attacking a trapped opponent. If RED has a chief rival (BLUE), expect an attack by RED when it is logistically difficult for BLUE to respond.

3. When Another Rider / Group is Caught

After a chase-down of a break, both the breakaway and the chasing group generally need a physical and psychological rest: A perfect opportunity for an attack.

The breakaway group may serve as unwitting blockers.

This counter-attack scenario is very common in professional racing. Teammates may sometimes be used to set up this situation.

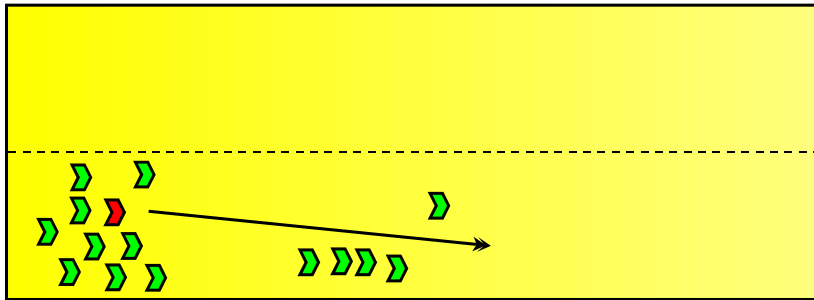


Figure 39. Attacking as the breakaway is caught. RED attacks through the breakaway as it is caught. The breakaway members serve as unwitting blockers.

4. From the Breakaway as the Chase Comes Up

Again, after a chase-down of a break, both the breakaway and the chasing group generally need a physical and psychological rest: A perfect opportunity for an attack.

Only now, the attack is from the breakaway.

The breakaway as well as the field is often confused in such a situation. If the terrain is such that a rider can soon be out-of-sight, the field may not realize that anyone has escaped.

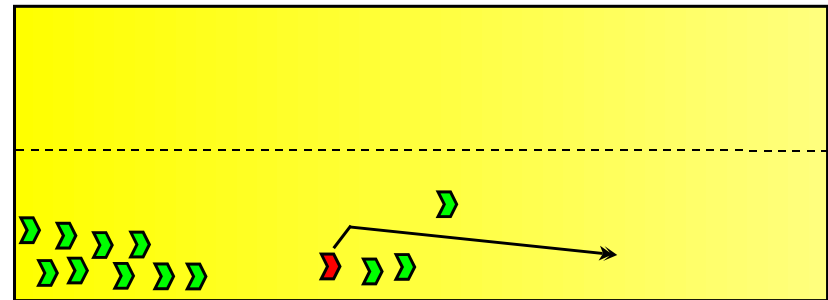


Figure 40. Attack from the breakaway as it is caught. The breakaway may serve as visual, psychological, and physical blockers.

5. With a Teammate at the Front

Although an attack is often an individual effort, teammates can help make attacks more effective.

When a teammate is pulling or just pulling off and physically blocking at least some of the group, fewer members of the group may be in a position to respond.

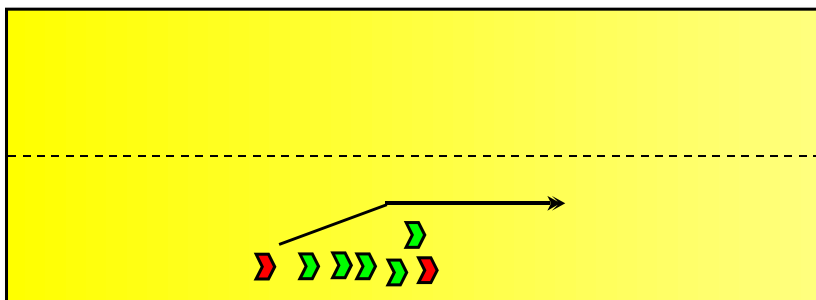


Figure 41. Attack with teammate at the front. The rear RED attacks with a RED teammate at the front.

6. Near the Top of a Climb

Riders possess a mixture of aerobic and anaerobic fitness. Those without aerobic fitness do not climb well, and are shed from climbs early.

Although good climbers possess high-level aerobic fitness, many do not have corresponding anaerobic fitness.

Expect anaerobic-aerobic athletes to try to shed the pure aerobic athletes near the tops of climbs with anaerobic efforts. Alternatively, heavy riders or great descenders may make a run for it.

7. After a Prime / Intermediate Sprint

In this common situation, most riders will be tired and vulnerable to an attack. It is common for a rider or group to keep going or attack after a prime. Solo attacks from riders who draft the prime winner, or draft a chasing bunch to the prime winner are common.



Figure 42. Katheryn Curi, leading in red, will win this prime. Will she keep going? Will other riders attack just after the prime? Photo © Garrett Lau.

8. When There are Corners or Twists

If you attack for all to see, and there is a long open stretch of road, it is easy for chasers to set their sights on you and work to reel you in. Around a bend or corner, you have a better chance of staying away, out of sight, out of mind.

9. With Changing Terrain or Other Camouflage

As above, it is easier to attack successfully when others cannot see you up the road. Trees, dappled shade, spectators, and others forms of camouflage make it more difficult for chasers to track you.

10. When Multiple Fields are on the Road

When multiple fields are on the same course, it may be more difficult to track breakaway groups or individuals.

Overtaking fields present the possibility of race neutralization—officials require the field to slow down and allow another field to overtake them. This means that a breakaway up the road can escape because chasing may be prevented.

11. When a Change in Wind Direction is Coming

Changes in wind direction present tactical opportunities. Savvy riders know the race route and anticipate such changes, often attacking as much as several miles before these changes occur in order to profit from them.

A strong team may attack before a crosswind section. Then the strong echelon created may quickly gain considerable time on the rest of the pack. Read more about echelons on page 23.

12. When Rain Starts

Rain decreases tire adhesion and makes crashes more common. This increased danger is more of a problem for unskilled riders.

Skilled riders quickly move to the front of the group. They often band together and attack.

13. Near the Race End

When sprinters are worried more about each other than about you, they may delay a chase and allow you to escape.

14. Short Line Through a Corner the Pack is Taking Long

Read more about lines through corners on page 85.

15. Outside-to-Inside Criterion Corner—Chopping the Corner*

Read more about lines through corners on page 85.

16. Crash or Other Disruption in the Pack*

Anything that distracts the group is used by profiteers as an attacking opportunity.

Crashes are unfortunately all too common distractions. Riders often attack. General classification riders in stage races generally do not attack each other in such circumstances.

17. At Feed Zone*

While many riders are busy picking up waterbottles or musette bags, opportunists charge away.

18. When a Vehicle Passes—Gaining a Temporary Draft*

Blatant motorpacing is not permitted in racing, but officials may ignore a short stint behind a passing vehicle or TV-camera motorbike.

* Considered by some unsporting. Although sometimes unsporting, be aware that many riders will use these opportunities to attack.

Surprise Attacks

Although many attacks are predictable, others are effective because they occur in situations that are generally unpredictable, or even apparently irrational.

Consider this scenario: There are 200 yards to the top of a climb, then one-mile straight downhill into the wind, a couple of corners, and finally one flat mile to the finish.

The race generally might be for the corners; no one is going to attack downhill into the wind. *Everyone* knows that a pack is faster than an individual going downhill, especially into the wind.

What if you roll away on the last part of the climb, and pedal smoothly, in an apparently non-attacking way, downhill. The pack may not react because a single rider cannot get very far alone downhill into the wind.

Can they not? Sure—if the rider works hard (albeit smoothly and not necessarily noticeably) and the pack is letting everyone else go

into the wind first. Really punch around the corners and get out of sight. Some riders in the pack might have trouble believing there is anyone up the road!

Here are five surprisingly effective times to attack that for most riders are not quite as predictable as those outlined above are:

Into a Tailwind

Everyone feels great in a tailwind. Escapes are often difficult. On the other hand, when a super time trialist goes, it forces everyone to work, and the riders drop one by one, preventing them from working again together. In a criterium, attacking into the tailwind side can give you extra time: Normally a criterium pack does not get organized into a headwind—they normally organize on the tailwind side. Timed right, an attack into a tailwind may give a bigger gap because the initial disorganization that accompanies many attacks means the pack won't organize for a full lap—the next tailwind section. You may have an extra half lap in which to work.

Into a Headwind

Who would dare? On the other hand, who wants to chase you, using their energy to pull the rest of the pack along? Another chance for a time trialist to go.

Before the Climb

Attacking before a climb can give you extra time to get up it. The climbers may save it for the ascent itself. However, you may have such a gap as to be enough ahead to get to the top before them. This works best into a little bit of headwind and in small fields. With large fields, the momentum of the pack is so large that you are likely to be swallowed up and waste your energy.

Just After Being Caught

Who would expect it? The field will think you are done. If you have tempered your efforts before being caught and are recovered,

such attacks can be demoralizing to others and devastating in their effect.

Prearranged Group, From the Gun

Many riders especially in a long race, like to warm-up in the early miles of the race. Others always play the odds, knowing that early breakaways generally do not work. However, if you arrange a strong group, jumping off the front in a criterium or road race right from the start can occasionally work.

Sneak Attacks

A strong attack sometimes discourages others and gains an immediate gap. However, a strong attack is perceived as a real threat—which of course it may be.

An attack is often defined as a hard effort meant to leave behind or weaken others. Some coaches advise never to attack half-heartedly—attacks should be sharp, solid actions.

I disagree. There are times when it is best to camouflage one's attack—to make an effort to separate yourself from others, but not so obvious an effort as to be perceived as a threat.

After all, it takes considerable strength to move away from the field, especially when they are watching you.

There are ways to effectively gain a gap without necessarily sharply accelerating. Gaps need not always arise from anaerobic efforts.

Sometimes it is possible to separate oneself without worrying others. This is a key point in many successful moves: Other riders feel they could match your efforts, but if they do not feel threatened, they see no need to do so. Here are some examples:

Again, although you may be a marked rider, you can still successfully get away if your rivals mistake your efforts and do not perceive them as a real attack or as a dangerous move.

Three common scenarios follow:

Roll off the Front

A sharp increase in speed is noticed. However, if you slowly increase the tempo, it is possible the others will stay at their own speed, and not realize that you are creating a gap. Since your effort is not perceived as a threat, you may just roll away. Alarm bells do not go off. Strong time trialists can catch the pack napping, and gain considerable distance before riders realize it: “Hey, he’s pretty far out there, and we’re not gaining on him—he’s rolled away.”

Lull Your Opponents into a False Sense of Security

Fool your rivals into thinking you are not a threat. Make apparently unsuccessful false attacks. (This also serves as a great warm-up.) If your repeated efforts get you nowhere, people may stop noticing them. Then you can really make the effort that counts, and riders will figure the same low-level response will get you back—which, for your serious effort, will not.

Read more about tactics involving *lulling* your opponents on page 64.

Make Offensive Move Appear Defensive

Cover a breakaway or an attack that makes your move appear defensive, when it is really an attack or offense of your own. Jeannie Longo used this strategy to win the women’s 1996 Olympic road race.

Attacks Unlikely to Succeed

Some situations make attacks very unlikely to be successful.

Be cautious about attacking when others are fresh, when the pack speed is expected to increase soon, when the attack requires too much effort, or when the attack is expected.

If the pack speed is expected to increase soon, an attack is unlikely to be successful. For example, if a long straight descent is coming, the pack will travel much faster than an individual or small group of riders down the hill.

If you are a poor climber, attacking shortly before a major climb will mean that you will effectively increase the length of the climb, having to work harder longer than otherwise.

Too much effort is needed to attack from the back of a very large field. Further, someone along the way is likely to shout “Attack!” and neutralize your move.

Attacking under surveillance, from the very front of the pack, especially if you are a marked rider, rarely works.

Attacking Positions

It is easier to attack from the back of a small group or from no more than 20 riders back in a larger group. If you attack from the front, everyone can see what you are doing and you will not have the element of surprise to help you open a gap.

Attacking from near the front of the field, but not at the front, may allow you to create the maximum gap with the least effort.

Being near the front means that you do not have to pass too much of the field to separate yourself from the group.

Being at the front would mean that you do not have the benefit of surprising the lead riders, who may serve as unwitting blockers.

If you attack from behind a small group, it is even easier if you let a small gap open, and attack into the gap, and then around the group. Then you can accelerate into the draft of the group and come around with even greater speed, allowing you to open a lead more quickly and with less effort.

Attacks: Edge of the Road

Attacks commonly occur at the road's edge. Fewer riders are in a position to respond. The gutter may camouflage the attacker. The attacker is physically further away from more riders.

Charging from the opposite side of the road or weaving may help keep shake riders off your wheel, but may also be dangerous.

Attack Formations

Like football, sometimes teams can create formations that improve the chances of attacking, or help defend against attacks.

Although there are many exceptions, whereas blocking is often best with teammates separated, attacking is often best with teammates near each other.

Five riders in an X-formation, or several riders lined up behind each other are classic positions.

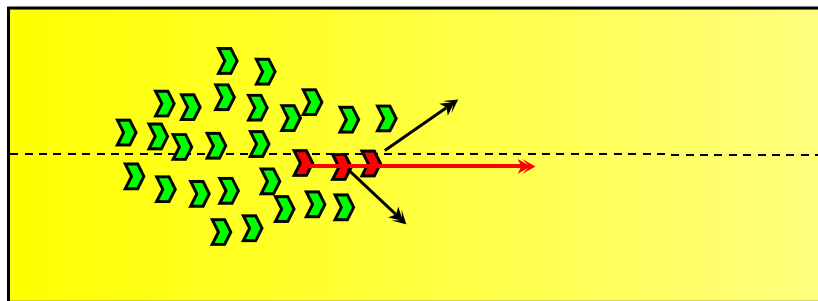


Figure 43. Lined-up teammates can help lead out, block, or provide multiple targets.

Pack Dynamics

Normally in a race you can count on a couple of riders to try to counter an attack or catch your teammates, and at least an equal number of “neutral riders”—followers on automatic drafting pilot, riders who would just as soon sit in, riders whose tactic is to save it

for the sprint, or riders trying just to survive. It may not take more than a couple of riders to control the pack.

Attacking the Breakaway

With relatively small numbers, you may be able to choose the time to attack based on the expected responses of almost every rider in the break.

Read more about tactics involving attacking your breakaway opponents on page 110.

Attacking One-on-One

If in a two-person break, attack when it is to your strength advantage. For example, are you a strong time trialist, climber, or technical descender compared with your breakaway companion? Depending upon your relative strength, attack on a roller, climb, or descent.

Attack when you have the element of surprise. For example, after several equal pulling efforts.

Approaching the finish line, does your opponent predictably check over his right shoulder to see your position and if you might attack? Attack just after he checks, perhaps on the left.

Relay Attacking

Relay attacking is the repeated attacking of an individual by more than one rider. Such actions may be made by teammates to set one of them up, or by riders from different teams against a stronger rider.

Different riders in a breakaway may attack the strongest sprinter—knowing that if they do not, they have no chance to win.

Riders in a stage race may relay attack the GC leader on a climb, knowing that if they fail to work cooperatively together to dislodge his lead, they have no chance to win themselves.

Wind, Corner & Climb Attacks

Wind Attacks

Headwinds and tailwinds present tactical opportunities for riders who have time trialing strengths.

If you are chased into a headwind, the nonchasers in the pack will get a free ride and you will have wasted a lot of energy if you are caught. However, even if you are not the strongest time trialist, attacking into a headwind may work. Many riders are simply intimidated by a headwind. Strong riders commonly watch each other and are reticent to work because no one wants to give anyone else a free ride.

Everyone feels great in a tailwind and escapes are often difficult. However, when a super time trialist goes, it forces everyone to work. Riders drop one by one, which prevents them from working again together.

When the strongest riders attack and gain a gap in a tailwind, it may be impossible to catch them. Riders drafting chasers actually slow chasers because they block the benefit of the tailwind.

If you are not the strongest time trialist, attacking into a tailwind may not work because the strongest time trialists will work knowing that no one is really getting a free ride.

Criterion

Riders generally feel more inclined to ride hard with a tailwind. On a headwind/tailwind course, there are times when it is advantageous to attack on the headwind side: No one may want to work to chase you and give others a free ride.

Depending upon the field, the reverse may be true and a tailwind attack may be more likely to succeed. If the pack is disorganized, it

may take an extra lap before riders get organized, if they get organized at all.

Teamwork: Attack in a Strong Quartering Tailwind

The fastest line may be on the windward side because the tailwind helps push the attacking rider along.

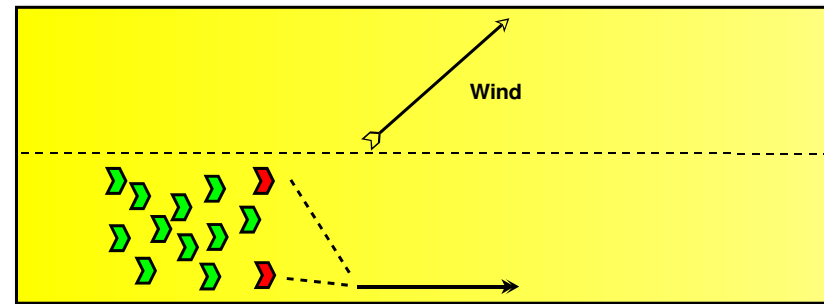


Figure 44. Attack in a strong quartering tailwind. Teammate helps block. To come around, chasers lose draft.

Headwind Attack

Questions to consider in deciding whether to attack into a headwind:

Will the group organize to chase?

Are you or your breakaway companions good time trialists?

Are there blockers back in the field?

Are the winds straight on, or quartering from the front and side?

Teamwork: Attack in a Quartering Headwind

The fastest line may be on the leeward side and riders will be forced into the gutter. To pass RED's teammate, a chasing rider will make it easier for the teammate, giving him an echelon draft. In second position RED's teammate will then be able to passively block.

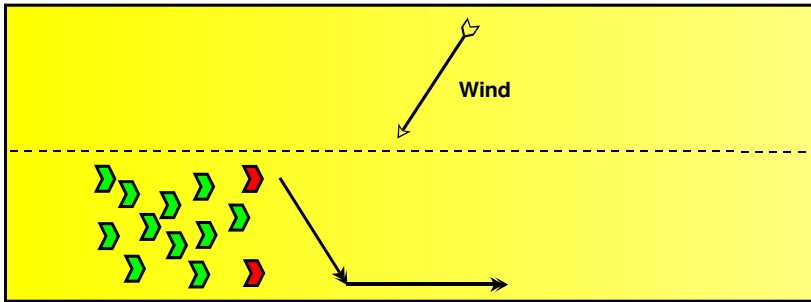


Figure 45. Attack in a quartering headwind. Teammate helps block. To come around, chasers lose draft.

Corner Attacks

The short line may be the fastest since the least distance must be covered.

The long line may be the fastest if timing and momentum allow you to gain a gap on your rivals.

(In the same way, on a velodrome, the shortest line is on the bottom of the track. However, a rider high up can use momentum to then swoop down at higher speed.)

Attacking while cornering presents skill challenges and risks. Keep your eyes open for rough patches or other road hazards.

Corner Short-Line Attack

Perhaps surprisingly, the field often takes the long line.

Why would the pack take long line? Perhaps the pack is led by a teammate as in the figure below. Perhaps there are crosswinds and riders seek shelter. Alternatively, perhaps due to traffic or habit, riders just ride the long line.

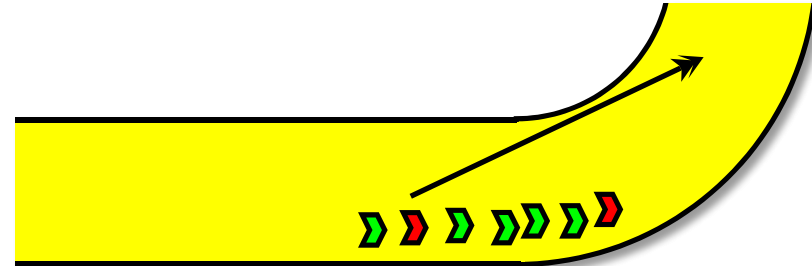


Figure 46. Corner short-line attack by a RED rider. The group is being led on the long line by a RED teammate.

Corner Long-Line Attack

Accelerating and then chopping the corner can provide a gap on rivals who will then not be able to corner as quickly. Following riders may need to brake. Such tactics can be dangerous.

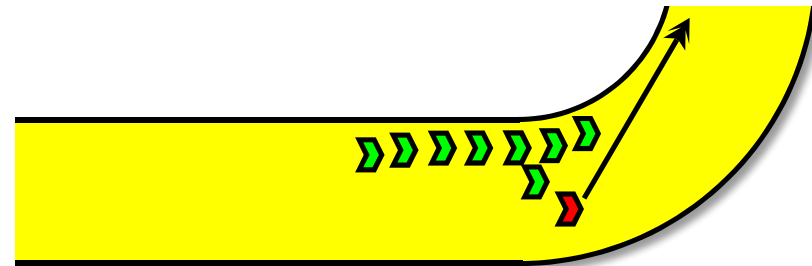


Figure 47. Corner long-line attack by RED.

Climb Attacks

Attacking on climbs can often work because it takes more effort for others to respond

Relatively small climbs may be decisive if repeated many times on a circuit.

Read about training for climbing in the *ABC* book ACE (Altitude Climbing Endurance) Training for Cyclists.

Questions to consider about climbing attacks include:

- Will there be attacks before the climb? In what ways might such attacks succeed?
- Will teams force the pace before the climb?
- Where in the pack do I want to start the climb? How can I get there?
- What is the size of the pack?
- Is the climb long-steady (aerobic) or stair-step (aerobic-anaerobic)?
- What is the distance to the finish?
- What gear should I be in?
- What are the wind conditions?
- Is it hot?

Attacks Before the Climb

Riders who attack before the climb may gain an advantage—although many riders will be wasting precious energy if they fail to gain advantage.

Non-climbers can do well if they attack early, are not considered threats, and gain a lot of time.

Attacking before the climb can give extra time to get up the climb. You may have enough of a gap to be ahead at top, or just be caught near the top of the climb and so avoid being dropped on a climb that you might otherwise not be able to ascend with the leaders.

Climbers may not respond to an attack before a climb, planning to save their energy for the climb. Non-climbers may not respond, wanting to save all their energy for the climb and not be dropped on the climb.

Attacking early sometimes works best if there is just a little headwind and a small field. With a tailwind, riders are more inclined

to chase. In large fields, with large-pack momentum, you are more likely to be swallowed up by the increase in tempo that commonly occurs before a climb.

Teams may send a non-protected rider on attack before the climb. Either this will toughen the race and help the climber, or the attacker may arrive at the top at the same time as the stronger, protected teammate climber and so provide a breakaway ally after the climb.

Forcing the pace before the climb is a common team tactic. This results in more riders being at their time-trial threshold earlier in the climb, and so means that splits in the group, presumably with their protected team climbers, are more likely.

Start Climbs Near the Front

In general, start climbs near the front of the pack if you can. Depending upon terrain and team tactics, you may be able to move up to the front shortly before the climb. In other situations, you must move up several miles before the climb itself.

Once climbing, the pace and effort at the back is the same as it is near the front. Starting near the front gives you a buffer to slip-slide rearward in the pack and still keep contact. You do not have this option if you start at the back of the pack. In general, the weaker riders are at the back. If they gap you off, you will have to work harder than the leaders to keep contact. Read more about climbing energy conservation on page 45.

Starting and staying at the front also allows you to be part of the action.

Aerobic vs. Aerobic/Anaerobic Climbers and Climbs

Riders possess a combination of aerobic and anaerobic fitness.

Pure aerobic climbers can climb well steadily. Aerobic/anaerobic climbers can climb steadily as well as surge or attack. Riders generally are dropped only when anaerobic.

An excellent pure aerobic climber will want to keep the pace high in order to drop as many rivals as possible.

An aerobic/anaerobic climber will use changes in gradients or attacks to shed drafting aerobic climbers.

Attacks by aerobic/anaerobic climbers early on a climb are not generally as effective as attacks near the top of the climb. Great aerobic climbers can let early attacks go and then slowly bridge the gap.

Cresting-the-climb attacks where a flat or downhill section follows may allow aerobic/anaerobic climbers to escape pure aerobic athletes who then will not have the benefit of a group to catch.

It is quite common for two good climbers to predictably beat each other on different climbing courses. The pure aerobic climber may eventually drop the aerobic/anaerobic climber on long grades. The aerobic/anaerobic climber may drop the pure aerobic climber on stair-step climbs or win hilltop finishes where the climbing pace is partially controlled by headwinds or group dynamics.

Gears

Gear selection is important.

An easier gear results in a faster cadence and a higher heart rate. A harder gear taxes the muscles more.

An easier gear, using a faster cadence, allows for snappier accelerations.

A smaller gear may allow faster rpm and snappier accelerations, but if there is a hilltop sprint, may prove too easy a gear for high-end anaerobic efforts. It takes just a little longer to shift a chainring than it does a rear cog. Being trapped in the small chainring may rob you of a sprint you might otherwise win.

Wind Conditions on Climbs

Although the draft effect is considerably reduced on climbs, as the speeds are lower, it can still be important, especially when headwinds are present.

Where a climb has a tailwind, great climbers will immediately go to the front and start riding hard. This will result in the largest gaps at the top.

Heat Plays a Role, Takes a Toll

Climbs, especially tailwind climbs, are often hot.

Dress or undress appropriately, and expect that overdressed riders will get into trouble.

Most Successful Attacks Happen After Half of the Climb

Early individual or small-group attacks on long climbs are usually unsuccessful. Riders may not yet be at their threshold pace, and so may be able to increase their effort aerobically or anaerobically.

After half to the climb many riders will have reached their time thresholds, some will be already working anaerobically. These riders will not have reserves to respond to attacks.

Attacks commonly drop riders at their aerobic limit during the final third of climb.

Attacks commonly drop riders without anaerobic fitness near the top. Attacks where the road flattens out after the climb and where the group will work together are often successful.

Descents

The descents after climbs present opportunities for climbing leaders to maintain or increase their advantage. They also present a real physical danger for riders trying to escape and those chasing them.

On straight descents, a large group will travel faster than individual riders will.

On technical descents, an individual or small group may have the advantage, being able to choose their line and negotiate corners more quickly.

Descending quickly in a race demands skill, alertness, and a tolerance for risk.

Read more about the skills of descending in the *ABC* handout *Climbing & Descending* and the *ABC* book *ACE (Altitude Climbing Endurance) Training for Cyclists*.

Countering Attacks

“I don’t skate to where the puck is. I skate to where the puck will be.”

—Attributed to hockey great Wayne Gretzky.

If you know who is going to attack, and where, you can be in the right place at the right time.

Expect Attacks from Others

You will not be the only person to attack. Plan for others to counter those who attack. Plan for your own counters.

You cannot watch every rider. Before and during the race consider who is likely to attack. Who are your chief rivals? Who are the teams? In a stage race, does it really matter if certain riders get away? Do they really present any threat to you?

Local riders often go for local wins, or even go for just the glory of visibility during part of races on their home turf.

With experience, you may be able to predict who will attack, and where, before the rider himself knows it.

Use your ears to listen for whoosh-whoosh of an accelerating bicycle.

Pay attention to gear and bicycle position changes, shadows on the road, and body language as discussed beginning on page 56.

With experience, you will develop a sixth sense about when attacks will occur.

Counters, or Guards against Attacks

Attacks can be controlled or countered individually or with a team.

Do you want to go with the attack and have it succeed?

Do you want the attack to go and be temporarily successful without you? Perhaps to tire out its riders and allow you to counterattack later?

Do you want the attack to be immediately neutralized?

Prevent Attack

If you are aware that an attack is coming, subtle action might prevent it from occurring. For example, if you see a shadow, or hear a rider accelerating from behind to a hole in the pack on the edge of the road, a subtle, safe maneuver toward that hole might physically block the attack.

Mark Riders

Potentially attacking riders can be marked. You or a teammate can sit on their wheel and be ready to jump with such riders should they do so.



Figure 48. If you are not near the front when an attack occurs, your options for responding are limited. Photo © Garrett Lau.

Zone or Personal Defense

As in basketball or football, individual teammates may mark specific rivals, play a zone defense in certain parts of the field, or be more active at certain times of the race.

Keep Tempo

Generally, a team effort, the team may keep the pace high. Such an action by the GC leader's team in a major stage race serves to thwart energy-sapping chases. Sprinters teams do the same thing toward the end of a race to discourage opportunists as well as to give their sprinter a leadout.

Warn Others

Individual riders, who cannot or prefer not to respond themselves, often alert others. They typically yell something like: "Attack on the left."

Get Others to Chase

If you can persuade others to chase down an attack, you can save energy. Remember, do not do other riders' work, or the work others will do, unless there is a good reason.

Chase Yourself

Marking an attack or jumping with an attack may not cost you that much relative energy. Unless you are working for a protected teammate or just about the strongest rider and can pull things back together and still win in the sprint, pulling the field back to close down another's attack is generally the last resort.

Blocking

Blocking is a tactic used to impede or slow down an individual or group of riders. It can be physical or psychological.

Although physical blocking in other sports often involves bodily contact, as you will see below this is not usually the case in cycling.

It is a very important tactic when, for any of several different reasons, it becomes advantageous to slow down the group.

Blocking often requires persistence. A rider or team blocks, others come around the block to lead, a rider or riders block again.

It is often a matter of slowing an individual or group of riders by just a few seconds here, a few seconds there.

Blocking may be useful in most types of mass-start bicycling events.

Why Block?

Although blocking is usually thought of as a team tactic, it can also be used successfully by individual riders to weaken others or create tactically advantageous positions.

As a team rider, blocking can be used to:

1. Help a rider breakaway or sprint, generally a teammate.
2. Control the pace for a sprinter. The team sprinter may have a fabulous finish, but no high-end endurance. If the pace is too high for too long, the sprinter burns up. Blockers slow the pace, allowing the sprinter to sit in and win at the end.
3. In a stage or points race, set up a breakaway that does not threaten the chances of a protected teammate. This may relieve pressure on the team to set the pace or chase other more dangerous breakaways. Read more about blocking and stage race tactics beginning on page 152.

4. Force other teams to chase. This may result in other teams doing more tempo work or force them to attack, allowing a counter move later on.

As a solo rider, blocking can be used to:

5. Divide other riders. Read more about this topic in *Teamwork Without Teammates* on page 124.
6. Provide time to recover, or contrarily...
7. Help bluff that you are tired.
8. Correct or gain the timing for later efforts.
9. Work on a real or imaginary mechanical issue.
10. Gain time to analyze race dynamics or check riders' positions.
11. Force others to work.
12. Send a message that others must share work. For example, "I'm not going to pull the whole breakaway; if that means we get caught, so be it."
13. Encourage attacks to:
 - Tire the group
 - Set up a counter
 - Frustrate a rival. Read more about frustration on page 63.
14. Improve safety. For example: Blocking and keeping a group together for a descent may result in a safer descent than if the field is split, with riders chasing each other down at break-neck speeds.
15. Provide opportunities to bridge.

Riders are often unhappy when others do not work to help them win. Be crafty, if possible, so that others are unaware of your actions and less likely to be upset or take countermeasures. If others are aware that you are blocking, you may become unpopular and subject to oral or physical abuse. Avoid erratic or unsafe styles of blocking.

Passive Blocking

Passive blocking is simply not contributing to the work of a group. For example, sitting in the back of the chase group and doing no work.

Other riders may no longer want to work, to carry you toward the finish line. Alternatively, they may work at less than full commitment, fearing a counterattack and wanting to save something.

Alternatively, they may get frustrated and mad, worry about you not working. You may discourage their progress.

Well-known strong riders (“patrons”) may also effectively control a race from the back of small or large groups.

Active Blocking on the Front

Taking a turn at the front and subtly slowing down can effectively block a group on autopilot. Slow down little by little, so that the pack’s speed falls.

How subtle a slow-down? Rarely more than a few miles per hour, sometimes only a few tenths of a mile per hour.

If you slow down too much, or too quickly, other riders will be wise to you, pass you when you are at the front of pack, making blocking efforts less effective.

Active Blocking Near the Front

Keeping near the front, but not necessarily on the front, can prevent smooth chasing efforts and an effective front rotation.

For example, stay second or third in the pack and jump on any wheel that comes by and refuse to work or pull. When another rider comes by to pull, jump on the new lead rider’s wheel, and when he pulls off, pull off with him or beside him.

Repeat.

This form of blocking, common in American and amateur cycling, is less common in European professional racing.

Active blocking, controlling the front of the group, can be hard work.

Active blocking is generally noticed, and other riders may become annoyed at your tactics. Other riders may try to hook you, elbow you, and abuse you verbally or otherwise.

Riders are mostly likely to understand this tactic when you have a teammate off the front of the bike race.

Most riders, when they understand what you are doing—even if they do not like it—do not take it personally—especially if you talk, apologize, and keep things friendly.

Attack Blocking

Imagine you are in a chase group trying to catch a breakaway containing one of your teammates. After some active blocking, the chase group starts yelling at you to stop interfering with the chase. Not wanting to fight, you move to the rear of the group and sit on, passively blocking.

Now the chase group begins to be fed up with your sitting on, even though they understand it. Riders in turn start gapping you off, and you can see that you will be subject to this torture. (See Gapping to Discourage or Rid a Wheelsucker on page 98.)

Change your role to aggressor. Attack the group. Be careful! You do not want to increase their speed for very long. Moderate the length of your jump. They will probably accelerate to catch you. This may disrupt their organization, and overall, slow them down. If the group again begins to work together, it will now likely work less intensely. Why? Some riders will need to recover from anaerobic efforts and riders will want to save something to guard against further attacks. A few more such attacks and the group will likely start playing cat and mouse and the breakaway with your teammate will be secure.

Multiple Blockers

When several teammates can work together to block, blocking is generally more effective if they are spread out near the front of the group.

For example, with two teammates if they are say 2nd and 6th in the group; with three teammates if they are 2nd, 6th, and 10th.

Two riders attacking-blocking on opposite sides of the road are an alternative effective tactic.

Boxing in Riders

Physically impeding a rider can be effective.

Subtlety is usually required, or the boxed-in rider often becomes verbally or physically combative.



Figure 49. Boxing in riders. RED is boxed in.

Boxing in a Chase

You have a teammate in the break with a good gap, and another strong team starts a rotating paceline, chasing. Only this team, not the whole field, is interested in a chase.

Solo, you can box in the entire team. Do not attack the pack. Pull the pack up to the front of this chasing team, and move over. The entire chase team will be boxed in.

Why will the pack follow you? As long as you ride steadily, they will just be following your wheel, marking you.

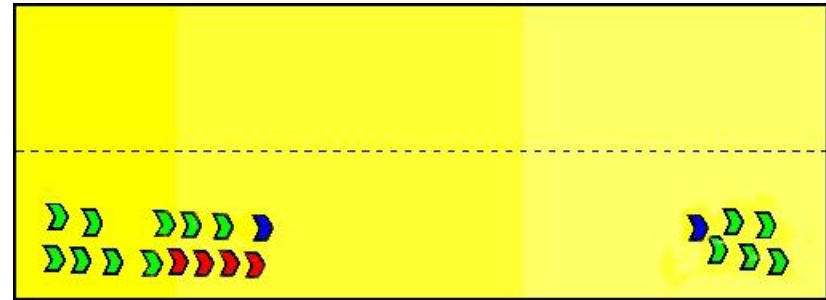


Figure 50. Boxing in the chase. Team RED is chasing. BLUE, with a teammate in the breakaway has pulled the pack up on the outside, and will soon move over on RED, boxing in the team chase.

Mass Team Blocking

With a team and a narrow road, it is relatively easy to physically obstruct the progress of a group. The team masses at the front and rides at only a moderate speed.

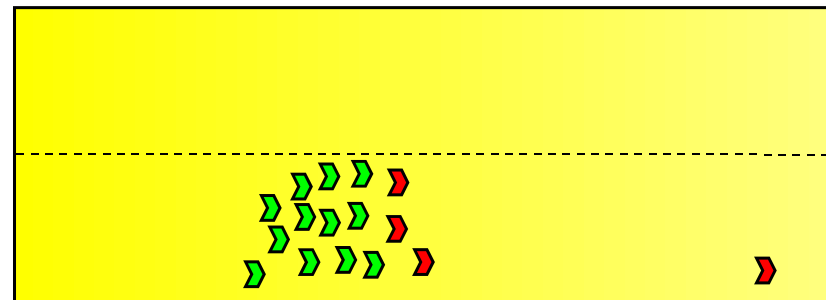


Figure 51. Mass Team Blocking. The centerline rule in effect, just a few RED riders are able to physically obstruct the progress of the pack.

One Teammate Block

A single rider may be able to block effectively. In a crosswind situation, a single rider can lead an apparent chase on the lee edge of the road. Although riding slower than echelon could travel, other riders may not want to come around into the crosswind. If another rider does come around, it will be relatively easy for this single rider to stay protected in the lee and then passively block again when the leading rider tires.

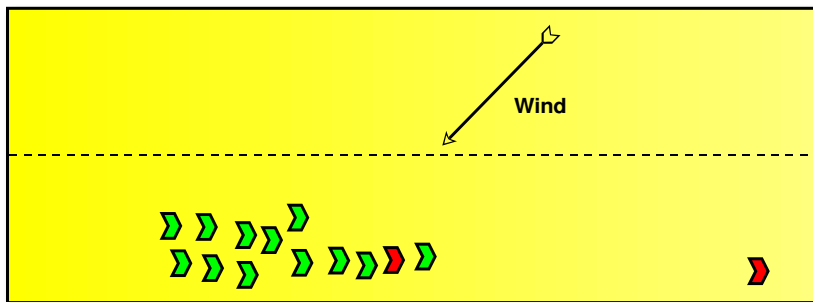


Figure 52. One Teammate Block. A single RED rider blocks for his teammate. He stays near the front, allowing a rider or two to work, but disrupting a smooth chase. In this scenario, a crosswind means that many riders are forced into the gutter.

Criterion Blocking

The essence of criterium blocking is to control the corners.

Changing momentum, safely, around the corners impedes the progress of the pack.

Both lines of corner approach—outside-to-inside, or inside-to-outside—may be used to block effectively.

If you arrive at the corner first and take the outside to inside line and slow slightly, the pack will shut like an accordion.

If you take the inside to outside line and slow slightly, the pack may be squeezed to the gutter and forced to slow down.

“Fred” Blocking Method

Act unskilled. Pretend that you cannot ride a bike in a straight line. Weave a little, miss shifts. Riders may not want to ride near you.

I have known riders to win this way, keeping others from passing, until ready and able to sprint for the finish line.

I do not recommend this method, but you should be aware of it. If you use this method, ride safely.

Talking Blocking

Distraction by talking can be very effective in forestalling a chase. Many riders want to be polite, and when engaged in any chat, naturally tend to reply and lose concentration or focus on the race. Alternatively, if you engage riders in a controversial subject, they may waste their energy arguing.

Bluffing Blocking

Bluffing occurs when riders may act tired or strong when they are not.

A rider may sit in and act as if tired or in trouble if blocking for a teammate or teammates ahead. When he no longer needs to block, this rider’s energy levels may return quickly. Riders may feign exhaustion if they think that you may carry them to the finish line, where they may suddenly develop the energy to sprint.

Riders may also effectively block by feigning strength they do not have. They may thereby intimidate others not to attack them.

Read more about bluffing—feigning fatigue or strength—on page 63.

Let Riders Go: Gap

Gapping-off riders is a special blocking technique. It not only slows riders, it disorganizes them and is therefore especially effective. Gapping is discussed in more detail on page 96.

Letting a rider go who is pulling the pack may be useful if riding alone he is not likely to catch the break, or if he will not be a factor in the sprint if the breakaway is caught.

A strong rider pulling at the front may encourage others to work. Letting a rider go may disrupt the chase.

Gapping can also allow a teammate to separate from the field without the need to surge or accelerate. This may save energy for the lead rider.

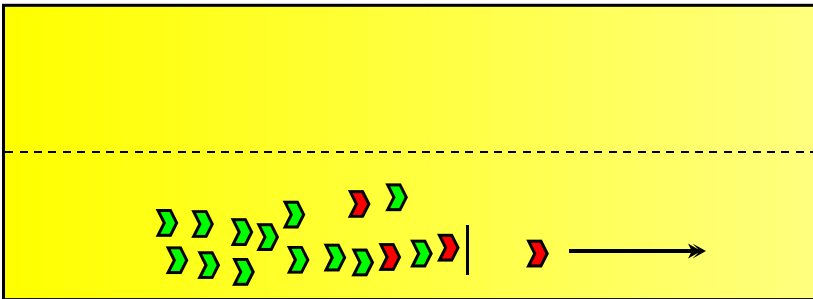


Figure 53. Gap and Block. The RED rider at the head of the pack has just gapped off a RED teammate. Two other RED teammates are sitting near the front of the pack.

Gapping

Gapping is letting some space open up between you and the rider in front of you. Whereas attacking uses *one's own* energy to gain advantage, gapping forces others to use *their* energy to gain or equalize advantage.

By subtly slowing, you can create a gap on one or more riders whether they keep a steady pace or, preferably, accelerate

Gapping is a powerful blocking tactic. In many situations it allows you not only to rest, but it also forces others to work harder.

9 Reasons to Gap

Review the reasons to block on page 91. The following reasons to gap will be discussed in detail.

1. Allow an individual or group to escape
2. Create and join a breakaway
3. Allow an echelon to form
4. Rearrange a breakaway
5. Discourage marking
6. Get rid of a wheelsucker
7. Force two groups to work
8. Rid chasing group of strong chaser
9. Create an opportunity to launch; with or without teammates

Gap Allows Individual or Group to Escape

In a group of 13, a RED rider sees that he has 3 teammates in the leading group of 5 riders, and gaps them off. Other things being equal, the odds for the RED team have improved considerably.

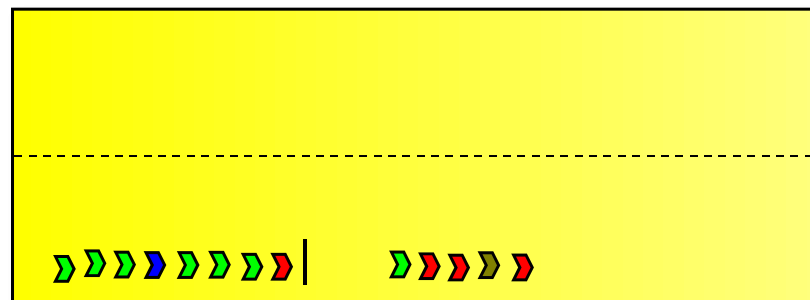


Figure 54. Gap allows a group to escape. The RED rider who allows the gap to open is letting five riders escape, three of whom are his teammates.

Gap to Create and Join a Breakaway

Riders, especially marked riders, may find it difficult to initiate a breakaway. It may take many energy-sapping attempts. It is often easier to join an already established break, one that has the right riders to succeed.

Here, as above, one of the RED riders, a strong jumper and pursuiter, creates a gap. This allows a breakaway group to escape, a group that contains three of his teammates.

Once the breakaway has a gap that he but few, if any others, can bridge, this RED rider plans to jump across the leading group, leaving the riders behind stranded.

Alternatively, once the breakaway is established, one or more of RED's teammates may stop working or drift off the back of the group to bring him up.

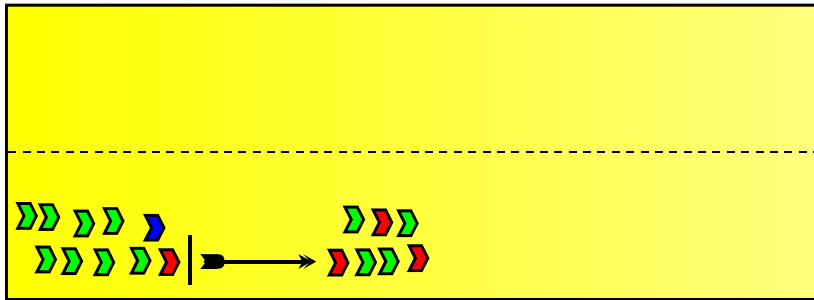


Figure 55. Gap to create and join a break. The RED rider creating the gap plans to jump across once the breakaway is established.

Gap Allows an Echelon to Form

An echelon, or staggered paceline, forms when there is a side wind.

All the other riders are forced to ride the gutter, unprotected from the wind.

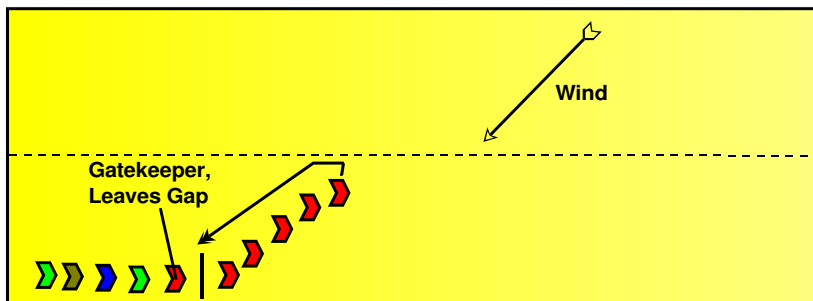


Figure 56. Gap to form an echelon. In this case, only the RED riders are protected from the wind.

A teammate or cooperating rider remains protected as the first rider in the gutter. As riders pull off, this gatekeeper allows a small gap to form into which the working members of the echelon can slot into place.

Sophisticated riders behind will form a second echelon rather than ride unprotected.

Gap to Rearrange a Breakaway

RED wants to rearrange the breakaway group. He prefers to be on BLUE's wheel rather than on the third GREEN's wheel, for two reasons:

BLUE provides a good draft. Also, as BLUE is a relatively weaker aerobic rider, he is not likely to pull long or hard, and so when RED is in second position, RED's workload will be relatively low for second position. The pack may notice BLUE's relatively weak pulls, but is less likely to notice RED if he does not pull as hard as the GREENS.

RED prefers to have BROWN behind him. RED knows BROWN has a poor jump and is a poor sprinter. In the sprint finish to come, BROWN is unlikely to be able to come around RED. This means that for other riders to threaten RED in a sprint, they will have to come around at least two riders.

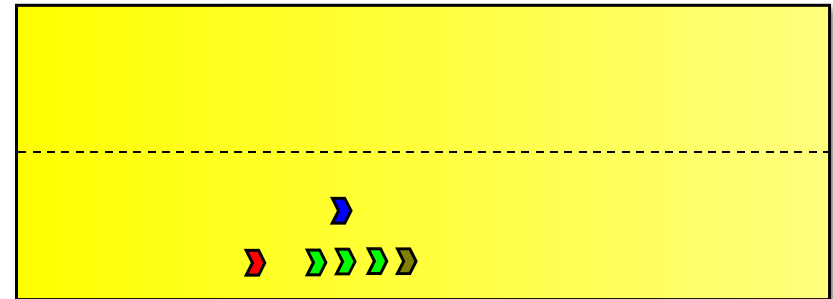


Figure 57. Gap rearranges the breakaway. Here RED misses the rotation and allows a gap on a GREEN in order to be in position to draft BLUE and/or to have BROWN draft him.

Gap Discourages Marking

Sometimes a rider is on your wheel and for one reason or another, you want them on someone else's wheel. Perhaps as above, it is nearing a sprint finish and they have a good sprint. Perhaps you are concerned that they will surprise you and attack from behind you. Perhaps the rider is a notorious wheelsucker. A gap may be all that is needed to dislodge this rider.

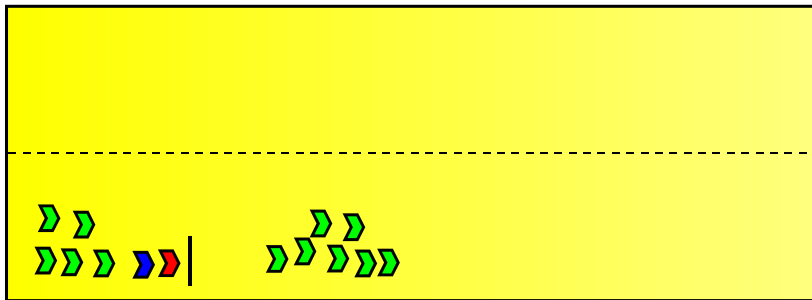


Figure 58. Gap discourages marking. RED does not want BLUE on his wheel. RED gaps the riders in front. After creating a gap, BLUE will likely jump to the leaders.

Gap Discourages or Eliminates a Wheelsucker

In this situation, BROWN is in a breakaway with six other riders and is not working. The group does not want to give him a free ride and tow him along.

RED gaps BROWN.

Either BROWN will come around and RED will go with him, or RED will jump and perhaps tow up BROWN.

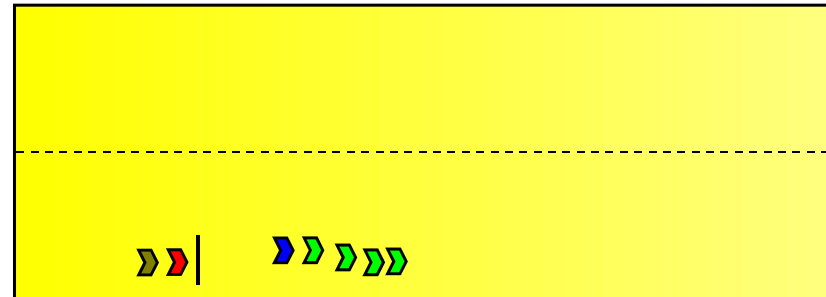


Figure 59. Gap discourages a wheelsucker. Here RED gaps BROWN. BROWN must come around, or jump back up with RED.

Taken in isolation, this strategy tires RED as much as BROWN. However, sophisticated breakaways know what they now must do:

The trick here is that now BLUE takes BROWN off the back.

If the members of the breakaway cooperate, BROWN must close or jump six times more often as any other individual.

BROWN will either give up, or cooperate and contribute to the work of the breakaway.

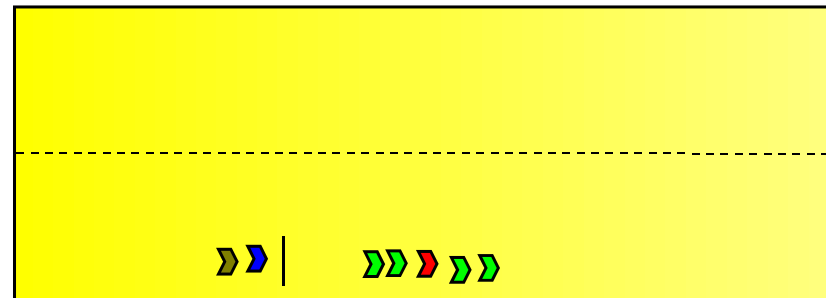


Figure 60. Gap discourages a wheelsucker. Now BLUE gaps BROWN. BROWN must come around, or jump back up with BLUE.

Gap Forces Two Groups to Work

The rider at the immediate front of a group is working the hardest. Drafting riders are all conserving energy.

By creating a gap, you create a tactical situation where at least twice as many riders must work. If the groups realize there is a split, the riders in the lead group might cooperate to maintain or increase the split; the riders in the chasing group may cooperate to close the gap. If you sit in, everyone is working while you are conserving energy.

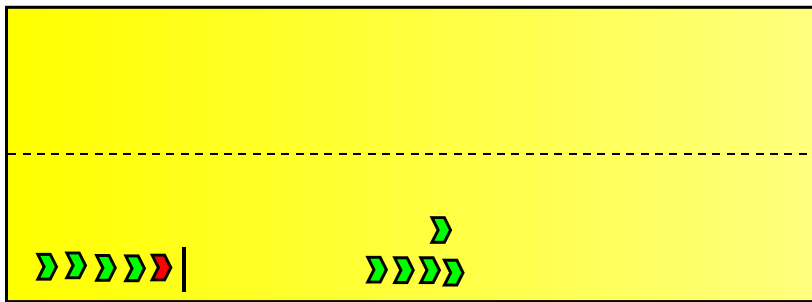


Figure 61. Gap forces groups to work. Here RED splits the field. RED will then move to the back of the second group, and conserve energy while both groups work.

Gap to Get Rid of a Strong Chaser

Consider a situation where you are in the field chasing a breakaway that contains teammate. Strong riders are in the field, chasing.

If you gap off one or two of these riders, you may disorganize the chase and improve your teammate's chances in the breakaway.

Let only one or a few riders go so that these chasers do not seriously threaten to catch the breakaway. Do not let strong riders go who can catch the breakaway, especially if they can outsprint your teammate.

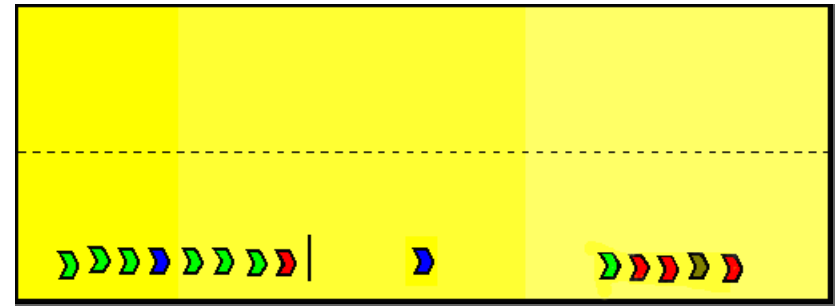


Figure 62. Gap gets rid of a strong chaser. By allowing BLUE to escape, RED prevents BLUE from towing up the entire field to his teammates in the break.

Gap to Launch

With Teammates

Consider that your team might have a strong time trial rider. A rider who can breakaway solo, but one who may not have a jump to attack and get away from wary wheelsuckers.

The team may gap this strong rider and allow him to escape.

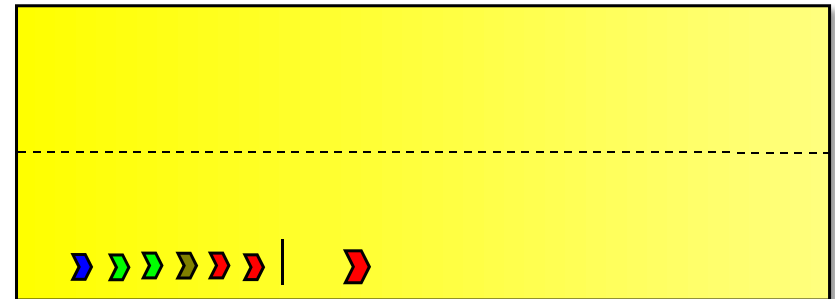


Figure 63. Gap to launch a breakaway. A gap allows BIG RED to escape. Near the end of a race, riders may mistake the setup as that of a leadout.

Without Teammates

Consider three riders nearing the finish line and a three-up sprint. It might be best in this group to be the third rider. In this position, you can draft two riders, and see the moves of both. However, suppose you are in second position. What to do?

Let a little gap open.

The third rider may get nervous, and come around you, so now you are third.

Alternatively, the gap may allow you to jump into the slipstream of the lead rider and launch around the lead rider; this may allow you to achieve a higher speed. Read more about taking a run at a rider on page 130.

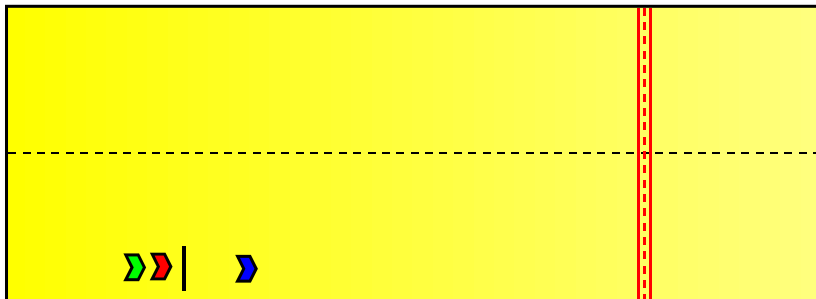


Figure 64. Gap to launch. RED gaps BLUE. Either GREEN comes around, or RED jumps into BLUE's slipstream and launches.

Breakaways

A breakaway is one or more riders ahead of the pack. Generally, you want to be in this lead group if it will succeed, but do not want to waste your energy being here if it is doomed to failure. You want to join the breakaways that will work, but not the ones that will not.

A chasing rider or group of riders may be between the breakaway and the main pack. The dynamics—the strategy, tactics, and moves of a chase group—may be similar to that of a breakaway.

Within the context of the discussion about gapping above, or breakaways to follow, a gap is generally any separation between riders of more than one bike length or time separation of more than one second.

All breakaways are gaps, but not all gaps are breakaways. There is no precise distance or time definition that distinguishes a breakaway from a gap. How breakaways are characterized also depends upon the context.

Gaps of a few seconds occur frequently in races; most are not breakaways.

When the race is supported by motorized vehicles, official vehicles may enter the gap when it exceeds 60 seconds. At this point, the gap is certainly a breakaway. In a criterium, a gap of 30 seconds would surely distinguish a breakaway.

If at the finish line the lead of either group over the field was only a second, most observers would correctly say the breakaway group won.

Breakaway Not a Team Time Trial

Although some of the tactics and techniques of riding in a breakaway group are similar to a team time trial, there is a big difference between the two.

In a team time trial all riders are working to contribute to the group traveling as fast as possible and the order of individual rider finish in the team time trial is immaterial.

In a breakaway, you have dual and sometimes conflicting strategies because the group is generally composed of riders from different teams. On the one hand, generally, you want to stay away from chasers and so you need to work hard. On the other hand, the order of rider finish is important, and you need to conserve. If the breakaway stays away from chasers, at some point you will almost certainly want to have enough energy to attack the breakaway, respond to attacks from others, or sprint at the finish line.

If you are lucky enough to have only your own team members in a breakaway then work as a team time trial. It is a perfect opportunity to give your weakest rider a win.

Read about team time trialing on page 150.

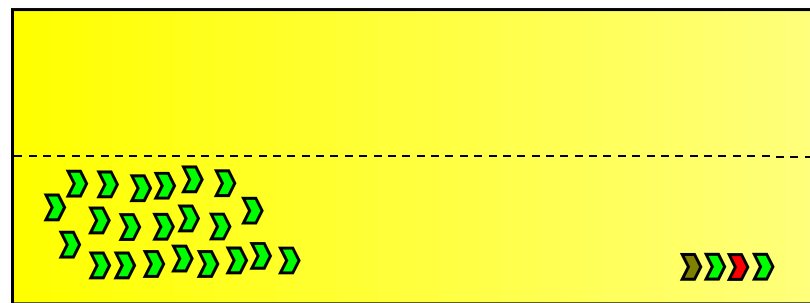


Figure 65. Four riders in a breakaway.

Successful Breakaways

A small group of riders manages to escape off the front of the criterium you are riding, and stay away. Earlier you were in two separate breakaways, neither of which worked. Why is it just now, when you are resting, that this breakaway eludes you?

Many elements factor into winning breakaways. Once you understand these elements, winning breakaways are much more predictable.

Frequent Flyers?

As the breakaway must travel as fast as or faster than the pack, it must contain several strong riders, often riders who have high-end aerobic power. If there are too many strong riders in the pack and they are alert, they will generally band together to chase weak breakaways.

Although many breakaway riders are persistent and repeated attempts improve their odds, others are more successful at picking and choosing which breakaways to join. It is not just a matter of luck.

Rider Categories

Breakaways in different categories occur most often where the group has riders of different fitness levels.

- Cat 4, 5: The strong riders ride away and off the front. It is not really a breakaway so much as many dropped riders.
- Cat 3: These riders have the most uniform strength of any group. They have risen from the Cat 4s, and are not as strong as 1-2s. Relatively few breakaways occur in this category.
- Cat 1-2: In this group, there are big differences, as the very strong are at the top category. Teamwork is prevalent. Breakaways are common.
- Masters: Here there are often elite Cat 1 riders mixing it up with beginner Cat 5s. Breakaways are common

Right Teams

In fields with strong teams, team representation in the breakaway is an important determinant in its success. Strong teams not only help power breakaways, they defend them. The right combination of

teams is not just about strong riders up the road. It also means that they have teammates in the pack who will block a chase.

Successful breakaways needs representatives from the strong teams, or else the good riders left behind will work together to destroy a breakaway's chances. Alternatively, a missing team might send a rider up to bridge or join the break. A smart breakaway will wait for such a rider to join it. Now the chances of a breakaway's success are increased.

Many beginning racers who have not been exposed to this in their own events can see this happening time and time again watching professional races on TV and learn to predict which breakaways will be successful.

Size

Large breakaways typically do not work. Although initially some members of the breakaway may work hard and well together, usually some riders will decline to work. At some point, this will begin to bother the workers, and the breakaway will fall apart or the working riders will attack the breakaway to form a smaller group.

Right Course

Some courses lend themselves to successful breakaways.

Corners help breakaways, as breakaways can take corners faster than a large pack.

Long straightaways with lots of visible road ahead work against breakaways.

Rolling or twisty courses are good for breakaways. All breakaways benefit from the principle of "out-of-sight and out-of-mind."

Timing: Breakaways are Like Attacks

Breakaways are like attacks. As discussed in the section on attacking, successful breakaways often work when the pack is lethargic, weary, or otherwise vulnerable.

For example, after a couple of criterium laps with contested primes, the pack is relatively tired. Breakaways have more chance of succeeding now that everyone is fatigued.

Sometimes it takes only a couple of riders at the front of the pack who are not quite on the ball to let a breakaway escape in front of them.

Review the information on attacking beginning on page 75.

Breakaway Must Work Immediately

Initial hard work is critical. At least several breakaway riders must work together immediately.

It is hard for teammates to block a small gap. A 15-second gap is necessary in criteriums, as a single strong rider in the field can close a 15-second gap solo. Larger gaps require the concerted effort of several riders and are much harder to close.

Why Breakaways Fall Apart

- **Fatigue.** Breakaways commonly contain enthusiastic riders who may be overzealous. As initial enthusiasm gives way to fatigue, these breakaways may fall apart.
- **Sprinter.** If a dominant sprinter is in the break, especially a sprinter unwilling to work, the breakaway will be wary of being outsprinted at the end and generally fall apart.

A strong rider, one who often escapes with a breakaway may prefer to sit up when in a breakaway with a rival who can outsprint him. Although he will let the breakaway be caught, he will try again for a different rider combination later.

- **Team member unwilling to work.** Just because someone will make the breakaway does not mean that he or she will work with it.

Some strong teams have predictable strategies. Teams may insert teammates into breakaway, but have no intention of working.

One local team only works in breakaways in the last half of a race. If you escape with a few of their riders early on, their members will just sit in. You have wasted your energy.

Another team will have its riders mark breakaways, but only to help set up the win for certain protected riders.

Breakaway Success Uncertain?

You get into a breakaway that may or may not work. You want to work hard if the breakaway will stay away, but not overextend yourself if it is destined to be caught.

Making the break was probably a good idea. It is often easier to soft pedal and partially cooperate in a breakaway that may or may not be caught than it is to catch a breakaway that turns out to work.

As with all of the strategies and tactics presented in this book, experience is invaluable in applying the tactics and in knowing the riders and teams you will be competing against.

A Break Forms—You Are In It

You have worked or have followed/covered moves and now find yourself in a breakaway.

Do you want to work in this breakaway? Are some in the breakaway motivated to work harder than others? Do you want your companions to work harder?

Sometimes a breakaway gels quickly, and it is obvious that everyone wants to work. So you all work.

Sometimes a breakaway seems messy and disorganized.

Why might this be so? What can you do?

Why Might You Not Want to Work?

Although you have made the breakaway, you might not want the breakaway to succeed. Alternatively, it might be fine for the breakaway to succeed, but you don't want to work too hard too soon.

- You have a teammate back in the field who is a great sprinter; you want the breakaway to be caught.
- You have a teammate, in a one-day race, back in the field, who is likely to out-climb, out-time trial, or out-sprint the field; you want the breakaway to be caught.
- You have a teammate, in a stage race, back in the field who is well-placed as GC leader, young-rider leader, mountain-leader, or sprint-leader; you want the breakaway to be caught.
- It is too soon for you. You don't have the endurance to succeed in this breakaway. Although you wouldn't mind working in a breakaway, this breakaway has formed too early in the race for your talents.
- You don't think that the breakaway group is strong enough to make it to the finish line, and you don't want to waste your energy.

- You'd like the breakaway to succeed for a while—until your teammate comes up to join it. However, you'd like to save your energy until that point so as to be better able to help your teammate.
- You carry a grudge against one of the riders in the breakaway, and don't want this rider to succeed in this race.

Encourage Your Breakaway Companions to Work Harder?

Generally, for a breakaway to succeed, the riders in the breakaway must be motivated to work. Whether as individuals or for their team, breakaway riders must generally see a reward in working hard.

What motivates riders?

Typically:

1. A chance to win
2. A higher race placing
3. A better time, moving up, in a stage of a stage race
4. A prime or other hotspot reward such as climbing or sprint points
5. A desire to have been part of a breakaway, have been part of shaping the race, television coverage, the experience, even if the chance for success in the finale of the race is low

Less-well appreciated:

6. To tire opponents or the teammates of opponents, to set-up the later success of a teammate
7. A chance to be up the road to assist a teammate after the field is reduced by a critical selection or the teammate otherwise joins the breakaway
8. A chance to earn a prime or other hotspot reward such as climbing or sprint points not for oneself, but to rob a competitor and protect a teammate

What Might You Say When Others Don't Seem Sufficiently Motivated?

As already discussed, sometimes it is best to be quiet and let others (apparently) direct the breakaway.

Sometimes, if you want the breakaway to work, and a rider needs motivation, you need to take charge.

What might you say?

Although you might directly help others find the motivation to work hard, it often works best if riders decide for themselves that it is in their best interests to work hard in the breakaway.

Here are some typical carrot and stick approaches:

1. What do you want to do? (Perhaps to a rider who sees herself as tentative; or, on the other hand, perhaps to a rider who wants to feel that she is the decision maker.)
2. What's your thinking? What does your team want you to do? (Perhaps to clarify the situation. Perhaps to understand how you can provide alternative reasons to motivate an apparently undecided rider or team.)
3. How can I help? (Perhaps to a rider who *thinks* she is the stronger rider (and perhaps you are mature enough to understand that it's wise to allow your competitor to hold the illusion of her superiority). Perhaps she *is* the stronger rider and you want to play nice so as not to be attacked.)
4. Let's work together! (A generally positive approach for most riders. Creates an immediate cooperative approach which might even induce a rider to forget her teammates and team's larger priorities back in the field.)
5. Let's try! I think we can stay away! (Helps to motivate riders to work harder than they may feel they can or should.)
6. You are doing great! (Keeps new or insecure riders confident and working hard. Requires subtle difference in tone for a rider who is stronger than you are vs. a rider who is weaker than you.)

7. I'll do what I can! (Helps give the impression, or concedes that the other rider(s) are stronger; suggests that you want them not to attack you, but keep things together in the breakaway; implies that you are willing to do your share, at least for now.)
8. Come on, you (expletive) wheelsucker, start working! (This common approach is used by riders out of proportion to its success. Sometimes motivates by guilt or shame, inducing a rider to work harder. Generally not effective for very long, and generally not a way to make friends.)

What other approaches do you think might work?

Under what circumstances do you think you might use the above exhortations?

Full Speed Ahead

Breakaway companions often share the common goal of escaping the peloton, yet may keep something in reserve for the finale.

At times, seconds or minutes gained may count more than the finish order, and full commitment is required.

In addition to the conversations described above, how might one encourage a breakaway companion to ride as hard as possible?

In general, by removing your breakaway companion's apprehension about the finale.

For example:

- If you are a stage-race GC rider looking for time, you might not care so much about rank order of the finish. You can let your breakaway companion know this.
- If you are looking for the stage win, and your breakaway companion needs time, you can let her know that you will pull for all you are worth, but expect to win the stage.

- If you want to contribute to the breakaway, but fear you might be dropped if you work too hard, you can let the others know that you'll do what you can, ask them not to drop you, and agree not to sprint against them.
- If there are intermediate prizes or premes, you can agree to split them.
- If two riders both want time and the stage win, you can agree to work together until, say, 1 kilometer to go.
- If two riders both want time and the stage win, you can agree to swap prizes. (Swapping prizes: The first place rider prize goes to the second place rider; the second place prize goes to the first place rider. In this way the honor and the prizes are split and riders stay motivated to work together.)

Of course, under many circumstances, fixing races is unethical and unsporting.

However, this sort of cooperation in ensuring the realization of your own goals is common and generally accepted.

How to Decline an Invitation to Work Harder

It works best to have as many friends not only on your team, but in the peloton as well. If asked to work harder, consider which of the following replies is likely to be respected by your breakaway companions:

- I'd like to work harder, but I have a teammate up the road.
 Comment: Generally a respected reason.
 Counterargument: Come on! Help us! Then you'll be able to help your teammate.
 Counter-counterargument: Are you kidding me! If we never catch her, she wins!

- I'd like to work harder, but I have a sprinter (GC rider, climber, best young rider) in the pack, and my team manager has told me not to work.
 Comment: Generally a respected reason.
 Counterargument: Well, you are here now. At least rotate through with us. The other teams will have to work harder to catch and your teammate will then be fresher.
 Counter-counterargument: My manager will kill me.
- I put myself in the red zone to get into the breakaway. Give me a few rotations to recover and I'll start working.
 Comment: Generally a respected reason.
 Counterargument: Fine. But we need you to help as soon as you are recovered, or we'll get caught.
 Note: After a few rotations, you better work or expect the group to instigate countermeasures, such as gapping you off or verbal abuse.
- You guys are all better climbers than I am. I am worried about getting dropped on the climb. As soon as we're over the climb, I'll start working.
 Comment: It makes sense, and sometimes you can get away with this. However, the others generally see that as your problem more than theirs, and when the climbs come, they will want to drop you.
- You guys are all much stronger than I am. Let me sit in.
 Comment: It makes sense, but unless they have a reason to allow you to sit in, they won't want to risk your wheelsucking and beating them in the sprint.

- It really makes no sense for me to help you. There's a time trial coming up and I'm a better time trialist than you are. All I have to do is mark you. Drop me if you can, but no way am I pulling.
Comment: This may make sense, but it makes just as much sense for you to work and then gain even more time in the time trial.
Note: Not a way to make friends.
- You never help me, why should I help you?
Comment: Though possibly true, you are not very good at bridging differences are you?

Summary

Whether it is strategically desirable to work in a breakaway, it makes sense to be agreeable and polite to other riders. Cooperation not only from teammates, but from non-teammates alike, often helps result in a successful outcome.

Working a Breakaway

There is more to being in a breakaway than working hard. *How* you work governs the breakaway's and your chances for success.

Will the Breakaway Work?

As stated above, the first question to consider before expending your energy is: Why waste your energy if the break's chances are doomed?

Establish an Early Gap

As stated above, you need a gap of at least 15 seconds in a standard criterium, more in a road race. Do it quickly—15 seconds is the gap that individual strong riders can close either by pulling or by bridging.

Work Efficiently as a Group

A successful breakaway is like a team time trial. Ride smoothly without surges. Pull off after the corner, not before—it is more efficient for the group. If you must pull off before the corner, do so to the outside, not the inside.

Larger riders break the wind more efficiently for the group as a whole than do smaller riders. Let larger riders pull into the wind, and smaller riders pull without wind, into tailwinds or uphill.

Secure the Break

After the breakaway is secure, you can afford to consider other possibilities. The breakaway is secure to a rider's ability when a gap of sufficient distance has been established so that the rider could continue to stay away from the pack if riding alone.

Do you want to continue the breakaway with its current rider composition? Do you like your chances against the other breakaway members? Do you have a teammate with you in the breakaway? Is there a much better sprinter in the breakaway with you?

Generally only after the breakaway is secure to your abilities should you consider breakaway-disruptive behavior.

Is There a Driving Force?

The driving force is not necessarily the strongest rider. Breakaways often need a conductor to make sure everyone is working, or to make sure that rival teams do not try to outmaneuver each other to the detriment of the break. If someone has taken that role, you can disappear in the breakaway and hide some strength.

How Hard Must You Work?

If you are a weaker rider, be realistic—you must ride efficiently and conserve energy. Your duty is not to help others win. Even if your race goal is to place in the top 10, the breakaway may accelerate and drop you. Taking equal pulls, “doing your share,” is not smart. It is suicide.

If you are a stronger rider, you must decide whether to use your energy to give the breakaway a maximum gap, attack the break, or ride efficiently for later moves. Stronger riders have the option of nursing weaker riders along, protecting them and the break.

Energy Conservation

There are ways to take your pulls and yet work less than your partners. This is important if you are a weaker rider in the break.

Positioning yourself behind the strongest rider may be unwise. After pulling, second position is the most demanding. The strongest rider may pull the hardest and longest. When it is your turn to pull, you may already be tired. Positioning yourself behind the weakest rider who will not be dropped is an energy-conserving move. The rider with the broadest hips usually provides the best draft. Better drafts mean less work for you.

Keeping pace and pulling into the wind is very demanding. In a criterium, breakaways often develop a rhythm and some riders seem to always pull on the headwind leg. It need not be you.

If the course has a hill, do not pull too hard in the section leading to the climb. You may need all your energy to keep up.

Steady riding is more economical. Riding behind steady riders saves energy.

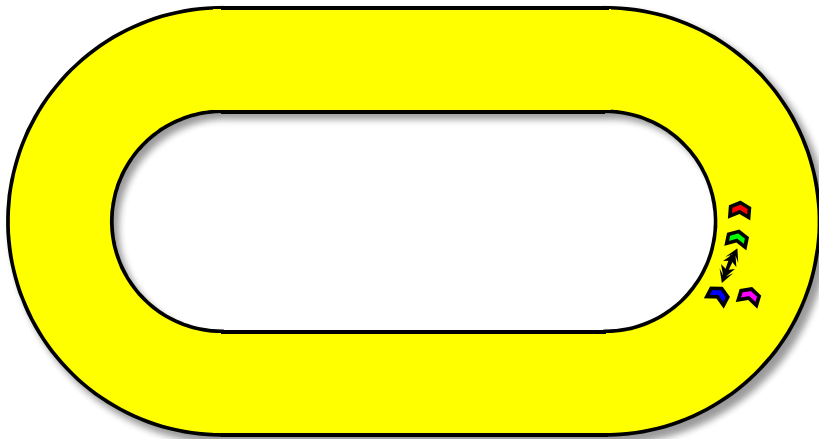


Figure 66. Varying the gap. As PINK pulls off and readies to draft BLUE, BLUE creates and then closes gap on GREEN. This disrupts PINK's rhythm and makes PINK work harder.

4 Ways to Make Breakaway Companions Work Harder

Position your rivals behind smaller, stronger, or less steady riders.

Vary the gap. Slightly gap the rider in front of you and close the gap. Although riding this way spends a little more of your own energy than riding steadily, varying your effort this way is more tiring to those drafting you.

This is especially fatiguing for rotating riders tagging back on the paceline. If you make this obvious, you will frustrate and annoy others.

Motivate the others to work harder with praise. In a sincere voice, tell your rivals what a great job they are doing. Many riders will respond to praise with even harder efforts.

Motivate the others to work harder with fear. If you are in a breakaway and stop working the breakaway, may get frustrated and stop working. However if there is a manager or spectator who says there is a teammate coming, the breakaway may work harder to prevent that teammate from working—and give you a free ride.

Now imagine an unscrupulous manager who says this, even if it is not true. This may be dirty tactics, but it might be effective. Now if you act as though you have a teammate coming up, you may be playing cleanly and still be advantaged.

Rearrange a Breakaway

As discussed above, you may wish to change the order of riders in the breakaway to save your own energy or use more of your rivals. Alternatively, you may have other strategic reasons.

To rearrange a breakaway:

- Gap by missing the rotation. After your pull, at the back of the paceline, allow the rider following you to rotate in ahead of you. Perhaps take a drink, pretend to eat, or fiddle with your shifters. Discussed in more detail on page 97.
- Gap within the breakaway line. May mark you as being apparently weak or inept.
- Rotate in early, take an early pull. This is generally the most effective strategy. It looks as though you are doing extra work, whereas a one-time early effort may result in a better draft, less work, and energy conservation for the rest of the race.

Attacking a Breakaway

As the breakaway is secured, the pace may slow.

As soon as some riders stop pulling, attacks are likely. Instead of sitting on, consider a short pull so less attention is drawn to you.

In many situations, only one or two riders are seriously able to defend against an attack. Consider a breakaway with six riders. If you attack when your chief rival has just finished a strong pull, no rider may be in a position to respond.

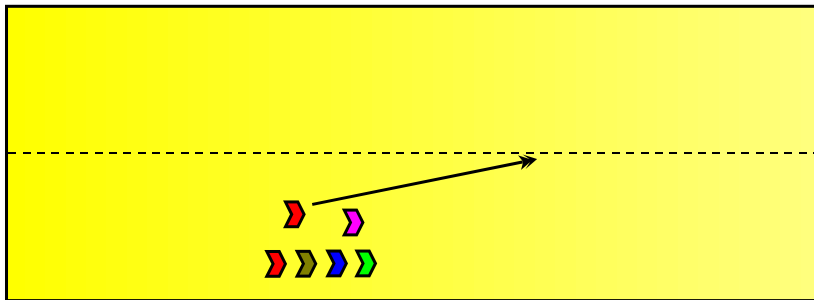


Figure 67. PINK tired, has just finished a pull. GREEN tired, is pulling. BLUE is blocked. A RED rider attacks, with a teammate on BROWN who is partially blocked.

Attacking a Blocked Rider Example: Paris-Roubaix, 2006

Cycling News: “Was it not possible for you to react when the decisive escape got away?”

Tom Boonen: “It was Gusev who attacked at the left side of the road. I was at the other side and wanted to cross over. At that moment Flecha passed me and I had to brake.”¹²

Defending Against Attacks

Consider a breakaway of just three riders. If the other two riders are teammates or work together, what will be your strategy?

If the break is not secure, there is a good chance that the other two will be willing to work together, harder than you are, in order to keep the breakaway from being caught.

However, if the breakaway is secure, how will you defend against attack from the other two? You may need to work a little harder than you might otherwise like in order to prevent them from attacking you.

It is okay to chat with your rivals; it may disarm them. You can propose to work together. Depending upon the situation, it may even be a smart idea to agree to let one of them win in return for a chance at a podium spot. Such an agreement makes sense in the following situations:

- Your two rivals are clearly stronger than you are.
- Either one of them could ride alone to win.
- If you are attacked and left alone, the pack will catch you.

I was off the front in a three-man breakaway with two strong US Postal teammates at a big race. To postpone their attacking me, I asked: “How can I help you two guys stay away.”

¹² Cycling News. April 10, 2006. [Accessed April 10, 2006.](#)

It worked. When it came down to the final climb, their strategic two-on-one advantage was neutralized.

There is a difference between working a temporary truce and breaking your word. If you have made an agreement, honor it.

Breakaway Finishing Strategies

Do you have teammates in the break? Do others? Do the best sprinters have team members to chase riders who might attack the breakaway?

Are you a relatively poor sprinter? You may want to jump early and hope that the sprinters watch each other. What do you have to lose?



Figure 68. Once the breakaway is secured, consider your options: Conserving energy within the breakaway, making breakaway companions work harder, attacking or defending the breakaway, or setting up a sprint finish.
Photo © Garrett Lau.

Are you good sprinter? Watch out for an early attack by a non-sprinter. You will want to keep an eye on the other strong sprinters. If you can maneuver a weak sprinter behind you in the breakaway, when you sprint, you will not have a serious rival on your wheel.

Best Places to Be: Review

- Behind weakest rider who won't get dropped
- Behind rider with biggest thighs/best draft
- Behind steadiest rider
- With the worst sprinter behind you

Tracking Breakaways

Are you gaining or losing ground on a rider or group ahead of you? In long professional road races, early breakaways may gain 30 minutes or more. Officials mark chalkboards to let the riders know the gaps. Alternatively, team managers relay the information by wireless transmission to rider earpieces.

In big professional races, chasing riders can estimate where the breakaway is by the helicopters covering the breakaway. Transponders on the motorcycles covering each group give GPS positioning information that is relayed to officials, team managers, and TV coverage. Team managers may watch live race coverage in their support vehicles.

You can approximate how you are doing by noting when the rider or group ahead of you passes a road marker—perhaps a tree, bridge, or sign.

Time how long it takes you to get to this point by looking at a watch or bicycle computer or by counting pedal strokes.

If it is a group of riders chasing a group of riders, what you are interested in is the time from the last rider in the group ahead to the first rider in the chasing group. To bridge the gap, you do not need to consider getting all the way to the front of a group.

Where the breakaway is out of sight, your feeders, roadside supporters, or spectators may also be able to give you the gap.

Time to Close to a Breakaway

Time to close = breakaway speed / speed difference x gap

For example, if the breakaway speed is 28 mph, and the chase is at 30 mph, the chase is 2 mph faster.

If the gap is 20 seconds, it will take:
 $28 / 2 \times 20 = 280$ seconds = 4:40 to close. Perhaps a little less, because as you get close, you will have some draft benefit.

Speed to Catch

Speed difference = Breakaway speed / time to close x gap

Therefore if the breakaway is traveling at 28 mph and you want to close a 15-second gap in one minute

$28 / 60 \times 15 = 7$ mph

You need to travel 7 mph faster than the breakaway, or 35 mph to catch in one minute. That is fast!

Chasing a Breakaway

Do you want to chase the breakaway? Do you want to chase solo? In a small group? Or, in the whole pack?

In general, do not chase and tow the pack all the way to the break by yourself. Get company to chase or join the break. Options include:

- Set an example and chase part of the way; let others help, especially members of other teams who do not have a rider in the breakaways.
- Create a visual bridge. If you attack part of the way up to the breakaway and close some of the distance, others may be tempted to catch you and keep going.
- Splinter off a chase group and join.
- Splinter off a rider who is a threat to the blockers. This may change their tactic from blocking to chasing.
- Set up a situation to discourage breakaway members from working. For example, if a protected rider is dropped from an attacking chase group, teammates in the breakaway may not want to continue to work hard if their team leader is losing time. (This will work only if team managers or others let the breakaway know what is happening.)
- Let others chase and counterattack.

Team Chases

If a breakaway contains threats to a protected teammate, the whole team may want to work together to chase. Although there may be reasons for a coordinated team effort, do other teams also have something to lose if the breakaway succeeds? If so, enlist their help.

Moreover, if others have even more to lose, do not do someone else's work for them!

Classic Chasing Error

A group of dropped riders works steadily to chase a breakaway. A yahoo in the chase jumps to bridge the 30-second gap to the breakaway. He explodes. The chase's rhythm is broken and it loses 10 seconds.

Unless you can attack and bridge alone, moderate your accelerations to catch the breakaway.

Moderate Your Effort as You Catch

Bridge almost all of the way, but not all of the way right up to the last wheel in the pack of a breakaway group.

Modulate your effort. Ease up just a little before you catch, or you may have to brake and lose momentum.

In large groups, generally advance to near the front of the group if possible. This helps give you some buffer so that a subsequent surge does not send you off the back.

criterium Solo Breakaway

Winning a race by a solo breakaway is a high point for almost any racer. Here is how to do it:

Requirements

Winning a criterium race by a solo breakaway has several requirements:

- Fitness
- Timing
- Commitment, mental concentration
- Help in the pack, or luck

Fitness

Let us face it—if you are struggling at the back of the criterium, nearly max'd out, today is probably not going to be your day to go off the front.

While sheltered in the pack, you need to be about 20 beats below your time trial threshold in order to be able to travel at the pack's pace or faster on your own.

It may seem easy in the pack's shelter, but check your computer. If the pack is going at 27 mph and you cannot time trial faster than that, where do you think you are going?

Timing

There are almost no riders who can make their escape at will. Riders who time trial many miles an hour slower than you can suck on your wheel, benefiting from your slipstream, using 30% or so less energy. You do not want that. You do not want to be *pulling*. There is no prize for the rider who pulls the most. You want a clean breakaway before you start time trialing off the front.

If you really are one of the strongest—and one who is able to make a solo breakaway stick—look for a time when you've been sheltered but the pack as a whole has been working pretty hard. A good example of this situation occurs when the pack has just finished chasing down an earlier break. Those weaker than you should be beyond their threshold, and not able to respond.

Primes provide opportunities. If the pack thinks you are going for a prime, you may escape. If you keep going, no one may be on your wheel, and when they realize you are not going to let up, it may be too late for them to catch you.

Alternatively, if riders are going for a prime, you can counter just after the prime, as they sit up.

A teammate can help. Your teammate attacks, and is chased. The moment he is caught, counter.

You can arrange it all yourself. Let a few strong riders go—say by opening a gap rounding a corner. Those few in front may realize they have a little gap and be willing to work. A few strong riders left in the pack may work to catch up. Counterattack as the breakaway is caught. Alternatively, bridge and go through the break. Either way you have set up the timing for a successful solo.

Of course, you can be too clever, and let a winning breakaway go. Choose the players and shuffle the deck wisely.

Read more about timing in the attacking section beginning on page 75.

When to Go

A breakaway in the last lap or two can work, but it is very hard to make it stick—the pack speed is winding up, leadout riders and sprinters are at the front, and no one wants to let anything go.

About one-third of the race to go is an ideal time. Riders are no longer fresh, the early strong prime chasers and breakaway attempts have been caught, and other riders are not too fearful of a solo

effort—they think there is still time and room to chase—yet the overall speed of the pack is not so high that you cannot get a good gap. I have seen most successful breakaways work from this distance.

Get a Gap

You need at least 15 seconds quickly. Less than that and any fresh rider in the pack can close the gap, bridging or pulling, alone. If you are strong enough to make it stick, with a gap of more than 15 seconds the pack needs an organized effort.

If you've timed it right, the pack won't get organized for at least half a minute or so because you jumped when there was one of those natural lulls in the pack. If you do not have at least 15 seconds quickly, your chances of escape are not good.

Wind

Wind is your friend. Wind discourages a chase. If you are committed in the wind, your chances for success are greater because the pack is less likely to organize.

If the timing is right, it can be advantageous to attack on the tailwind side of the course. Just as the pack is getting organized, they will hit the headwind side of the course and be delayed even further.

Commitment

Once you have put your cards on the table, make it stick. Get into time-trial mode. Be efficient around the corners. Ride at your time trial threshold or a little above. Go!

criterium Solo Breakaway Heart Rate

Here is a heart-rate graph from a successful criterium solo breakaway. The race was 20 laps, each lap taking about 2 minutes. The solo effort began with a little more than 6 laps to go.

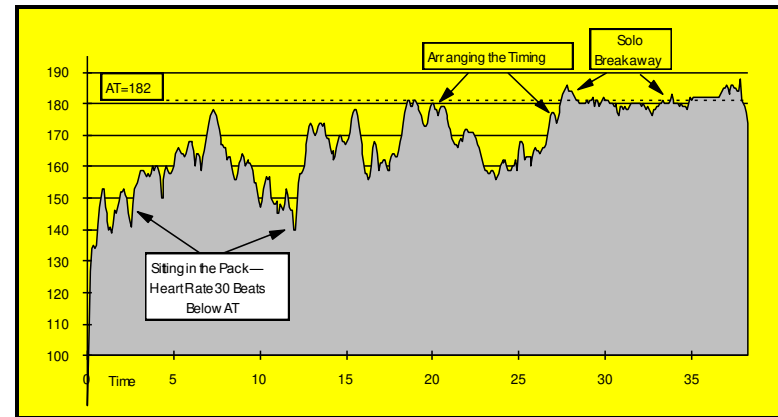


Figure 69. Criterium solo breakaway heart-rate recording. 20 laps, each lap about 2 minutes. Solo with about 6 laps to go.

Help in the Pack

The more strong teammates you have, the better. If you have that crucial gap, and your teammates are sitting at the front, other riders will be discouraged from chasing.

Sometimes a couple of strong favorites will watch each other, the pack will watch them, and no chase will ensue. Perfect for you!

Let the Crowd Help You

Even if it is a small race, with just family and friends around, a solo breakaway will get cheers. Spectators love to see a solo effort. Draw energy from the announcer and the crowd on each lap. Count down the laps with them. Stay focused.

Watch Out Behind

Keep your pace, be committed. However, watch what is happening behind you. If you are being caught by a small group, it is not over if you can stay with them. If you ease up a just a little before

you are caught and latch on, you can use them to keep you ahead of the field until the end of the race. They may even think you are so pooped that they let you not work and then, who knows, you might even take the breakaway sprint. So be aware of chasers.

It is also possible that by timing your efforts and surging, you can splinter the chasers, and have solo riders chasing. It is more desirable to be pursued by a solo chaser since solo chasers are weaker than groups.

Egg on Your Face?

A solo breakaway attempt is often a gamble. If you win, it is a great race. If you are caught, you may be too tired to sprint and place. If you are strong, if the opportunity presents itself, and you have a chance, go for it! You will not know what you can do without trying and it is a lot more exciting than sucking wheel.

Part 4 Teamwork

“It is amazing what can be accomplished when nobody cares about who gets the credit.”

—Robert Yates, owner of Dale Jarrett’s Nascar Winston-winning racing team.

“Teamwork is the fuel that allows common people to produce uncommon results.”

—Unknown.

“I like to win but I’m not motivated to win. I never go into a race saying, ‘I want to win this.’ The thing that motivates me is riding for someone, either leading out a sprinter or helping a climber or defending a jersey. And when I’m in that situation, in any of those situations, then I perform much better because I’m motivated.”

—Sean Yates, British professional road racer and respected domestique.

Teamwork Theory

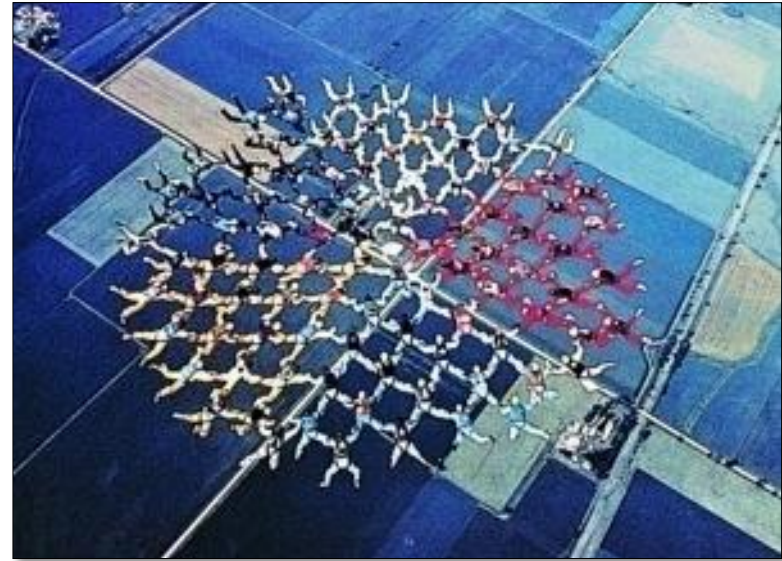


Figure 70. Teamwork. Giving a hand makes all the difference.

Bicycle-racing teamwork can provide crucial tactical advantages. Although this book is primarily interested in race-day tactics and strategy, having good race-day teamwork demands a good team before races. Some teamwork principles will be outlined here. For more detailed information, read the *ABC* book *Smart Coaching*.

Sociology

Teamwork, whether in bicycling or elsewhere, has characteristic features. These include:

- Common goals

- Cooperation
- Courtesy and empathy
- Unselfishness
- Recognized sacrifice
- Affiliation
- Social support
- Enjoyment in teammate's success
- Common adversary

Teamwork Enemies

Teams often run into trouble when individual ego runs unchecked and is a problem.

High excitement and fatigue are characteristic of heavy training, travel, and racing.

Keep in mind that athletes are often unable to control their emotions when adrenalin is high or when fatigued. Some may shout, some may curse, and others may cry.

Many athletes require considerable experience under these circumstances to learn to control their personalities and keep their emotions and egos in check.

Teams work better when all team members have an assignment or role. All members must be recognized and appreciated.

Bullying and nasty nicknames do not work.

Do More than “Your Share”

Do not expect to get back more than or exactly what you put in.

On the other hand, if you get back much less, you may be discouraged about how teamwork is working out for you.

One rule of thumb is to be prepared to give 70%, yet take 30%.

Another creed: help others, be prepared to be self-sufficient yourself—yet be willing to accept help.

Improving Communication

Communication skills are improved by following these guidelines:

- Don't take things for granted
- Thank teammates
- Recognize strengths of teammates
- Give honest, sincere praise
- Provide constructive criticism in small bites; indirectly
- “Criticism, like rain, should be gentle enough to nourish growth without destroying roots.”
- Ask rhetorical questions instead of being commanding or argumentative
- Allow others to save face
- Make it easy to correct problems or behaviors
- Set a good example; do the right thing yourself

Team Philosophy

Important personality and style characteristics for coaches and riders for successful teambuilding include the following:

- Riders are people first, athletes second
- Athletes first, winners second
- Long- and short-term physical and mental health of athlete paramount
- Last finisher as important as first
- Improvement, not perfection
- Reward effort, not outcome

Managing Your Team

A good team is greater than the sum of its parts. Every member of the team has specific strengths. Riders will have different fitnesses on any given race day. There are different kinds of races: road races and criteriums; long or short; and hilly, rolling, or flat courses. Some races suit one rider better one day and others better suit another rider another day. Although a particular race may better suit one rider, better teams use all their riders to improve that rider's chances.

While teamwork does not guarantee good results, sound team tactics improve the odds and are a lot of fun.

Successful Teams

Pre-Race

Successful teams characteristically:

Have a leader; it need not always be the same person.

Train together, preferably once a week.

Practice leadouts.

Have a pre-race meeting. With practice, such meetings only take a few minutes. Ask and answer the questions as outlined beginning on page 72. What is the course like? Where are the obstacles? Who is the best person to sprint today? Assign roles.

During the Race

As much as possible:

Riders should know their roles and act accordingly. Read more about this below.

- Communicate. Let each other know how you are feeling, which other riders to watch, and where the course has obstacles coming up.
- A teammate should be in every significant breakaway.

- Have only one teammate, if any, working at a time.
- Team members are prepared to chase.
- Team members give their designated sprinter a leadout.

After the Race

Successful teams strive to:

- Hold a post-race meeting to assess what happened. Look at “mistakes” as positive learning opportunities to improve.
- Share the winnings. The individual did not win the race alone, the team did. If you are racing with teammates, share the prizes.

Race Roles

Every rider should have a designated role in the race, whether it is to attack early, cover the moves in the middle, save it for the climbs, or sit in to sprint at the end.

These roles may change, but having a plan for each rider will help each individual feel part of the team and contribute to the team's success.

Assigning roles thoughtfully will help ensure that the team covers the important moves in the race.

Being aggressive, or having designated team members cover most serious moves, will take the pressure off other team riders.

As you will read below, as a basic premise, teammates do not chase teammates. Generally, then, no more than one team member works in the wind at a time.

How might the team be aggressive, yet no one be working?

Consider the following: The team has a rider in the breakaway, a rider in the chase group, and several riders in the field. The team member in the break is not obliged to work to catch the breakaway. The team rider in the breakaway is not obliged to work until his teammate in the chase group catches. In addition, of course, teammates in the main pack are not expected to work.

If the chase group catches the breakaway, the teammates will be expected to work. At this point they will be the freshest riders, and might do well relay attacking the merged breakaway group.

Breakaway Work

A weak teammate in a breakaway group should not work. As long as the teammate is in the breakaway group, the team members are not obliged to work—though they may choose to do so anyway realizing that the weak breakaway team member has no chance.

However, once the weak teammate in a breakaway group is dropped, the team may have little choice but to chase.

One rider in the break? Good sprinter? You can wait for the finish. Not a good sprinter? Attack.

More than one teammate? Alternate attacks.

Read more about working a breakaway beginning on page 104.

Field Work

Block

Read about blocking beginning on page 91.

Chasing

If your team misses the breakaway, be prepared to chase.

Of course, if possible, it is better to get others to chase, or at least help chase.

Depending upon how many riders you have on the team, keep your designated sprinter, and perhaps best leadout rider fresh.

Wait to start hard chasing until you have all the workers at or near the front; otherwise it is difficult for them to get into position. Work as in a team time trial, keeping the pace even, with stronger riders taking longer, not faster pulls.

Read more about chasing a breakaway on page 113.

Leadout

A leadout is a tactic whereby a rider, usually a teammate, provides the benefit of a draft to better position another rider, generally before a sprint. Read about leadouts on page 138.

Basic Race Teamwork

Basic Teamwork

Beginning team racers often want to help, but do not know exactly how.

Although you care about your own personal performance, you must be willing to help your teammates. This may mean riding harder or more easily than you would without teammates present. The heart of teamwork is realizing that together we are much stronger than we are individually.

Keep it simple. If nothing else, know these two basic race teamwork rules:

Chase Opponents

If there is a breakaway without a teammate and if the pack is not working to chase down the breakaway, work to chase down the breakaway.

Don't Chase Teammates

If a teammate is off the front, or team members are in a break, sit in and do not chase the breakaway.

Classic Teamwork Event Example

Consider this setup: Two teammates are in a breakaway with an opponent. Call the teammates RED1 and RED2. Call the opponent GREEN. Back in the pack are several other teammates, RED3, RED4, and RED5.

Up in the break, RED1, RED2, and GREEN are working together, and in the chasing peloton RED3, RED4, and RED5 are sitting in blocking, not doing any work, and so making the other riders work harder to catch the break.

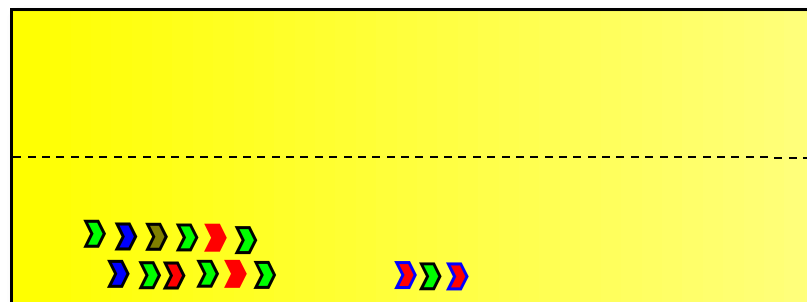


Figure 71. Classic teamwork. REDs in the pack block for REDs in breakaway.

Teamwork-Chase Catches

If the chase group catches, fresh RED3, RED4, or RED5 attack separately or together and work to win or force another chase.

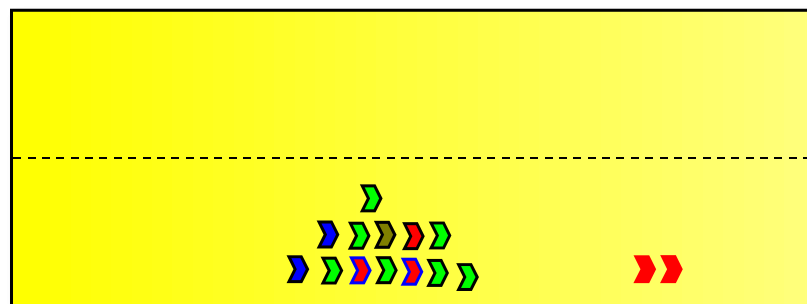


Figure 72. Classic teamwork. Chase group catches and RED teammates again attack.

Two-On-One Team Finish

In this common race-finish situation, two RED teammates are off the front with a third rider, GREEN.

By working together, almost certainly RED1 or RED2 should win.

Classically, one of them attacks. It is best not to leave it to a sprint finish. It is best to settle the winner sooner, rather than later.

In the diagram below, RED1 jumps as GREEN finishes a strong pull. RED2 is behind GREEN. RED1 goes away to win solo.

If GREEN chases RED1 down, just as RED1 is caught, RED2 counterattacks and goes off to win solo.

If GREEN chases again, RED1 tucks in, and just as RED2 is caught RED1 goes again, this time for good, GREEN being finally too tired to chase.

Generally, it is preferable to have the better sprinter drafting GREEN, and the better time trialist away. In this way, REDs are more likely to win first and second place. Do not be greedy. Although first and second is a better result than first and third, second and third in this situation is a bad result.

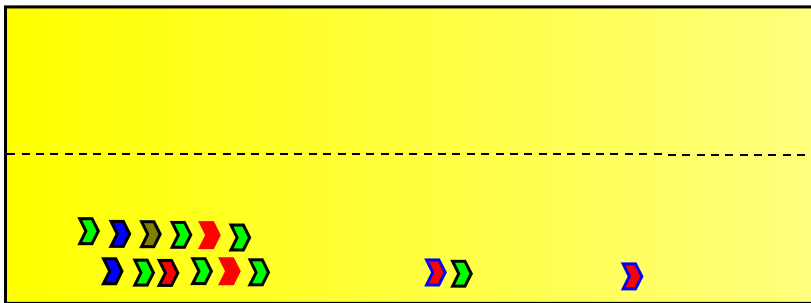


Figure 73. Classic teamwork. REDs in the pack block. Nearing the finish line, two-on-one, REDs take turns attacking GREEN.

Other Scenarios

If GREEN attacked earlier, solo, this would not be a problem, because RED1 and RED2 are stronger together than GREEN alone. They would work together to chase GREEN, and then attack.

If after RED1 originally attacked, GREEN then chased hard, momentarily dropping RED2, it would not matter. RED1 should just sit on GREEN's wheel. GREEN will probably slow down enough so that RED2 could catch on. Then it is two-on-one again.

RED1 gives RED2 a leadout.

Read more about two-on-one tactics on page 141.

Teamwork is Enlightened Self-Interest

Teamwork improves each individual rider's chances. Riders improve their own odds as well as their teammates. In the above example, assume RED1, RED2, and GREEN are about equal in ability.

Without teamwork, the chance for a particular RED winning is one in three. With teamwork, the odds are one in two.

Even relatively selfish riders should realize that in competitive racing, teamwork is enlightened self-interest that helps improve their individual chances.

Teamwork Secret

The secret is working together: RED3, RED4, and RED5 not minding—rather enjoying—their teammate's success. Perhaps in another race, RED1 and RED2 can block for RED3, RED4, or RED5. Riders feel good when their teammates do well!

Advanced Teamwork

Protecting Riders

Riders protected by a team, be they GC contenders in a stage race, powerful riders for breakaways in the latter part of a race, or sprinters likely to win the race if it comes down to a field sprint, may need protection from early attacks, wind, or other obstacles.

Teammates work to shelter these protected riders and minimize the work they need to perform before their crucial roles in the race.

Setting Tempo

Riding strongly, but not all out, discourages attacks. Tempo pace is faster in one-day races and slower in long stage races.

Riding tempo may be a team tactic in a stage race used to discourage breakaways, keep breakaways within reach of the field, keep the field together until the finale for the team's sprinter, keep the breakaway close enough so that the team climber can catch them if the race ends with climbs.

Toughing the Race

Riders can only respond to a limited number of attacks. If rivals are forced to respond more often than their tolerance, or ride harder than they should, they will be more vulnerable to later attacks.

Keeping the pace high, attacking rival teams, or any of the tactics that force the pace discussed on page 50 may be useful to set up protected riders to deliver the coup-de-grace to one or more rivals.

Setting Up an Echelon

Since there is a limit to the number of protected riders the roadway will accommodate in a crosswind situation, setting up most of a strong team or a few strong teammates into the first echelon can gain decisive time gaps.

During road races with routes along long roads with quartering winds, such moves may come several miles before a change in wind direction.

Teammate Up the Road

A team rider may not be considered a threat to the overall outcome of the race, and so may be allowed to escape the field in a solo or group breakaway.

This rider may reduce pressure on the protected teammates back in the group to work. When the decisive breakaways do form, this still-up-the-road rider may be so exhausted that he is eaten up and drops way back; if still energetic, he may join in and play a crucial role in securing victory for a protected teammate.

Leadouts

A classic end-of-the-race team strategy. Read more about leadouts on page 138.

Teamwork Without Teammates

You may race without teammates. However, it is possible to play the peloton in such a way as to effectively have a dozen or more teammates. Here is how to do it:

Teamless?

If you find yourself without teammates and adopt a passive role, the lack of teammate support may hurt your chances.

If you are a relatively strong rider, and in the hunt for a place or win, it is possible to work the field and have many others help you.

Basic Principles

Recall some basic tactics discussed earlier:

- Every expenditure of energy should have a purpose.
- Letting the pack work against you lessens your chances for success.
- Letting the pack work for you improves your chances.
- The more riders you can get to work hard while you rest the better your chances when you play your cards.

Teamless Example

I traveled out of town to a regional championship. The race was a rolling 2-mile circuit, 20 laps. I knew I probably was one of the strongest. I was not sure who the other players were.

Each lap, I moved to the front as we rolled toward the most significant climb. As we came to the corner that began the start of the climb, I let a gap open on three or four riders.

These riders would normally get up the climb first. I slip-slided, climbing a little more slowly than everyone else, conserving energy. The pack was large enough that on the rolling downhill the leaders

could be caught without too much effort. Usually, I would make it down the hill at the front again, and slow the chase just a little through the corners.

Each lap I let three riders work hard, escape, and work together to try to get away. Each lap four or five other riders worked to chase them down. Each lap a few more riders blew off the back. After about 15 laps, one of the riders, annoyed at those gaps, yelled, “What the hell are you doing!”

By the time the closing laps came around, I had done lots of tactical work, but hardly any anaerobic efforts. The strong riders had worked quite hard. I had let my “teammates” off the front repeatedly. I had let my other “teammates” chase them down. They had all helped me save my energy.

When it came down to the end, I had the most energy left!

After the race, the rider who had yelled at me came up and said, “You were riding as if you were protecting your teammates off the front. You let them go, you gapped them off. You even did some blocking in the chases. But they weren’t really your teammates!”

I told him that in several years of racing he was the first rider to have figured out this strategy and discussed it with me. It was as if a light went on, and he smiled and said: “Next time you’re racing here, count on me—you’ll *really* have a teammate!”

Defense Against Teams: Mark Protected Riders

If a team has several strong riders, any one of whom might win, you have your work cut out for you.

If a team has a designated leader, you can sit back and let the team work for you. All you really need to do is mark the designated leader.

Non-Team Alliances

With or without a team, it pays to be friendly, be a good sport, and have friends in the peloton.

“There’s definitely a good-old-boy network out there. You know, there’s favors that are made every turn during races. No one’s going to pass up a win. No one’s giving up a win. If someone can win, they’re going to win. But, if they can’t win, ’cause they’re just not having a good day that day, they’re going to make room for you. ’Cause they know you can win.

I know most people by name, and I can, in the race say, ‘hey, just give me, uh, I need a little room here.’ And they open up a spot for you. And they are not going to do that for you when you are first coming up through the ranks.

They don’t let anyone in they don’t trust. They see a guy next to them, they don’t recognize the jersey or know who they are, you’re not getting in. There’s no doubt about it.

If I’m going to lose the race anyways, I’d rather lose it to someone that I know and that’s a friend of mine, and help him win, and then later, when I have form, I know he’s going to be there, to open up room for me, that I can possibly win.

Versus if you’ve just got some young amateur kid, what’s he going to do for you at the next race?

Nothing.

Honestly, he wouldn’t even know you opened the gap for him. He’d think he made the gap.

You gotta give a little bit, and it gets returned later. It does. It really does.

But the amateur guys would never understand that.

Even a neopro wouldn’t realize that that guy helped you out.

Maybe just a little bit.

Maybe he would have won anyways.

But, the fact is, that they just made it a little bit easier for you.

But those kind of favors get returned all the time.

That’s good-old-boy network, right there.

Doesn’t get anymore good-old-boy.

You know, there’s no doubt about it.”

—Chris Horner, interviewed in the movie *Pro*, 2004.

Part 5

Primes & Finishes

“It was eleven more than necessary.”

—Jacques Anquetil, five-time Tour de France winner (1957, 1961-64), after winning a race by 12 seconds.

“I wasn't the strongest, Gianetti was. But even if I wasn't the strongest, I rode the most intelligently today.”

—Johan Museeuw, after drafting Gianetti in the last lap of the 1996 World Road Race Championship and then outsprinting him at the finish.

Prime Hunting

Primes Defined

Primes (also written and pronounced premes) are prizes or awards given within a race. Most criterium riders are familiar with crit primes. The existence of these prizes may be known in advance, but their timing within the race often depends upon the whim of the race announcer, who will announce say, a prime for the winner of the next lap.

Road races can have primes too. Prizes may be awarded to the first rider to the top of a hill. In circuit races, points may be awarded for several ascents, and the overall hilltop champion awarded “King or Queen of the Mountain” and a prize.

Over the course of a stage race, it is usual to have a “King or Queen of the Mountains Winner,” which is prestigious and valuable. Primes may be awarded on flatter sections as well. A separate classification and jersey for a cumulative intermediate sprints winner may be awarded.

Races whose outcome is determined by primes or points are one of the most popular forms of track racing called points races.

Prime Hunters Are Developed Riders

Prime hunting is a later facet of a local racer's development. When you first start racing and are inexperienced, your first priority is survival. This usually means doing as little work as possible and saving all your energy to last as long as you can in the race. It is foolish to waste energy in the middle of the race when it may jeopardize your ability to finish.

Once you can survive mass-start racing, the next step often is trying to finish the race in the lead bunch. Once you start placing, you may start thinking about those primes.

Primes Can Be Valuable

Prime hunting can be very lucrative in Cat 1-2 races. Even in the lower categories and in the Masters races the prizes received for prime hunting can be of greater value than those for many of the placings.

Some riders may have a reasonable chance of winning primes and little chance of placing in large field sprints. It gives riders something else to shoot for. A different target than the race finish. They wisely concentrate their efforts on primes.

Prime Hunters Are Fit

Prime hunting provides another benefit: fitness. “The best training is racing,” and the best race training may be prime hunting. Once you can place in a race, prime hunting raises your overall work level for the race and thereby helps you become fitter. It trains your body to withstand anaerobic efforts, and to recover from them.

Once you reach a certain level of fitness, if your only goal is placing in a criterium, the race may be too easy. In many races if you sit in until the finish, you will need to train harder than you race to keep fitness. If your goal is fitness for some larger goal, prime hunting may be valuable to that training. When you become an elite rider, you may race local races for primes as well as the race win.

Tactical and Fitness Considerations

There are similarities and differences between successful prime hunters and successful race finishers.

Successful prime hunters may have less success in winning races. There is usually only a single rider who wins a prime. For this reason, those out of contention tend to withdraw from the hunt early on. Contrast this to the sprint finish, where no one in contention gives way. For this reason, a small gap or tactical surprise often succeeds in prime hunting where it does not at the end of a race.

Many primes are won with gaps on the field, most sprints are in bunches. Prime hunters usually do not want to waste their energy for second place. Race finishers often are thrilled for a second place.

Prime hunters may go early: In a criterium, a prime hunter may launch with a kilometer to go—generally a suicide strategy at the end of a race.

Prime hunters do not need an excellent sprint. Race winners usually do. Prime hunters need a good sprint and excellent recovery. Race finishers need no recovery after the final sprint.

Teamwork Effective in Prime Hunting

Teamwork for primes can make prime hunting easy. Unlike the field sprint at the end of a race where everyone is going for it, there are relatively few in the field going for the primes.

The pace is very high in the finishing sprint, and a leadout may be vital. In prime hunting, a teammate does as well to let her partner go, and merely jump on any chaser. A solo chaser with an opposing teammate on her wheel will often give up a prime: Either way she is likely a second at best. At the finish of a race, a chance for second is well worth the effort.

Primes Present Tactical Opportunities within a Race

Primes are opportunities. Opportunities are when and where things happen in races. Successful breakaways and attacks often develop just after or in concert with the gaps that occur on prime laps.

Even if a successful breakaway does not develop, by going for primes you will have worked on your attacking skills, done some interval work, livened things up, and been an active, not passive participant in the race.

Sprinting—Overview

Many variables contribute to making a cyclist a successful sprinter: fast-twitch muscle strength, the ability to spin fast cadence, tactics, and technique. As always, confidence and motivation contribute to success.

Phases of a Sprint

The sprint can be divided into three phases:

1. The jump, or initial acceleration.
2. The high-cadence middle section.
3. The final kick or holding on to the finish.

The Course

It is hard to be a serious sprint contender if you do not know the route to the finish line. Unless it is a criterium, it is best to ride the last mile of the course several times. Although plans may change, plan ahead.

A few important things to know:

- Level, uphill or downhill sprint.
- Headwind, quartering wind, or tailwind.
- Distance from the last corner to the finish line.

Know Your Rivals

Who are the strong sprinters, what are their strengths and weaknesses? Do they have a good jump? Do they wind up and have a long sprint? Do they have a short, high-speed range? Alternatively, are they perhaps a little quicker at accelerations? Is a non-sprinter likely to try a flyer, lead out a teammate, try to tire the field, or make a bravado effort?

Teammates

Review team tactics starting on page 119. Read about leadouts on page 138.

The protected, designated sprinter should do as little work as possible in the race. If you expect a mass finish, others cover breaks, work on the uphills, and drive the pace.

Positioning

From which side of the course do you want to sprint? Will one route give you a clear shot? Will another path block rivals? Where should you plan to pass others? What are others likely to do? How can you anticipate and counter their moves?

Do you have a leadout? Will you key off another rival? In a breakaway, will you want a specific rider on your wheel? Is there a rider you would not want on your wheel?

Many riders want to be on a specific rider's wheel. Consider also arranging the group to place a desired rider (generally, a slower sprinter) on your wheel.

Read more about rearranging riders in a breakaway on page 97 and working your breakaway on page 104.

Flyer?

In the last few kilometers, some may decide they do not like their chances in a bunch sprint, but that they may be able to escape the group. You might decide this yourself if you are a good pursuiter, but not a great sprinter.

This works best if there are two or three dominant sprinters in the group, who will watch each other, playing sprinting chicken, saying to each other: "Go ahead, you chase."

If the rider who takes the flyer is a good pursuiter, you may want to go with them. Even if you get caught, this rider may keep you relatively safe from the bumping in the field, give you a better line around the last corner or two, or serve to keep you relatively fresh, taking you to where you can launch your sprint.

If the pack speed is high, and the flyer is a middling rider, the pack will probably catch easily and too soon for you to derive the benefits listed above. You may hit the front of the field too soon, and be swamped by waves of riders going around you on both sides.

Final Kilometer

If the pack speed is high, it is almost certainly too soon to go on your own. If you do not have a teammate, a good wheel to be on belongs to a strong rider who will not fade; one that you can just come around at the line.

If there are two or three dominant sprinters in the group, if you are not one of them, and if the pace has slowed (especially after a previous attack, chase, and catch), perhaps try a flyer—the group and sprinters may hesitate, watching each other.

Timing

Do not be impatient and go too soon. Be ready to glue-up to others who charge too soon.

How long a sprint do you have? When do you have to go?

When you get to the point at which you can continuously accelerate to the finish line, it is time for you to go even if no one else has started sprinting. If you start to fade and slow down before you reach the finish line, you are outside of your best sprinting range.

This distance is generally between 100 and 200 meters.

Other considerations:

- Downhill or tailwind sprint? Be prepared to go earlier than usual.
- Headwind? Go later.
- Quartering wind? Look for an opening on the lee side.
- Corners? The pack will string out and it will be tough for people to stay on wheels: maybe you want to attack before the final corner. Reorient your thinking. Do not think finish line; think last corner. In at least half of US criteriums, the race is won racing for the last corner, not the finish line.

Race for the Last Corner?

In criteriums, to win and to get the timing right, it is often necessary to be one of the top three riders in the last corner.

If the finish line is just 200 meters after the last corner, you may need to be first through that last corner.

Effectively, the race is often to the last corner, not the finish line.

Hand Position

Power and control are best with the hands in the drops of the handlebars. Be in this position.

It is possible to sprint with the hands on the brake hoods.

It is not possible to sprint effectively with hands on the handlebar tops.

Gearing

Gearing depends upon distance to the finish line, terrain, wind, and conditioning. You can accelerate more quickly in an easier gear. It is like accelerating a stick-shift car—you often can jump faster by using an easier gear.

It is best to choose a gear in which you can accelerate quickly, but not spin out. Although you can change gears once or even twice during a sprint, it often costs a valuable fraction of a second.

If you start a sprint from a relatively low speed, you will need an easier gear.

If you start a sprint from a relatively high speed, you will need a bigger gear.

Glue-Up to Rider in Front of You?

In general, the faster the speed, the more important it is to be close to the rider in front of you.

Drafting as close as you are comfortable to the rider in front of you allows you (1) to save as much energy as possible and (2) helps prevent riders from cutting in and taking that wheel.

However, (1) it is also more dangerous and (2) may reduce your options to move left or right to counter a move coming from either side of you.

Depending upon the wind, curves in the road, or other factors, it may be best to be a little to the left or to the right of the rider in front of you.

Taking a Run at a Rider

A trick to coming out of the draft to attack or to sprint is to:

- Let some space open up in front of you.
- Accelerate toward the wheel in front of you.
- Pull out of the draft and pass at the last possible moment.

Why does this work?

Suppose you have the same fitness as the rider in front of you and that you time trial at the same speed. Other things being equal, if you follow the wheel closely, when you pull out into the wind, you will only be able to go the same speed as that rider.

Drafting, you are saving energy. If you take a run at the rider in front of you, when you slingshot past you will be traveling faster than the lead rider with the same effort.

Of course, having saved some energy drafting, even though equals, you will be able to go even faster.

Therefore, when you take a run at a rider, you not only end up attacking or sprinting at a higher speed, you are already at a higher speed when you pass the rider.

This makes it more difficult for the leading rider and any riders behind you to latch on to you or match your attack or sprint.

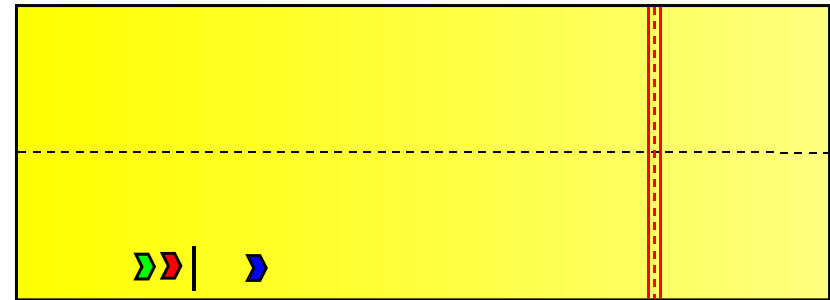


Figure 74. Taking a run at a rider. RED lets a little gap open on BLUE. RED jumps into BLUE's slipstream and launches. BLUE is controlling the acreage, riding on the right side of the road.

Jump Hard

Accelerate to your top speed as quickly as possible. This creates a gap between you and the rider behind you.

If you slowly wind up your speed, it is easy for the rider on your wheel to benefit from your draft.

Where to Go

Control the Acreage

If you are leading out a sprint and riding down the center of the road, riders may jump and pass you on either side. By riding on the edge of the road, as the lead rider BLUE in Figure 74, you need watch only one side.

Use Obstacles

Course obstacles, such as a corner, changing wind, small climb or rise, or curve in the road may help decide the crucial timing of the jump.

Moreover, other riders' positions to react (or not) may help determine not only the timing but also the route to take through the group. Said differently, sometimes other riders may serve as obstacles to your main rivals.

Distractions

Riders narrow their focus during a sprint. They focus on the finish line, they focus on their rivals, and they focus on their effort.

A cheer or encouragement from a spectator is unlikely to distract most sprinters.

However, a crash, the wind-driven collapse of fencing or a scaffold, might. In addition, the focus of the best sprinters on each other or a leadout rider on one side of the road may provide an opportunity for attack on the group on the other side of the distraction.

Double-Sprint

Other things being equal, it is a rare rider who can sprint from more than 200 meters and take it to the line if others are in his or her draft.

One technique when sprinting from, say 250 meters, is to jump hard, though not all-out, and soft-pedal one or two pedal strokes with about 150 meters to go.

This will often induce a slipstreaming rider to come out of your draft, but not give him or her enough time to come around you.

Now sprint all out, and if you have the timing and momentum right, you are more likely to win than if you had sprinted all-out from 250 meters.

Counter to Dominant Sprinter

Is there a dominant sprinter in your field, one who wins almost every criterium you enter?

The last time you raced, although there were a few attacks and short-lived breakaways, did she predictably win?

How do you deal with this, especially in a situation where you do not have many teammates?

Most of the time, the sprinter is relying on other riders to chase down attacks and breakaways. She is using the field to play into her hands.

Try speaking to a few other riders before the race and see if you can agree not to chase each other. Agree to work together at every opportunity in a breakaway.

Attack early and often. Let the sprinter chase. Everyone else: Draft her. Make her work.

Relay attack. As soon as the sprinter catches, someone else attacks. Let the sprinter chase. Everyone else: Draft her. Make her work.

Flyer. Let the sprinter chase. Everyone else: Draft her. Make her work.

Celebrate Safely

Riders commonly celebrate winning by raising one or both arms when crossing the finish line.

Riding one or two-handed can present a safety risk, and at times has been against bicycle racing rules.¹³

Celebrating too early presents another risk: Being pipped at the line.



Figure 75. Jonathan Cantwell has started to raise his hands in victory, but Rahsaan Bahati is sprinting “through the finish line” and sneaks past. Paramount Criterium. 2006.



Figure 76. Oscar Freire, second from left, pips Eric Zabel, center, who celebrated too early. Milan San Remo, 2004. Photo © Graham Watson.

¹³ USCF rule 1013 until 2004.

Plan to Win a Sprint

A key to winning is the self-knowledge of how that victory may occur—an appraisal of your abilities—both strengths and weaknesses.

In other words, triumph comes from a conscious (or occasionally subconscious) understanding of what circumstances must be or might be in place for that success to occur. It is relatively rare that riders prevail entirely by accident or luck.

Consider also the menu of moves that can occur in the last 1,000

meters of a race, whether those moves are initiated by you, or are responses by you.

Once you understand your strengths, and the scenarios that can result in victory, you may be able to put the moves together to make it all happen.

Here are some possible moves (Table 5, below) for a rider when the sprint initiates from a distance of 100, 200, 300, 500, and 1,000 meters to the finish line, from the front, middle, and back of a breakaway group of six. For a rider with different strengths, the approach might be different.

Distance	Front (Position 1)	Middle (Position 3)	Back (Position 6)
100 meters	All-out sprint. Choose the shortest line or lee side. Gear will be smaller here than for sprint initiated from any other distance.	All-out sprint. Choose the shortest line, lee side, or the opposite side of #2 rider if this rider is echeloned on #1 rider. Gear will be smaller here than for any other distance.	All-out sprint. Perhaps with a little gap and accelerate into the draft. Gear will be smaller here than for any other distance.
200 meters	Almost all-out sprint. Choose the shortest line or lee side. Double sprint: Slight soft-pedal at 100 meters and then all-out sprint.	Almost all-out sprint. Glue-up to wheel of sprint initiator or choose the shortest line or lee side. If then leading with others in draft, double sprint: slight <i>soft-pedal</i> at 100 meters and then all-out sprint.	Almost all-out sprint, perhaps into a gap. Glue to wheel of sprint initiator or choose the shortest line or lee side. If then leading with others in draft, double sprint: slight <i>soft-pedal</i> at 100 meters and then all-out sprint.
300 meters	Rearrange riders: Short sprint, ease up as others react and start sprints. Catch a wheel, launch all-out sprint 100 meters to go.	Generally, a good position in which to be. Respond to moves. Stay in position until 200 meters to go.	Move in front of the weakest riders. Watch for the best sprinter to move, glue-up, and come around at the line.
500 Meters	Do not make hard pace; it is likely to waste energy. Stay center of the road to allow you to respond to the left or to the right. Alternatively, ride the edge of road to control attacks to one side only. Anticipate moves, listen for others. Respond to be in middle position with 300 meters to go.	Sit in. If the pace lets up, make a mini-jump that causes others to make their move. Jump on moves to keep position.	Move in front of the weakest riders. Try to be in middle position with 300 meter to go.
1,000 meters	Continue moderate effort and pull off to help keep the group rotating. Make little jump to induce others to make a move.	Keep rotation going if still pacelining. As the pace increases, shift to a harder gear. If the pace decreases, shift to an easier gear.	Move in front of the weakest riders. Sit in, watch for moves. Do not necessarily be the first to jump when a move is made or you may end up at front too early.

Table 5. Sprint moves based on distance to the finish line and group-of-six position.

Train to Sprint

You arrive at the end of a criterium or road race and do not finish well. Alternatively, riders jump at the top of hills or before other obstacles in a race, and you cannot respond.

Sprint Requirements

Power

Successful sprinters are able to generate lots of power for a short period of time. In other words, they are able to produce high anaerobic power and torque.

World-class male road sprinters can produce more than 2,000 watts, or almost three horsepower, for about 10 seconds; world-class female road sprinters can produce more than 1,500 watts.

In contrast, good climbers are able to produce lots of power for their weight for sustained periods of time.

High Cadence

Sprinters also have the ability to produce high rpm. Although not every sprint requires a high cadence, acceleration is easier in a smaller gear.

Successful sprinters are the ones who can accelerate the quickest, and then maintain power with high rpm.

Tactics

Successful sprinters must be tactically astute. Sprinters require a good sense of timing—how to best use their physical talents.

In professional road races, great sprinters are often protected by teammates until the last few hundred meters (yards) of a race, never fighting the wind on their own until the last few seconds.

In amateur races, without teammates, sprinters may need to be cannier, jumping on rivals' wheels and following attacks, in order to be present and in contention for the finale.

Although attacking, pulling, and working hard in road races are considered macho, or evidence of panache, the best sprinters rarely do, saving their energies for the finale.

Great sprinters are rarely criticized for sitting in or for not pulling, for not taking their share of the aerodynamic burden. Perhaps paradoxically, mediocre sprinters—precisely those riders who might do better if they saved their energies for the finale—are often ridiculed as wheel-suckers for the same behavior.

Do You Have a Weak Sprint? Or Are You a Weak Sprinter?

The bottom line is that not all weak sprinters have a weak sprint.

Check out your sprint fitness by comparing your measured performance against top sprinters in your category as shown in Table 6.

Many riders consistently and routinely sabotage their efforts before the finale by wearing themselves out prematurely.

Savvy, relatively-weak sprinters may win many races through two basic tactics:

1. Saving their own energy
2. Wasting others' energy

Where a professional sprinter might develop a peak power of more than 2,000 watts of energy, and a Category 3 sprinter about 1,500 watts, only 750 watts may be required to win a Cat 3 road race when the riders arrive fatigued.

Saving Energy

Clearly protected by teammates, sprinters in professional road races and criteriums rarely need to follow early breakaways or attacks. Their teammates do that for them.

Teammates also give sprinters a leadout, protecting their position until the last few hundred meters of a race.

Along the way, the biggest obstacles for most sprinters are sustained climbs. Sprinters may be big riders and have a relatively low power to weight ratio for sustained high-level aerobic work. They often fall behind on hills.

If the hill is short, the damage is not great; teammates can pace them back to the lead group.

Alternatively, a relatively heavy sprinter may be able to catch up on a descent.

Wasting Others' Energy

The amateur road-race rider has another objective: Making others work and waste their energy.

This is a crucial race strategy that most riders never learn. It is a big step in improving one's chances in races.

In amateur road races, with fewer teammates to protect an individual sprinter, or without teammates to chase back on after being dropped on climbs, sprinters have trouble on even modestly hilly courses.

There are many strategies for wasting other riders' energy: For example, creating gaps and bridging to breakaways.

How to Become a Better Sprinter

Work on the Physical

Anaerobic Power and Torque

Riding tempo on club group rides helps develop endurance and modest aerobic power. However, it does little to develop anaerobic power or torque. Like any other cycling-fitness element, training improves ability.

Develop anaerobic power and leg torque with a variety of intervals: 5-second, 15-second, and 30-second efforts, in big and small gears. Develop leg torque with one-leg riding.

For more workout details and examples, see the ABC book *High-Intensity Training (HIT) for Cyclists*.

Leg Speed

Again, high-cadence ability does not result from riding tempo on club group rides. Specific incremental and other high-rpm exercises, small-gear high-rpm sprint practices help develop this important cycling fitness element.

Work on the Mental

Neuromuscular

Sprint drills are important because sprinting is a skill. Many riders who have not practiced this skill are surprised to find that (1) loss of steering control and riding straight, (2) loss of front- or rear-wheel traction, or (3) choosing the right gear, require experience.

In addition, reaction time can be trained. Reaction time is important in general road riding and criteriums. In a sprint, it is critical. Often you have only a split second to react to another rider's move or an opportunity.

Like almost all skills, practice helps strengthen neurological pathways in the brain and down to the muscles.

As with most skill training, 15 minutes or so is enough for any one session.

For the first few sessions, practice with plenty of room and only a few participants.

At first, practice sprinting in the drops or on the hoods, from different gears, from different speeds, for 5 to 15 seconds.

Start with surges, and then build up to all-out efforts.

Let riders learn through experimentation and practice the steering, wheel traction, and gear-selection issues; then discuss and practice them again in small groups.

For example, notice that power is maximized with hands in the handlebar drops. Wheel traction does not relate so much to the amount of power produced as to balanced weight distribution fore-aft on the bicycle.

Then work on reaction time: With a coach or training partners, designate one rider to initiate a jump, blow a whistle, or say: “Go.” Practice responding as quickly as possible.

Sprint just a few strokes to as many 10 strokes. This drill is about improving reaction time, not about sustaining cadence or torque.

After perhaps 10 or 20 such efforts on one day, perform a similar drill another day. Riders respond not only by sprinting with their legs, but also by saying “Go!” themselves, aloud.

After perhaps 100 such repetitions, spread out over several sessions, internalize the “Go!”

Tactics

Although club group rides are fine for endurance and general aerobic training, they need not be constant pacelines. Let gaps open, set up teams, and play tactical games.

Practice sprints. Training this aspect of racing will put you ahead of the majority of racers who, perhaps surprisingly, never practice!

Set-up sprint practices with leadouts and small groups. For example, choose a half-mile oval course and practice sprint tactics with riders alternating in the role of leadout rider and designated sprinter every lap.

Alternatively, set up half a dozen sprint points on your way home on a group ride. It is good “real-world” training to learn to sprint when you are already tired.

Read about and learn to save energy. Many riders now use power meters during training and races. At first, riders try to see how much power they can sustain during rides or races. Do just the opposite: See how little you can use and still finish the ride with your usual group.

Practice Timing with Solo Sprint with CompuTrainer

CompuTrainer is an electronic stationary trainer device made by RacerMate. It has an interactive computer graphics program with a pacer. You can set the pacer power level. Drafting the pacer requires only half the wattage of the pacer.

Set a course with a finish line. Set the pacer power level higher and higher, and learn how to jump out of the pacer’s draft at just the right time to finish ahead of the pacer.

Alternatively, learn how to jump at any given pacer power level to obtain the biggest gap you can.

More Info on Safety, Practice, Training

Speeds are high, adrenalin is pumping. A field sprint is often a dangerous time. Once again, practice in training with small group sprints, leadouts, and race simulations. With practice, you will be better.

For more information about sprint training and technique, see the *ABC* books *High-Intensity Training (HIT) for Cyclists*, *Smart Cycling*, and *Skills Training for Cyclists*.

Road Men	Cat 5	Cat 4	Cat 3	Cat 2	Cat 1	UCI Pro
Neuromuscular						
RPM, progressive, 60 seconds	125	130	135	140	145	150
RPM, progressive, 30 seconds	135	140	150	155	160	170
RPM, progressive, 15 seconds	145	155	165	170	175	185
Muscular						
ILTs 60 rpm, 3 min, watts/kg	2.6	2.8	3.4	3.7	4.0	4.5
Anaerobic						
Anaerobic power 10 sec, watts/kg	12	14	16	18	20	25
Anaerobic power 10 sec, watts/70 kg (154 lb)	850	1,000	1,120	1,250	1,400	1,750
200m time, fast track, seconds	14.0	12.5	11.5	11.0	10.5	10.2
1000m time, fast track	1:19	1:17	1:15	1:13	1:10	1:03

Road Women		Cat 4	Cat 3	Cat 2	Cat 1	UCI Pro
Neuromuscular						
RPM, progressive, 60 seconds		120	130	140	145	150
RPM, progressive, 30 seconds		130	140	155	160	165
RPM, progressive, 15 seconds		145	155	170	175	180
Muscular						
ILTs 60 rpm, 3 min, watts/kg		2.5	2.8	3.1	3.4	3.7
Anaerobic						
Anaerobic power 10 sec, watts/kg		10	12	14	16	18
Anaerobic power 10 sec, watts/55 kg (121 lb)		550	660	770	880	1,000
200m time, fast track, seconds		15.0	14.0	12.5	11.5	11.0
1000m time, fast track		1:20	1:19	1:17	1:15	1:13

Table 6. Fitness standards for excellence. Top male and female sprinters by category. Adapted from *High-Intensity Training (HIT) for Cyclists*.

Leadouts

Fastest Does Not Always Win

It is not necessarily the fastest racer who wins the final sprint, or even wins the primes. Why is that?

One important reason is that the fastest sprinter may not be in the right place at the right time. She may be “boxed in.” She may not be able to develop her sprint.

Alternatively, she may be forced to use her sprint at the wrong time (for example, too early), with another rider taking advantage of her draft and coming around for the win.

Teamwork

A teammate can help considerably. Several can help even more.

It is relatively easy to win the sprint if you are the fastest, and if you are third with 300 meters to go, second with 200 meters to go, and the way is clear to sprint. The problem is being in the right place.

A teammate can keep the pace high for you until the final 100 to 200 meters. A teammate can allow you to sit on her wheel until the last 100 to 200 meters, at which time you can come around your “leadout” woman.

If you are not on someone’s wheel, you are not saving energy by drafting. The person behind you is saving energy by drafting. If you have a leadout, you are both saving energy and the person behind you no longer has this advantage.

With someone in front of you, protecting you until the last 100 to 200 meters, the person behind you must be stronger than you are to win—because she must travel an extra 2 meters (6 feet)—the length of your bicycle and a few inches drafting clearance.

If you have more than one teammate in a leadout train, you will start the leadout further from the finish line. It will be even harder for

others to interfere with your positioning at the end of the race—for example, by swarming up the sides. The person directly behind you will still have your draft; as before, she will still have to travel an extra 2 meters to beat you.

The more teammates involved, the more important it is to discuss team tactics before the race.

Timing

Timing is important. Your own leadout woman must not come to the front too soon. If she does, she might not be able to keep the speed high enough, and waves of riders may pass you on either side and your position may be lost.

Two Teammates

With two teammates to help, the first can pull the second who pulls you. Then the leadout can begin earlier, and your position be assured more readily.

Three Teammates

With three teammates to help, you can have a sweeper on your wheel, a teammate who assures that no other rider takes too much advantage of you—the designated sprinter. Now a drafting rival will be two bike lengths behind and have to travel even farther to beat you. Furthermore, if your sweeper times it right, she will gap you off at just the right time and make it even more difficult for your competitors.

Rider Just Before the Sprinter

In order to give a good lead-out this rider needs to be almost as strong, or as strong as the sprinter. It is just that the sprinter has a special talent: fastest over the final 200 meters.

The final lead-out rider has to sprint with the finisher on her wheel. In the leadout rider's mind, her finish line is 200 meters before the real finish line.

Sprinter Directs

The designated sprinter directs the show. The leadout woman is at the front, and so cannot see what is happening. She may need to be directed, told to go even faster, go left, or go right, to react to other challenges.

Summary

- There must be at least one teammate to lead out the sprinter.
- The final leadout person drops off, after a maximal effort, 150–200 meters to the line.
- Watch out for waves that could “box in” you or your leadout.
- The sprinter directs.

Endgame: One-on-One

It has come down to the last part of the race, and you are away with one other rider. How do you plan the end of the race?

Secure Your Break

Make some estimation of your opponent. If she is a decisively better time trialist and faster sprinter than you are, it may be appropriate to acknowledge this and settle for second.

It may even be appropriate to tell her so. If she is uncertain of your abilities and starts to dicker with you about who should pull, putting you both at the risk of being caught by the pack or chase group, give the win away, be happy with second. Moreover, do not try to renege on your deal if you make one, or you will never make another!

Set Up the Sprint

Normally, in a road sprint, it is easier to be behind your opponent with 250 meters to go. That way she leads you out and you jump and come around her with about 75 meters to go.

If you have been trading pulls to stay away from the pack, you can psychologically set this up by pulling from about 400–500 meters to about 250 to go. That way it is “her turn.” In addition, save a little something with that last pull, if the pack is not on you.

In a criterium, decide ahead of time whether you want to lead out of the last turn, or if you want your opponent to do so. Set it up the way you want. For example, if it is 200 meters to the line after the turn, and there will be a tailwind, you probably want to lead it out to the finish line from the last corner. Arrange the last lap so your opponent pulls you toward the last corner and it is your turn to pull around the corner.

When each of two riders want the other to lead, and no other competitors are in sight, they occasionally come to a complete standstill—a trackstand or surplace—waiting for the other to lead out the sprint.

Watch the Wind

If there is a crosswind, set things up so that you will have the faster leeward side.

Correct Gear

Usually you have to shift a cog or two harder for the last sprint. You shift, keep a little slower cadence, then stand, jump, and wind it up.

Correct Body Position

Do not forget: Hands in the drops, stand, accelerate to speed.

When You Gotta Go...

When you get to the point at which you can continuously accelerate to the finish line, it is time for you to go!

Endgame: Two-on-One

It has come down to the last part of the race, and you are away with two other riders. One is your teammate. How do you plan the finish?

Secure Your Break

Two-on-one. Great! Either you or your teammate will probably win if you play your cards right.

Once you start working over your opponent, however, do not count on her ever working in this race with you again. Do not start dickering and playing until you reach the point in the race where either you or your teammate can successfully finish the race ahead of the chase group or pack alone.

Don't Be Greedy

What is the best that can happen? First and second for yourself and your teammate. The worst? You are caught by the pack, or your opponent first, your teammate second, you third. Do not be greedy. If you are all about equal, try for first and second, sure, but be happy with a first and third, your teammate and you.

Who Is the Best Sprinter?

If your opponent is the best sprinter, you definitely do not want a sprint for first. If you are the strongest sprinter, you want your teammate to time-trial away for first, and you want to outsprint your opponent for second.

Set It Up

There are many different ways to play it. Unless your opponent is by far the weakest sprinter, or concedes third, play it! Here are some examples:

Plenty of Time Until the Finish?

It is not necessarily the first attack that wins. Remember it may take many attacks to drop your opponent, or to get away. Alternatively, you may succeed only in weakening her.

Side to Side

Ride at a moderate pace, you on one side of the road, your teammate on the other. Who does the opponent stalk? The stalked rider slows down, the other speeds up.

The opponent is forced to jump and change sides, or your teammate is away for the win. When she switches sides, your teammate slows down and you speed up and jump both of them.

Your opponent must jump repeatedly twice as often as you and your teammate. If your opponent jumps you both, you and your teammate work together to chase her, then counterattack.

Back to Front

You are in a three-rider paceline. You and your teammate should pull only moderately.

- If your opponent is leading, the weaker of the two of you jumps as your opponent pulls off. If she chases, the stronger teammate sits on her wheel and counters the moment before catching.
- If your opponent is in second, and the pulling teammate is doing so only moderately, the rider in third can let a little gap open, jump into the slipstream gap to accelerate, and attack decisively.
- If the opponent is third, the second rider lets the first rider gap off and go away down the road, or rearranges the paceline.

Not Much Time Until the Finish?

No time to dicker around because the pack or chasers threaten to catch you. You have some choices:

Leadout

Weaker finisher leads out stronger teammate.

Gap

A stronger rider lets a gap open between herself and a teammate. If the opponent does not chase, the teammate wins. If the opponent does jump and chase, the stronger rider is prepared to draft off the opponent and counterattack.

Counter to Two-on-One

Savvy teammates can make your life difficult if you are the lone rider. How do you deal with two teammates who know the material covered above?

Your main strategy is separate your rivals, so they cannot work together.

You want to use them, not be used by them. You have many choices:

1. Suppose one attacks, and you are forced to jump. Do not chase, catch, and sit right on their wheel.

Keep a little gap.

With a little gap on the lead rider, you have options:

- You can see the lead rider and respond to her acceleration.
- If the trailing teammate has a big gap to close, you can jump into the gap of the lead rider, gaining a partial draft and accelerate, dropping both teammates while they are separated and unable to work together.

- If the trailing teammate closes and attacks, you can jump into the gap of the lead rider, again gaining a partial draft, and more easily match the acceleration of the trailing attacking rider.

2. Alternatively, if you are as strong or stronger than each of the riders, allow one of them to attack you and escape. Depending upon the distance to the finish line, allow a smaller or larger gap to form. Then jump the rider marking you. Bridge up and attack the lead rider. Timed properly the two teammates will be too far separated to wait for each other and then work together to chase you.

3. If you are a stronger climber, you can wait for a climb and drop them. You may have a choice: drop them one at a time or together. You might want to slowly increase the pace so that first one, then the other is dropped. Alternatively, you may want to jump them both early on the climb. In this situation, the faster climber may wait for the slower climber, or they may help each other up the climb. After the climb they may work together to chase you down. Drop them separated or together? Which tactic you use depends upon how far it is to the finish line, the length of the climb, and the terrain after the climb.

Part 6

Event-Specific Tactics

“When you’re a kid eighteen years old, seventeen, all you dream is to win the Tour de France. There are a lot of seventeen-year-olds out there doing it, but I tell you it’s more difficult than people think.”

—Greg LeMond, three-time Tour de France winner (1986, 1989-90), two-time world champion (1983, 1989).

“There is nothing in America even remotely comparable to the Tour de France. We think the World Series claims the undivided attention of the United States, but there is a saying here that an army from Mars could invade France, the government could fall, and even the recipe for sauce Béarnaise be lost, but if it happened during the Tour de France nobody would notice.”

—Red Smith, New York Times Pulitzer-Prize winning sports writer.

Race Selection

When the racing calendar comes out, many racers sit down and plan their racing year.

Will you plan ahead of time which races to attend? How do you choose? Do you need to research information about a race to decide whether to go? Will you need to plan or adjust your training for the race?

Be Flexible, Not Too Ambitious

It is easy to get excited early in the season and write down almost every race on the local or national calendar.

With experience, you will learn how often you can physically and mentally race.

If you do too much, you may find that you want to stop racing midseason. Perhaps you will find that by racing every other weekend you maintain enthusiasm throughout the racing season.

Plan for recovery. Allow some breathing room during the season to recharge your mental batteries.

Racing improves speed, but may worsen strength and endurance. You may want to plan some time off racing during the season to retrain these fitnesses.

Set Priorities

What are your goals for your racing year? Do you want to move up a racing category, perhaps advance from Cat 4 to Cat 3? Do you want to do particularly well at your state or national championships?

Once you have thought about your goals, start with your top priority races. Call these A-priority races. Choose a maximum of six A-priority races.

Next, choose a maximum of six B-priority races.

Assign all other races C-priority. Perhaps select some races knowing that if you get a little tired of racing, those will be the first to go.

Availability

How many choices do you really have?

If you live in a hotbed of racing, you may be able to race locally Saturday and Sunday every week.

If you live in Hawaii and you want to race regularly, you may need to enter triathlons, perhaps as part of a team.

Distance

It is one thing to drive 30 minutes to race in a local criterium. However, would you drive three days to race in a local criterium on the other side of the country if a local one were available? Clearly not—unless there were other reasons.

Cost

Consider not only the cost of entry, but also the cost of transportation, hotels, and rental vans.

Time Commitment

Will the race take you away from work, family, or other commitments for more time than it is worth?

Occasionally the travel time commitment takes time away from important training for higher-priority events.

Support

This can work in different ways.

Some racers choose courses with good support—for example, good organization, short lines at registration, neutral wheel support, free snacks and beverages.

Some racers want to support a local promoter or race-affiliated charity.

Prestige

Big races motivate some racers—for example, when big prizes, big competition, or local, state, national, or world championships or records are at stake.

Some riders refuse to race for waterbottles. They are looking to help pay their bills.

Teammates

Will you have any? If you race a different race or different day, will you have more?

Fit Into Your Program?

Of course, if it is an A-priority race, it is important to you. However, if it is merely a “training” race, how does it fit into your overall training process?

Race Duration

Some riders figure it is simply not worth it to travel a few hours for a 45-minute criterium or 30-mile road race. They want to be riding for a longer period of time.

Track racers may travel thousands of miles, and warm-up and cool down for many hours for just a few minutes of racing.

Are there several races you can enter? Many organizers design their criterium schedule to cater to racers who wish to enter multiple events, often at a reduced fee for second or third entries.

For example, a 45-year old might not only race 45+, but also race the Cat 3 race, if eligible, or the 35+ race.

Suitability

Most racers prefer to race courses that suit their abilities. For example, a strong sprinter may prefer a flat or rolling course and shy away from races with sustained climbing.

A strong, small, aerobic climber may avoid races likely to end in field sprints and prefer courses with long climbs.

Competition

A variation on the suitability theme.

Is it hard enough? Is it too hard?

A talented 60-year old might be willing to race a 55+ criterium, but not travel to a race that offers only a 35+ field.

If you are a new, inexperienced Cat 5 40-year-old male racer in California, the 40+ field is too tough. In California, 40+ fields generally contain several Cat 1 riders, perhaps including a former Olympian or two. A Cat 4/5 race might be more your level.

Conflicting Races

A variation on the competition theme.

Scheduling conflicts on the racing calendar may allow you to enter a race and do better than you might otherwise achieve.

For example, two criteriums on the same day in your district might give you the opportunity for a win if the top sprinters choose the other race.

Sunday Race After Saturday Race

Is your goal to gain points for an upgrade?

In many areas, racing is available on both Saturday and Sunday.

During such a race weekend, skipping a hard Saturday road race may give you a better chance against a tired field whose top riders have raced the day before.

Field Size

Another variation on the suitability theme. Some riders thrive on big fields, big excitement. Others get lost in crowds and prefer a more manageable, safer group.

Have a small team? Have a new team? A smaller field may allow your riders to bond better, learn about each other's strengths and weaknesses, and learn beginning strategy and tactics in a more controlled environment.

How Technical?

Another variation on the suitability theme.

Some riders thrive on technical courses, others shy away from the contact and danger inherent in such racing.

Have a new team of neophyte racers? A non-technical course may provide the best opportunity for most members of your team to finish the race.

Have a skilled team? A technical course might provide the best opportunities to execute team tactics.

Test of Fitness

Planning to race a time trial at Nationals? Perhaps you will want to travel to a local or regional time trial to test your fitness against other riders.

Improve Fitness

Racing improves some aspects of fitness. Although many cycling fitnesses can be trained alone, the group dynamics of mass-start racing is valuable for improving race form.

This is especially important for racers who live in areas with few competitive group-training rides.

Gain Experience

It is sometimes important to race, regardless of results, for the experience.

As a beginner, you may want to race frequently just for this reason.

You may want to travel to major races, such as National Race Calendar events, even though you have no hope of doing well. Such exposures can be valuable later when you have the fitness to excel.

Previous Performance

Riders sometimes like to return to courses they have done before.

This may be to defend a past victory, try to improve upon a past performance, or evaluate themselves on a race classic.

Weather

Cold? Wet? Hot?

Some thrive in adverse conditions. Some do not race in the rain, or snow. Races are generally cancelled only if lightening is present.

Course Danger and Medical Safety

Although some riders seem to welcome danger, most look for safe courses. Is the criterium in a downtown area with thousands of bots dots? Are the roadways too open to spectators or vehicles? Are there dangerous descents or corners? Is the road surface good? Is the weather likely to be bad, and will it affect safety?

If there is a crash, is there quality medical care nearby?

Job

Professional riders may have no choice. They may be told it is their job to go to a certain race.

Nearness to Other Points of Interest

Live in Chicago? Thinking of traveling to Nationals with your family? Would you prefer to spend vacation time traveling to Bakersfield, CA, or to San Diego, CA?

Although some racers think only about the race, other nearby attractions may sweeten the trip for them or their traveling partners.

Race Planning Form

Keep a working list of your planned races. I and the riders I coach use an Excel worksheet on our training logs to do this. *Training Logs* is available through <http://arniebakercycling.com>.

Road Race & Criterium

Most of this book applies to road races and criteriums.

The general, the specific, and the team race strategies and tactics that are discussed throughout this book apply to most of these events.

Criterium riders will be especially interested in tactics to move up—advance within the field. Some of these tactics are discussed on page 47.

Many beginning racers find the stress of criteriums a little too much. Moreover, the stress saps energy.

If you are nervous in criteriums, and competing on a non-technical course where the risk of a breakaway is relatively low, consider riding the first few laps in the back, where there is less jockeying and fighting for position, and the race is less stressful.

Once riders have settled in, moving up half a dozen laps from the end of the race is often relatively easy—especially in small fields. The race will be psychologically stressful for a shorter period of time.

Criterium riders need to have good to excellent cornering skills. For more information on skills training and cornering skills in particular, see the *ABC* book *Skills Training for Cyclists*.

Time trials and stage races have specific considerations not discussed elsewhere in this book. These will be discussed next.

Time Trial (Solo)

Time trialing tactics and techniques are all about getting the most out of power available.

Said slightly differently, time trialing techniques allow you to ride at a given speed with less energy. There is more to time trialing than just going as hard as possible.

I will discuss some race tactics here. For more information, see the *ABC* handout *Time Trialing*.

Fast Lane

Most roads have a “best place to ride.” In choosing where you are going to ride, consider safety, shortest line, and surface. The fastest place to ride is usually a couple of feet in from the edge of the lane—where the inside wheels of most cars have made the pavement a little bit smoother and there is less rolling resistance.

Hugging the shoulder of the road may be the safest location only if there is a lot of traffic on the course. The shoulder usually has the most glass and other debris, making it the most likely place for a flat.

With an organized event, signs warn motorists of your presence or the road is closed so that riding down the middle of the lane is less dangerous.

Legal Drafting

If the road is not closed, vehicles passing you may provide momentary draft. There is nothing illegal about edging to the center of the road and slightly picking up the pace to momentarily draft them. Vehicles traveling toward you may slow you down. You may wish to move toward the gutter to avoid their headwind draft.

Equipment

Time trial bikes, wheels, handlebars, bike set up and positioning, and clothing can help performance. Read more about aerodynamics on page 53, in the *ABC* handout *Time Trialing*, and in the *ABC* book *Smart Cycling*.

Starts

Gear selection, pedal and body position, initial effort, and focus play important roles. Practice, and as said above, read more about aerodynamics on page 53, in the *ABC* handout *Time Trialing*, and in the *ABC* book *Smart Cycling*.

Turnarounds

What generally results in your fastest time is the ability to get back up to speed quickly. Practice turnarounds on your time trial bike.

The following technique of time trial turnaround is generally the most effective:

Perform the turn asymmetrically. Save braking for the last moment. Slowly coasting into the turn wastes time. Ride a couple of meters beyond the turnaround along the right edge of the road. Establish a lean to the right along the right side of the road. This allows a sharp turn to the left. Make an acute turn and get back up to speed quickly. This method is slightly longer than a symmetric curve, but allows for better control of the bike and a quicker start back up to speed.

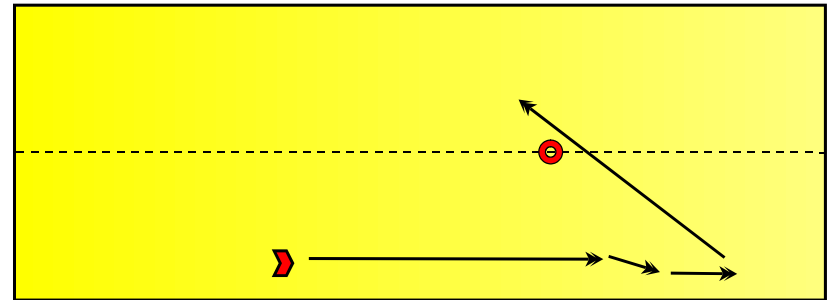


Figure 77. Making the turnaround. Method 1. Fastest method on narrow roads. Establish lean to right. Sharp turn to left beyond turnaround.

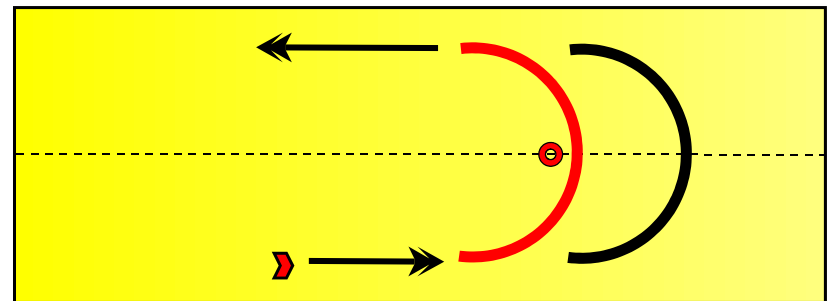


Figure 78. Making the turnaround. Method 2. Suitable on wide roads. For the shortest distance, start the arc before the pylon (RED) rather than at the pylon (BLACK).

Pacing

A specific section on pacing theory is found on page 31. Accelerate to speed quickly, but not too much beyond your average event power output. You should be working at your time trial threshold the entire event. When you reach the finish, if you have a sprint left, you have not worked hard enough during the time trial.

On flat, windless courses, excellent time trialists have nearly equal splits for the first and last halves. If your time for the first half is slower than the second by more than 30 seconds, you probably did not warm up enough. If your second half is slower, you may have a problem with mental attitude, pacing, or endurance.

An exception to exceeding your time trial threshold is a rolling or hilly course. It is reasonable to float a little before a climb and then slightly exceed your threshold as you ascend to avoid losing momentum up a hill or roller. Floating does not mean you stop working. Do not let your heart rate drop more than 5 beats per minute. Slight anaerobic effort does not mean sprinting—it means you may exceed your threshold by about 5 beats. No more!

For more on using a heart rate monitor in time trials, read the *ABC* handout *Time Trialing*, and in the *ABC* books *HIT—High-intensity Training for Cyclists* and *Smart Cycling*.

Team Time Trial

The idea is to allow a predetermined number of the group to finish together in as fast a time as possible.

Team Time-Trial Setup

Here is a scenario: You have four riders on your team. You need to finish at least three out of the four—you are allowed to have one team member drop out. This may be because that rider is not as strong, or because of a mechanical problem.

Let us assume the course is varied terrain. What are some important points to keep in mind?

Smoothness

Foremost in importance: You or someone else on the team will be riding at their maximum. After all, if no one on the team is at their max, the group is not going as fast as it can.

This means that it is vital that the group be smooth and consistent in its energy output. The rider coming to pull at the front must not accelerate. He must pull smoothly forward.

Stronger Riders Equalize with Longer Pulls

Since some riders are stronger than others are, it may seem reasonable that some riders will pull harder (at a greater speed) than others. This is not the best technique. It is not pulling harder that is required, it is pulling longer. As already expressed, the weakest rider will be at maximum time-trial output throughout. The strongest rider must not exceed the weakest rider's time-trial threshold. Stronger riders pull longer, not faster.

Although you do not have to finish a team trial with all your riders and you may drop your weakest rider later, you cannot afford to drop

a rider too early. Even the strongest team member may have a bad day; you should generally try to keep everyone together for as long as possible.

Rider Spacing

At first, riders might think that the most efficient spacing would be to have stronger riders alternate with weaker ones in the paceline order. As it turns out, this is one of the most inefficient ways to succeed in a team time trial.

Why?

1. The hardest part about working in a paceline comes when it is your turn to pull.
2. You get a better draft when drafting behind two riders than behind one.
3. It is also hard when you reattach to the back of the moving paceline after you have taken your pull and pulled off.

It is hard to be behind the strongest rider of a paceline. You have to take a pull after the strongest rider. Since a single rider provides less draft than the group, you get the least rest behind the strongest rider and *then* you have to pull. You rest the least.

If you have a strong rider behind you, it will also be harder to reattach to the paceline after your pull.

Therefore, if you are a weak rider and you are nestled between the two strongest riders in a four-person line, you are in for it.

It usually works out much better to have the second-strongest rider behind the strongest one—then the strongest rider has to reattach when the next-strongest rider is pulling.

With one strong, two average, and one weak rider, place the weak rider between the two average riders: i.e. STRONG, AVERAGE, WEAK, AVERAGE.

Modifications may be necessary when rider size is considered.

Hilly Time-Trial Course

The weakest riders have to save their strength much more so than on a flat course, to enable them to climb reasonably well with the group. The weakest riders of the group may actually never pull on the flats, in order to have the best chance of staying with the group on the climbs.

Equalize Your Contribution

If during the race, you can climb more comfortably than the designated fastest or strongest riders of the group, things are not proportioned correctly. When it comes to the flat sections, either you need to do more work to equalize your contribution or the strongest needs to pull less.

Crosswinds

Allow your teammates to echelon. Do not squeeze them to the side of the road.

Double Pacelines

Large teams may ride in double pacelines. With fewer than 10 riders, this is usually a mistake. If you do use a double paceline, avoid half-wheeling.

Plan for a Dropout

Although flat courses generally mean all team members will finish together, where course are rolling or hilly, especially in the second half of the time trial, a relatively poor climber may bury himself early in the event and pull his climbing teammates to the hills with the plan of dropping out.

Keep in mind that disaster in the form of a mechanical problem or unanticipated rider weakness may make this a losing strategy if the minimum number of finishers is not able to complete the event.

Know Your Limits

Weaker riders of the group must know their limits. Sometimes they must miss a pull or two.

Stage Race

“The objective for any domestique is to go in and try to do the best you can to help the team. You’ve either got to win or you’ve got to work.”

—Neil Stephens, Australian professional road racer and respected domestique.

A stage race is a multiple event in which riders’ times in each separate event or stage are added together to give a cumulative race time. Every rider in a stage race will have a cumulative or general classification (GC) time. The GC leader at the end of every stage is awarded a leader’s jersey. The rider who has taken the least time to complete all the stages is the winner.

In some stage events there are time bonuses for the top stage finishers as well as for intermediate sprints or primes. These bonuses are subtracted from riders’ elapsed time.

Riders who finish closely together are otherwise given the same time for the stage. Riders are given separate finishing times only if there is a gap of at least one whole second between the riders.

Stage races are generally multi-day events. Theoretically, several stages could be held on the same day.

Many stage races consist of point-to-point, circuit, and time-trial events. The point-to-point races typically include some mountain top finishes.

The three major European stage races, or grand tours, are the Tour de France, Giro d’Italia, and Vuelta a España. Each is about three weeks long.

In the US, most stage races include a criterium event. Local US stage races typically consist of a time trial, road race, and a criterium.

A road points-race format is slightly different. Points are given for relative position and accumulate over several races. This is often easier for organizers: only the relative position of the top riders need be considered. Timing of every rider in every event is not required.

Minor Competitions—Races within the Race

Although the overall-winner competition is the most important, there are other competitions in every stage race.

For example, there is the winner of each individual stage. In larger events, there are awards for the best overall team, the best overall sprinter, and the best overall climber.

Your tactics in any given stage of a stage race depend upon your overall goals and strategy for the race as a whole. These will be influenced not only by your own ability, but also by the abilities of others. They also depend upon whether you are part of a team or you are riding as an individual.

Overall Stage Race Goals and Strategy

Individual and team goals and roles for riders in a stage race include the following:

- Overall high placing in the general classification (GC)
- Stage win
- Overall team classification, if awarded
- Overall minor classifications, if awarded
 - Points
 - Sprinters
 - Climbers
- Stage race experience and survival for new riders
- Block training (overtraining) for later fitness

Most teams sit down and set up their strategy and tactics based on their race goals. They do so before the race begins, and usually meet every day to discuss the evolution of their strategy and tactics.

Team Rider Roles

Stage-race team members generally have one of three roles:

- Protected rider. This rider is a GC contender, or potential stage winner.
- Domestique. This rider is a worker for a protected rider. Domestiques are devoted to their protected riders. Riding as a domestique usually prevents a rider from having more than a remote chance at winning the race. Domestiques commonly work twice as hard, putting out twice as many watts, as their protected riders on flat or rolling stages. Domestiques are often called upon to perform the following jobs:
 - Shelter protected riders from the wind.
 - Set tempo, or pace, when team strategy demands it.
 - Defend against attacks from other teams. This may include marking other riders and chasing breakaways.
 - Provide leadouts to designated sprinters.
 - Go to the back of the pack to get feeds and ride up through the pack to deliver feeds to protected riders.
 - Provide mechanical support. If a protected rider has a problem such as a flat tire, the domestique offers his wheel, or tows the protected rider back to the field.
- Independent. This rider is an opportunist and has no defined role. Even in major professional stage races with protected GC riders, one or two riders on a team may be allowed to be independent. These riders may be long-odds GC or stage-winner candidates. They may be allowed to work independently by team management in order to give them a different type of stage race experience. If a team member does become a GC or stage race contender, independents may be recruited into domestique roles.

GC Contender

As stated above, the overall classification in a stage race is based upon accumulating the lowest amount of elapsed time during the course of the event.

In each stage, riders' times are related to the GC or stage winner. For example, if the second place rider crosses the finish line 10 seconds after the winner, that rider is 10 seconds down on the stage.

To win a stage race, you do not have to win a single stage. All you must do is lose less time overall than anyone else.

Although most GC winners prefer to win at least one stage, deals are often made. For example, a highly-place GC rider may agree not to contest a stage win in the mountains or a King-of-the-Mountain (KOM) climber's prime with another rider in order to gain time on a rival.

GC contenders must perform consistently well in time trial and mountain stages. It is during these stages that time is predictably gained or lost. It is here that the race is won. A bad day and the loss of five minutes may make it impossible for an otherwise stellar rider to win.

GC contenders must not waste energy. They must use energy when it gains them a time advantage or causes a rival to lose time. Review the methods of conserving energy discussed in Part 1.

That is not to say that flatter stages are not important. Teamwork generally keeps the pack together on such stages. In these stages, the sprinters get their chance for glory—a stage win. Riders in contention for a high GC placing are generally happy to let the sprinters contest the relatively dangerous stage sprints. As stated above, when the pack finishes together, all riders get the same time.

Major tours often begin with relatively flat stages that favor sprinters. Such stages provide excitement to spectators. When the mountain stages come, it is common for some sprinters to drop out of the race.

In top-level racing, if breakaways do form on flat stages they are generally not of riders in contention for overall victory. However, when crosswinds are present, when crashes occur, or in lower-level racing, even the strongest riders can lose the race through inattention or misadventure.

Tracking Leaders

In major stage races, riders are usually in radio contact with supporting team cars and managers. The team managers do a lot of strategic and tactical decision-making. In the grand tours, managers use in-car TV to monitor real-time helicopter and motorcycle coverage. They usually know not only where every important rider is, they can see the expression on their faces.

Local Stage Races, Lower Categories

In local-level stage races there are no team cars, no radio communication. You must be alert to your competition. If you are in GC contention, consider writing down the leaders' numbers and time gaps on a small piece of paper and clear-taping the paper to your handlebars. You will then be aided in knowing who to watch, who is a threat, who you can let go if necessary. Communicate with your teammates orally or by signal.

In smaller stage races, especially in the lower categories and in Masters racing, it is common for the stage race to be decided in the individual time trial. In these situations, there is often not enough climbing to separate the fields. GC placings almost never change in criteriums.

GC Leadership and Defense, Lower Categories

An individual or team working to keep their position or lead is said to be defending their position or lead.

Where individuals dominate rather than teams, there comes a point in many stage races when many of the leading overall riders are riding in defense of their positions rather than offensively for advancement or stage wins.

In relatively short and non team-dominated events, the strongest rider may simply take the leader's jersey in the first day's time trial or prologue and never relinquish it.

GC Leadership and Defense, Major Tours

Teams Must Conserve Energy as Well as Individuals

Just as a strong team protects its team leader, a strong team leader must make decisions to protect his team from too much work in order to keep them fresher for crucial stages.

In team-dominated events such as the major tours, GC riders and teams may make a conscious decision not to win the GC leadership too early, lest they feel that they have "a duty" to defend it from multiple attackers.

Although a team's defense of the GC jersey is thought to be an axiomatic, routine decision, it need not be.

Yes, it is a great honor to wear a yellow jersey in the Tour de France. Although in professional racing, the GC leader and his team generally feel honor bound to defend the jersey, it is much more of an honor to wear the leader's jersey at the end of a major tour than during a tour.

As with many of life's honors, true value is set by financial rewards.

In the Tour de France, the current financial honor of wearing the yellow jersey is €350 (about US\$ 450) for any one day. It is €450,000 (about US\$ 575,000) to wear it at the end of the tour (to win).

Defense: GC Leader Not an Overall Contender

If a GC leader is not an overall contender—leading by virtue of sprint bonuses or opportunistic breakaway—almost all of the time, the team rides to protect their leader, who may never again regain the jersey and its glory. Although the team realizes that the jersey will likely eventually be lost, the team enjoys its days of glory.

Defense: GC Leader Is an Overall Contender

An overall contender generally rises to lead the general classification after a long individual time trial or mountain stage.

Riding tempo on the front of the field and chasing breakaways takes its toll, and such an early defense may prove the team's undoing. GC-leading teams may do too much too early—an error especially on flat stages where sprinters' teams have just as much motivation and may be induced to ride tempo at the front instead.

If the GC will be decided later in the stage race during subsequent time trials or mountain stages, it may make sense to surrender the lead to a rider who will not be able to keep it. The new leader's team may defend the jersey, lessening the pressure on the “true” GC leader's team. If the surrender is prearranged or understood, subtle team alliances may also help the “true” GC leader.

To work as a winning strategy, setting tempo early on during a long stage race requires a dominant team and a dominant overall GC rider.

Here is why: If the team is dominant, but the GC rider is not, other GC contenders need only use the team of the nondominant rider to do their work for them.

Specifically: Consider what would happen in a Tour de France if a Jan Ullrich is as strong as a Lance Armstrong, and a US Postal Team is dominant. If Armstrong's team works too hard from the beginning, all Ullrich has to do is sit on Lance's wheel. He does not need a strong team of his own except for a team time trial. He can follow Armstrong in the flat stages and in the mountains, wait for Armstrong to tire and be isolated from the attacks of others, and then launch his own attack. Armstrong's strategy works when both he and his team are the strongest.

If the GC rider is dominant, but the team is not, controlling the race too early also leads to problems. Consider what happens in a Tour if Floyd Landis is dominant, but his team is not. After the first individual time trial and mountain stages, Landis takes the yellow jersey. If his team does too much too soon, Landis will individually not be strong enough to defend against multiple attacks from multiple other GC riders during later mountain stages.

Hiding in Plain Sight

A casual spectator might look at the top 20 general classification after a week of a major tour and be surprised to learn that only two or three names listed have any chance to win the event.

In the first week of a major tour, the GC is often set by a prologue (short) time trial, sprint bonuses, and perhaps a team time trial.

A prologue time trial may take just a few minutes. The top 20 riders may be separated by only a few seconds.

In the next few days, sprint time bonuses, generally up to 20 seconds, will likely help determine GC placings.

Major tours often include team time trials in the first week, but rarely major climbing stages.

With a team time trial, the two strongest teams of nine riders might have all of their riders listed in the top 20, taking up 18 of those top spots. If their team captains are not great individual time

trialists, climbers, or both, all the members of the team will disappear from contention when individual time trial or climbing stages take place.

Once individual time trials and climbing stages start, the real GC contenders emerge. The gaps will be many minutes, even hours.

Isolation—Divide and Conquer

Especially in stage races where other teams are strong, GC contenders and their teams must work to weaken not only other GC contenders but also their teams.

It does not help a GC rider to gain one minute on a rival and his team on the final climb if it is another 20 miles to the finish and the rival's team pulls that rival back up.

Review the principles of isolation as outlined on page 51.

Stage or Minor Classification Contender

In larger events, jerseys are often awarded for the winner of every stage and for the leader of every minor classification. In smaller events, they are usually awarded only to the stage race winner and overall race leader.

Sprinter

Sprinters may be in contention not only for individual stages but for minor classifications as well. There may be a points or sprinters jersey awarded to the rider who overall places best at intermediate and finish line sprints.

Such riders may have great finishing speed, but may not be great time trialists or climbers.

These riders will be protected on flat or rolling stages and given a lead-out, if possible, in the finale of the stage.

The domestiques on sprinters teams generally work to chase down breakaways on stages that their protected sprinter might win.

Climber

As stated above, GC contenders must be good climbers. However, a great climber may be a relatively poor time trialist and not a GC contender. Here again, this great climbing rider may be protected by the team in the stage, especially when climbs dominate the second half of the stage.

The domestiques on climbers' teams generally work to toughen the race leading up to climbing finales. This effectively lengthens the climb and improves the results of their climbers.

Especially in major tours, great climbers interested only in the climbers jersey and not the GC may decide to lose some time in early stages so as not to pose a threat to GC contenders. In this way, they may be allowed an early escape in a later stage and garner vast amounts of climbing points over several mountain passes during just one stage.

Opportunist

Riders not in overall contention may be allowed to escape the main field, especially in the last third of a stage race when riders are tired and when riders realize their goals are already realized or unlikely to be achieved.

For example, it is easy to see that some riders have no hope of regaining, say, a lost 60 minutes to the overall leaders. No teams or other individuals may care or chase.

Stage Race Fitness Training

Beginning riders may participate in stage races for experience alone. Even professionals of several years may never have entered a major tour and may do so only with the view of learning and survival.

Riders may use stage races to gain fitness, and may not be concerned with their results in that particular race.

Short stage races commonly are used to improve fitness for longer, more important ones.

The day-after-day block training that stage racing provides has also been credited with improving the fitness of riders to peak for much shorter events.

For example, Peter Keen, Chris Boardman's coach, has credited Chris's suffering in the Tour de France with allowing him to achieve the hour record, and David Miller won the 2003 World Championship time trial after participating in that year's Tour de France and Vuelta a España.

Stage races are demanding. Crucial to success when using stage racing to improve fitness is enough recovery time following the stage race.

Riding the Front

When the speed is likely to pick up, for example near the race finale, or before obstacles such as climbs, or where crosswinds are likely, it is especially important to be near the front of the pack.

Of course, you always want to avoid crashes, but in a stage race, this is especially important for GC riders who might lose victory or podium chances.

Domestiques stay near protected riders to help support them with equipment or a tow back to the field in the case of a crash or mechanical problem.

Domestiques also ride near protected riders to provide a safety shield from less safe riders.

Teamwork and Alliances

Keeping good team strategy and tactics requires continued efforts in teamwork. Review the elements of teamwork on page 117.

Even between teams, it is a good idea to have good relations and make as many friends as possible. Not only is it a good idea socially, it is a good idea tactically. There are always opportunities for alliances in the field to help you, or at least not hurt you; opportunities for them to chase or hurt your rivals. Moreover, they will.

Read more about non-team alliances on page 125.

It is very common in stage races for half a dozen different races to be taking place in one breakaway at the same time.

Understand the different motivations of riders whether it is for general classification, minor classification, individual stage, or team events.

By understanding the motivations of riders going for other competitions, you can use those motivations strategically and tactically. Depending upon the circumstances, you may find that other riders help your own cause whether you help them or not.

Smilin' George

In one of my first stage races, George Mount was in the field. "Smilin' George" was a friendly and canny racer. George was in third on the GC. Already far down in time on the two GC leaders, he was also considerably ahead of fourth and 5th. He decided to go for a stage win.

George outlined for each of us something to be gained if he attacked.

George came up to me, in fifth. "Arnie. I am really too far ahead of you for you to worry about me. If I attack, fourth might chase me. Then, if you sit in, you might improve your position. So please, don't chase me." Sounded reasonable enough to me.

Then I overheard him approach first, second, and fourth.

To first and second he said: “I am so far behind, I am not threat to you guys. If you let me go, you can have an easier time on this stage. Sit in, let me go, please, and it can work out well for everyone.”

To fourth he said: “I am so far ahead of you that you aren’t likely to catch me. But, if first or second chase, you might be stronger than them at the end and be able to win the stage. If I go, let me. If they chase, sit in and it might help you.”

Sure enough, about a minute later George attacked.

He quickly gained 30 seconds on the field, and no one chased.

Then, however, everyone looked at each other and said, “Nah. Let’s go get him.”

It did not work that time, but it might have worked another time. Moreover, it did not cost George anything in the attempt. George was smart to try to make friends that way.

Stage Race Breakaways

GC Contenders

GC contenders must be alert to early breakaways that contain other GC contenders. This is likely to be the case in amateur racing.

Although GC leaders may contribute to breakaways and gain even more time on rivals, sitting on (not working) in defense of the leadership is a perfectly acceptable tactic.

In major tours, early breakaways with one or two GC contenders are relatively rare. Most of the time other teams work together to neutralize such moves.

Most of the time GC contenders are together in small groups near the finish of the climbing stages. The domestiques, having done their jobs, have dropped back. The climbs have decimated the rest of the field.

Opportunists

In major tours, most breakaways consist of opportunists.

In top-level stage races, once the breakaway goes, the race often settles down. The breakaway consists of opportunists who are dreaming of a stage win. These riders present no threat to the overall leaders of the race.

In the earlier stages of long tours, the riding may be more nervous in the field. Accidents are more common in these early stages.

Few early stage breakaways succeed.

At this early point in the stage race, it is not quite clear whether an opportunist might represent a GC threat. It is not quite clear that such riders can be given free rein.

Additionally, the sprinters’ teams are fresh and not all sprinters will make it over the hilly stages to come. These early flat and rolling stages may be the only opportunities for stage wins for some sprinters’ teams.

Once the breakaway is clear, however, although the pace may be fast, it is generally steady. Team riders may ride tempo, but small groups chasing breakaways are relatively rare. Once a breakaway is clear, often up the road by 10 or more minutes, small groups chasing breakaways must work very hard for relatively little chance of a stage win.

The main pack consists of the GC riders and their teams. Most of them are conserving energy, wanting to do as little work as possible. They know the major showdowns will be the time trials and climbing stages.

Although occasionally such gains can catapult a rider who might otherwise finish mid-pack into a top 10 position, the breakaway opportunists will likely pay for their efforts in later stages, losing major time (more than 5 minutes, often as much as 30 minutes) on the hilly stages.

Although teammates of riders high in the GC generally stay within the field to protect their team leader, occasionally a teammate of a rider in overall GC contention plays a different tactical game.

Such an escape may relieve the GC contender's team from the need to set tempo, and so reduce the pressure on the team. Teams are not expected to pull the peloton along to chase down a member of their team.

If a team has a strong team time-trial performance and gains several minutes over otherwise potential GC winners, team opportunists who get into breakaways may help to weaken teams forced to chase.

A breakaway with a team opportunist may also provide a teammate to a GC contender at the top of a climb or other obstacle.

For example, in the 19th stage of the 2003 Vuelta a España, Floyd Landis was able to wait for his team captain Roberto Heras, and help him gain time on his rival Isidro Nozal.

A breakaway with a team opportunist may also provide the team with another potential bonus: a stage win.

Riding the Gruppetto/Bus

All riders of a stage must finish within a certain percentage of the time of the winner of the stage, say within 25%. If the winner finishes in 4 hours, everyone who finishes after 5 hours is out of the race.

In major tours, most of the riders finish flat or rolling stages together and are given the same time. If riders lose the protective draft of the pack early in a stage due to a lack of fitness, they probably will lose enormous amounts of time and drop out of the race.

In hilly stages, many otherwise strong riders must work for their team leaders. As the major climbs of the day come, these riders, their work done, slip off the back. In a one-day race, these riders generally

drop out. In a stage race, they begin forming a grupetto, sometimes called "the bus." This "laughing group" has done its work for the day and is in a cooperative survival mode.

Grupetto riders generally time their arrival with several minutes to spare.

These riders have no hope of overall high placement. They are saving their energy for the next day's domestique work, or perhaps a chance for stage glory.

One way to tell a professional rider from an amateur is that the pros will only work as hard as they have to. Riding harder than necessary only makes the next day's work more difficult.

Team Time Trial

A group of great riders does not always have the best team time-trial times. If a team time trial is part of a stage race, the team must practice. Review the principles of team time trialing discussed on page 150.

Checking Results

In one-day races, results of the top finishers are generally posted promptly, and riders have 15 minutes to protest posted results before they are final.

In stage races, determining the finishing times of each rider is required. Results may not be posted for many hours.

Waiting for results may waste valuable time best spent elsewhere, recovering.

In a stage race, you may protest results up until the time that the next stage starts.

It is generally wise to leave each stage promptly and begin a recovery process. Plan on arriving a little early the next day to check results. You may be able to check results later in the day on the race web site.

Recovery

Working to ensure optimal recovery is especially important in multi-day races. For more information on this topic, see the *ABC* handout *Recovery*.

Stage Race Nutrition

Keeping glycogen stores high and keeping well-hydrated are important stage race tactics. Riders eat and drink a lot both on and off the bike.

During long, hot stages, attention to sodium intake is also important.

For more information on this topic, see the *ABC* book *Nutrition for Sports*.

Stage Race Summary

Multi-event races have complicated strategies and tactics because individuals and teams have many different race goals. Stage racing requires seeing a bigger picture than the placing on each stage.

Although fitness is always important, there is an increase in the relative importance in all of the general and specific tactics of racing discussed throughout this book.

Final Words

*“There are three kinds of riders at the end of a race.
Those who say: ‘What happened?’
Those who let it happen.
And those who made it happen.”*

—John M. Richardson, Jr., professor and Tommy Lasorda, former manager for the Los Angeles Dodgers, paraphrased.

The English language contains hundreds of thousands of words, all composed of 26 building blocks, letters.

In a similar way, all the myriads of tactical combinations and strategies are based on a limited number of building blocks and principles: conserving energy, making rivals use energy, reading race situations, attacking, pulling, blocking, and gapping.

This book has introduced those building blocks.

After reading this book, together with your own race experience, you will soon find that you will no longer be left at the end of a race wondering what happened. Rather, you will be participating in or making it happen.

Glossary

The following words are defined in their road-racing context. Some of them have different meanings in other contexts such as mountain biking or track racing.

The entries have either direct relevance to strategy and tactics as discussed in this book or to understanding the vocabulary of race commentators on TV.

AERO / AERODYNAMIC: With reduced air resistance. Equipment design, body position, or movement to reduce wind resistance.

AERO BARS: Handlebars or attachments to them that allow an aerodynamic position.

AEROBIC: Using oxygen with a fuel source. Implied intensity is below anaerobic level. Implied level of work is low enough that exercise can be continued for prolonged periods.

ANAEROBIC: Without the presence of oxygen. Implies a high level of work intensity that can only be maintained for relatively short periods of time. A very short energy production system—that of creatine phosphate—can supply energy need for about 10 seconds without the production of lactic acid. Other anaerobic efforts result in higher levels of lactic acid.

ANAEROBIC THRESHOLD (AT): The point where the body's energy production switches from aerobic to anaerobic. Its precise location and method of determination is subject to scientific debate.

ATP: Adenosine triphosphate. A chemical in cells serving as an immediate source of energy.

ATTACK: An aggressive high-speed jump away from other riders. A sudden acceleration to move ahead of another rider or group of riders.

AUTOBUS: In a stage race, the group of riders at the back of each stage that will generally complete the stage just within the time limit.

Synonym: Gruppetto, laughing group.

BELL, BELL LAP: The last lap before the finish or a prime. May or may not be signaled by a bell—for example, by a buzzer.

BLOCK: 1. Physically or psychologically impede or slow down an individual or group of riders. Most commonly, when a teammate is in a breakaway. 2. Set of cogs on the rear hub. Synonyms: Cassette or cluster.

BLOCK TRAINING: Consecutive days of interval work or stage racing. Incomplete recovery between sessions may raise overall fitness as long as commensurate recovery is postponed, not omitted.

BLOW UP: To be suddenly unable to maintain race pace or high intensity. Commonly due to anaerobic effort or glycogen depletion.

BONK: Run out of energy, tire. Commonly due to glycogen depletion. Synonym: Hitting the wall.

BOTTOM BRACKET: Cylindrical part of a bicycle frame that holds the crank axle, ball bearings, and cups.

BOXED IN: Trapped in a group of riders and unable to move relative to the group—forward, backward, or sideways.

BPM: Beats per minute. Refers to heart rate.

BREAK, BREAKAWAY: One or more riders forming a group ahead of the main group.

BRIDGE, BRIDGE A GAP: To join a rider or group of riders ahead. Bridging usually implies a tactical effort in which only a rider or small group reaches the group ahead. If the whole pack rejoins it is not a bridge; it is a chase or the group ahead was merely caught.

BROOM WAGON: The last sag wagon. Support vehicle in a ride or race that follows last rider or group on the course. The vehicle that picks-up abandoned riders.

BUNCH: The main group of riders in a race. Synonyms: Group, field, pack, or peloton.

CADENCE: Pedaling rate, in revolutions per minute.

CARAVAN, RACE CARAVAN: The officials and support vehicles in a race.

CARDIOVASCULAR: Referring to the heart and blood vessels.

CASSETTE: The set of cogs on the rear hub. Synonyms: Block or cluster.

CAT, CATEGORY: 1. Rider competition levels in USCF races based on ability or experience or both. Cat 5=Beginner, Cat 4=Novice, Cat 3=Sport, Cat 2=Expert, Cat 1=Elite. 2. Ranking system for mountains based on difficulty. Cat 1 (more severe) to Cat 4 (less severe). Hors categorie, beyond categorization, is an oxymoron for the most severe climbs.

CENTURY; METRIC CENTURY: A hundred mile ride; a 100-kilometer ride.

CHAINRING: A sprocket attached to the crankarm to drive the bike chain. Synonym: Chainwheel.

CHAINSTAYS: The tubes of a bicycle frame from the bottom bracket to the rear dropouts.

CHAINWHEEL: A sprocket attached to the crankarm to drive the bike chain. Synonym: Chainring.

CHASE; CHASERS: To try to catch a rider or group ahead; riders trying to catch others.

CHICANE: Series of corners or curves on a course.

CIRCUIT RACE: Multilap road-race event on courses of more than one mile.

CLASSIC: 1. One-day European professional road race with a long history. Classics include Amstel Gold, Het Volk, Liege-Bastogne-Liege, Milan-San Remo, Paris-Roubaix, Paris-Tours, Tour of Flanders, and Tour of Lombardy. 2. In California, a new race the organizer hopes to promote again in the following year.

CLINCHER, CLINCHER TIRE: Bicycle tire with a bead holding it onto the rim. A separate tube within holds air.

CLIPLESS, CLIPLESS PEDALS: Bike pedals that use a releasable mechanism to bind cleated shoes; without toe clips.

CLOSE A GAP: Remove distance or time between individuals or groups. Bridging implies just one rider or a small group closes the gap.

CLUSTER: The set of cogs on the rear hub. Synonyms: Block or cassette.

COAST: Glide or continue forward while not pedaling. Similar to soft pedal except that there is no force pressure on the rear wheel. Cannot be done on a track or fixed-gear bicycle. Synonym: Freewheel.

COG: Sprocket on a hub.

COL: (French) Mountain pass.

CONTRE LA MONTRE: (French) Against the clock. Time trial.

COOL-DOWN: Low intensity cycling performed after a workout or competition.

CORNCOB: Cluster of cogs on a cassette with one-tooth differences on adjacent cogs. Synonym: Straight block.

COUNTER ATTACK: A new attack directed against the previous attacker. Not the same as a relay attack, which is the repeated attack of an individual by more than one other. Such actions may be made by teammates to set one of them up, or by riders from different teams against a stronger rider.

CRANK, CRANKARM: Bike part; one end is attached to the bottom bracket axle and the other holds a pedal.

CRITERIUM: In the US, a multilap road race in which the distance of each lap is between 800 and 5,000 meters. In Europe, a stage race.

CROSSWIND: Wind that comes from the side; a quartering wind.

DANCE (ON PEDALS): Ride out of saddle, usually on a climb, with a quick cadence.

DERAILLEUR: Lever-activated mechanism that pushes the bike chain from one sprocket to another.

DIRECTEUR SPORTIF: The team organizer or manager.

DISC WHEEL: Solid wheel generally used for its aerodynamic advantage, most commonly in time trials.

DOMESTIQUE: A team rider who sacrifices individual performance to help teammates. Duties can include giving up one's bike for another rider, supplying refreshments to teammates, chasing breakaway riders, and setting tempo. French for servant.

DOPING: Using chemicals or substances to boost performance. Usually refers to the use of substances that have been banned by the UCI.

DRAFT, DRAFTING: Riding behind one or more riders; saving energy in the slipstream. Drafting is illegal in individual time trials.

DRIFT: Move or turn sideways. May be a result of entering a corner too fast with wrong line or inattention.

DROP ANCHOR: Slow ride, generally up a steep hill.

DROP, DROPPED: Ride faster and away from another rider or group. Lose contact with another rider or group.

DROPS: The lower part of down-turned handlebars, usually below the brake levers.

DURATION: Length of time spent performing an interval. If work is continuous, volume and duration are the same.

ECHELON: Staggered riders drafting in a crosswind.

ENDGAME: Final phase of a race. Synonym: Finale.

ENDURANCE (MUSCULAR): the capacity of muscles to sustain work over a period of time.

ENDURANCE. Ability to last.

ENERGY: The capacity to perform work.

ERGOGENIC: Substances or treatments used to improve physiological, psychological or biomechanical function. They may be nutritional, pharmacological, or psychological.

ERGOMETER: Machine that measures exercise power output.

FALSE FLAT: Uphill section of road that appears to be level ground.

FATIGUE: The inability to maintain a level of work.

FEED ZONE: Designated area on a racecourse where support crew can disburse food and drink to racers.

FIELD SPRINT: The dash for the finish line by the main group of riders.

FIELD: The main group of riders in a race. Synonyms: bunch, group, pack, or peloton.

FINALE: Final phase of a race. Synonym: End game.

FLAMME ROUGE: (French) Red sign marking the final kilometer of a road race.

FLYER: Attack and effort off the front, often solo.

FORCE THE PACE: Go harder and increase the work rate of the group.

FRED: Novice rider, or one who rides that way.

FREEWHEEL: Glide or continue forward while not pedaling. Similar to soft pedal except that there is no force pressure on the rear wheel. Synonym: Coast.

FULL TUCK: Crouched aero position used for maximum speed on descents.

GAP: Distance or time between individuals or groups.

GAPPING: Letting some space open up between you and the rider in front of you.

GC, GENERAL CLASSIFICATION. Overall ranking in a stage race.

GEAR INCHES: Relative measure of bicycle transmission; gear ratio multiplied by wheel diameter.

GELS: Carbohydrate gels. Generally: foil-packed, about 100 calories.

GENERAL CLASSIFICATION, GC: Overall ranking in a stage race. Based on accumulated time of each stage. Rider with lowest time leads the GC.

GLYCOGEN WINDOW: Period of time after exercise in which carbohydrate feeding preferentially refuels the muscles. Various authorities believe this period to be from up to 30 minutes to up to two hours.

GLYCOGEN: A form of complex carbohydrate energy storage. Primarily in muscle and liver.

GNARLY: Rough or treacherous.

GOAL: A desired state of affairs, vision, or objective.

GOLDEN JERSEY: Race leader's jersey in the Vuelta a España.

GRADE, GRADIENT: Steepness, measured in percentage. As a mile has roughly 5,000 feet, a 1% grade rises about 50 feet in a mile. A 6% grade rises about 300 feet in a mile.

GRAND TOUR: One of the three major three-week stage races: The Tour de France, Giro d'Italia, and Vuelta a España.

GRANNY GEAR: Very low gear ratio, one to one or less. On a triple chainring, the smallest chainring combined with the biggest cog to yield the lowest gear. Synonym: Pixie gear.

GROUP: The main group of riders in a race. Synonyms: Bunch, field, pack, or peloton.

GRUNT: 1. Hardened cyclist. 2. Difficult climb.

GRUPETTO: In a stage race, the group of riders at the back of each stage that will generally complete the stage just within the time limit. Synonym: Autobus, laughing group.

GRUPPO: (Italian) Group of bike components, usually of the same model and make. Includes brakes, derailleurs, gears, and cranks.

HALF-WHEELING: Riding almost side-by-side—half a wheel in front of another rider. Half-wheeling often annoys or frustrates those half a wheel behind.

HAMMER, PUT THE HAMMER DOWN: Period of hard, fast riding. Contrast to get hammered by a stronger rider. Synonym: Jam.

HANG ON: To just manage to stay with the pack.

HANGING IN: Keeping pace with a group of cyclists. Not leading.

HEART-RATE MONITOR (HRM): Electronic device that measures current heart rate.

HILLCLIMB: Event consisting almost exclusively of climbing.

HITTING THE WALL: Run out of energy, tire. Commonly due to glycogen depletion. Synonym: Bonk.

HONK: Accelerate or work hard by standing on pedals, out of the saddle, pulling on the handlebars, and moving the bike side to side.

HOODS, BRAKEHOODS: The covers of the brake handles.

HOOK: Rub one's back wheel against the front wheel of another rider; or suddenly move one's back wheel to the side, forcing the following rider to slow down to avoid running into it. The rider behind frequently crashes. Sometimes inadvertent; sometimes an illegal, aggressive racing tactic.

HORS CATEGORIE: Beyond categorization. An oxymoron for the most severe climbing category.

INTENSITY: Load or speed of work.

INTERVAL, INTERVAL TRAINING: Relatively more intense efforts with easier recovery periods.

ISOLATION: Tactic to separate a rival from others so that he alone will have to work hard.

ISOLATED LEG TRAINING, ILT: Training technique of riding with one leg to improve performance.

JAM: Period of hard, fast riding.

JERSEY: Shirt or pullover worn by cyclists.

JOCKEYING: Tactic of slow riding in preparation for a sprint, Synonyms: Loafing, waiting game.

JUMP: A short, quick burst of speed. A jump may develop into a breakaway or sprint. It may be made standing on the pedals, out of saddle or seated.

KICK: Acceleration that may be at the beginning or end of a jump or sprint. As in finishing kick.

KOM: King of the mountains. Award for the best climber.

LACTIC ACID: A product of the body's energy metabolism. Normally the blood contains less than one millimole of lactic acid per liter. Efforts up to the anaerobic threshold may result in levels of up to

four millimoles per liter. Levels as high as 10 millimoles per liter can be sustained by some riders for up to an hour.

LANTERN ROUGE: (French) red tail light on train's caboose, last finisher in a race, last in general classification.

LAP, LAPPED: Distance of one complete loop of a track or a circuit course. To be lapped is to be behind a whole lap. Taking a lap is to gain a lap.

LAUGHING GROUP: In a stage race, the group of riders at the back of each stage that will generally complete the stage just within the time limit. Synonym: Autobus, grupetto.

LAUNCH: Escape or attack.

LEADOUT: A tactic whereby a rider, usually a teammate, provides the benefit of a draft to better position another rider, generally before a sprint.

LEG SPEED: Cadence, and the ability to produce high cadences.

LICENSE (TRAILER, BUS, AMBULANCE): Symbolic license earned by competing in a grand tour. Those who have competed in the Tour de France are said to have a trailer license because racers are often pulled along. Those who have competed in the Giro d'Italia earn a bus license because racers are often grouped until finish. Those who have competed in the Vuelta a España have an ambulance license because racers are often exhausted at end of season.

LINED OUT: A group of riders in a long line, one behind the other, as the pace at the front causes them all to seek a draft.

LOAFING: Tactic of slow riding in preparation for a sprint, Synonyms: Jockeying, waiting game.

MAGLIA ROSA: (Italian) race leader's pink jersey for Giro d'Italia.

MAILLOT JAUNE: (French) race leader's yellow jersey, usually for Tour de France.

MALTODEXTRIN: Complex carbohydrate used for its combined relative caloric density and reduced concentration compared with single sugars.

MASH: To push a big gear.

MASS START: Events in which all entrants leave the starting line at the same time.

MASTER: In the US, an athlete 30 years of age or older. Many other countries use the term veteran.

MAXIMAL OXYGEN CONSUMPTION (VO₂ MAX): The maximum amount of oxygen a person can consume in one minute.

MECHANICAL, TAKE A MECHANICAL: Mishap with a bicycle such as a flat tire caused by a piece of glass. In the US, criterium riders with recognized mishaps may take a mechanical—miss a lap—due to such problems, and rejoin the race. Malfunctions or problems due to misassembly or generally preventable errors are not considered recognized mishaps, and riders may not take a mechanical.

METRIC CENTURY: A 100-kilometer ride; 62 miles.

MINUTEMAN: Cyclist preceding another in a time trial, usually by a minute or two.

MOTORPACE: Draft a motorized vehicle. Sometimes refers to drafting a significantly stronger rider. Often used as a training technique. According to the vehicular code, illegal in many areas. Special safety precautions are advised.

MUSETTE: (French) Cloth shoulder bag for carrying food and drinks. Usually handed to racers in feed zone.

NEGATIVE SPLITS: Racing the second half of a race faster than the first half. Racing subsequent laps faster than prior laps.

NEUTRAL SUPPORT: Support given by a neutral party, in contrast to that given by team personnel or friends.

NEUTRAL ZONE, NEUTRALIZED: Non-racing section of course.

Neutralization occurs in special situations such as the start of a

race in a busy urban area or in mass crashes. Riders must slow and maintain their relative positions.

NOODLE: To ride slowly.

OBSTACLES: These include climbs, corners, narrowing roads, irregular surfaces such as cobblestones, weather, intermediate sprints (primes), race finishes.

OFF THE BACK, OTB: Rider who has failed to keep pace with the main group.

OFF THE FRONT: Rider ahead of the main group.

OFF-CAMBER TURN: Surface sloping away from the curve, making it more difficult and dangerous to corner with speed than when the slope is toward the inside of the curve.

ON THE RIVET: Riding hard. Riders often move forward on the saddle when riding hard; old leather saddles had rivets on the front.

ON THE TOPS: Riding with hands on the horizontal top of the handlebars.

OVERTRAINING: Lack of fitness related to excessive intensity or duration of training. Mental or physical.

OXYGEN DEBT: Amount of oxygen used by the body during the recovery period from a work or interval period that is in excess of that used without work.

PACELINE, ROTATING PACELINE: Group of riders in a line, alternating turns pulling at the front and sitting in. See TRAIN.

PACK: The main group of riders in a race. Synonyms: Bunch, group, field, or peloton.

PAVÉ: (French) Cobblestone road surface.

PEAK: Time period during which maximum performance is achieved. Often the result of hard work combined with a period of good recovery.

PELTON: The main group of riders in a race. Synonyms: Bunch, group, field, or pack.

PERIODIZATION: Training different aspects of fitness at different periods of time.

PIXIE GEAR: Very low gear ratio, one to one or less. On a triple chainring, the smallest chainring combined with the biggest cog to yield the lowest gear. Synonym: Granny gear.

POINTS RACE: Event in which points are awarded for relative position and accumulate over several intermediate sprints or races to determine the overall winner.

POWER: Work performed per unit of time.

PRIME: Also written and pronounced preme. An award given at selected points in a race. "A race within a race."

PROLOGUE: Short time trial held on the first day of a stage race.

PULL OFF. Move over and allow another to pull.

PULL THROUGH. Assume the lead and take the wind.

PULL: Lead, riding into the wind without the benefit of a draft.

PUNCTURE: Flat tire.

PURSUIT, PURSUITER: 1. A chase, or chaser of other riders. 2. A 2,000 to 5,000 meter one-on-one track event in which riders start on opposite sides and chase one another, or one who is accomplished at working at the intensity of such an event.

QOM: Queen of the mountains. Award for the best climber.

RABBIT: Racer who sets a fast pace early in a race.

RAIL IT: Ride fast and cleanly through a corner.

RAINBOW JERSEY: Jersey awarded to World Champions. The jersey has colored bands in blue, red, black, yellow, and green.

RECOVERY: Period of time when not working hard, rest period.

RELAY ATTACK: Repeated attacks directed against an individual by more than one other rider. Such actions may be made by teammates to set one of them up, or by riders from different teams against a stronger rider. Not the same as a counterattack, which is directed against the previous attacker.

REPETITIONS: The number of times a task or interval is repeated.

ROAD RACE: In general, a race performed on paved surfaces. To be distinguished from a track race or a mountain bike race. Road races are divided specifically into criteriums, time trials, and road races.

ROCKET FUEL: High-energy food or drink often containing caffeine or other stimulants.

ROLLERS: 1. Stationary training device composed of three cylindrical tubes (rollers) on which a bicycle sits. 2. A series of short hills.

ROTATING: Action of riders alternating pulling at the front.

SAG WAGON: Motor vehicle following a group of riders, carrying equipment, food, fluids, clothes, and lending assistance in the event of difficulty. If there are several sag wagons, the last one is the broom wagon.

SANDBAGGER: Bike racer who stays in an easier category instead of moving up.

SET: In training, a series of repetitions.

SHAKE `N BAKE, WHIPLASH: Evasive racing technique where a lead cyclist swerves across road to drop drafting cyclists.

SIT ON A WHEEL: Draft.

SIT-IN: Rest by drafting; not pulling or working. Synonym: Suck wheel, wheelsuck.

SITTING UP: No longer tucked or riding aerodynamically. Frequently when no longer working hard—either in a failed breakaway attempt, giving up before or during a sprint, or off-the-back

SLINGSHOT: Surge past another rider after catching his or her draft.

SLIPSTREAM: The area of reduced air resistance behind a rider. The draft.

SNAP: The ability to accelerate quickly.

SOFT-PEDAL: Pedal easily without much power.

SPECIFICITY: Training principle that states you specifically improve those characteristics of fitness that you train.

SPEEDWORK: Relatively short, fast efforts aimed at developing speed.

SPIN: Often used to mean high cadence, it more accurately refers to the smoothness of the pedal stroke.

SPINNER: Bike rider who pedals at a relatively fast cadence.

SPLITS: Checkpoints along the route, often used to time the distance between riders.

SPRINT: Acceleration to speed.

SPUN-OUT: Unable to increase cadence, spinning as fast as possible. Implies the need for a bigger gear.

SQUIRREL: Rider who does not ride straight.

STAGE RACE: Event in which cumulative time of more than one race is totaled to determine the overall winner. Generally multi-day events.

STATIONARY TRAINER: Training device that does not move. Rollers, Lifecycles, Turbo Trainers, Trax stands are all varieties of stationary trainers.

STRAIGHT BLOCK: Cluster of cogs on a cassette with one-tooth differences on adjacent cogs. Synonym: Corncob.

STRATEGY: A plan or method for achieving a goal.

STRENGTH: Force that can be applied.

SUCK WHEEL: Rest by drafting; not pulling or working. Synonyms: Sit in, wheelsuck.

SURPLACE: (French) Tactic/technique of balancing in place, motionless on a bike. Synonym: Trackstand.

SWEEPER: Wide turn.

SWITCHBACK: Acute-angled turn on a climb or descent.

TACTIC; TACTICS: Action taken to further an overall strategy; the building blocks of strategy; the maneuvers.

TEAM CAPTAIN: Riding member of the team directing other team riders.

TEAM LEADER: Rider for whom the team rides to win a stage or race.

TEAM TIME TRIAL (TTT): Two or more riders working together in a time trial.

TECHNICAL COURSE: Course that requires advanced bike-handling skills.

TEMPO. Pace. Normally implies moderately-hard, steady riding at about 75% of maximum heart rate.

THROWING THE BIKE: Technique of pushing the bike forward in a close sprint.

TIME TRIAL THRESHOLD: Highest intensity one can maintain for a time trial, generally 30 to 60 minutes in duration.

TIME TRIAL: A race in which riders start individually and race against the clock without drafting competitors.

TOPS: Handlebar between the stem and the brake levers.

TRACKSTAND: (French) Tactic/technique of balancing in place, motionless on a bike. Synonym: Surplace.

TRAIN: Fast moving paceline. In a sprint finish, pulling riders take a final hard pull and do not rotate back into the line.

TRAINING EFFECT: The body's positive response and adaptation to physical demands.

TUCK, TUCKED, FULL TUCK: Aerodynamic riding position with the head and torso low, back flat, and arms close in. Used for descending and time trials.

TURBO TRAINER: Brand name of a type of stationary trainer device.

UCI: Union Cycliste Internationale, the international governing body of cycling.

USA CYCLING: US national governing body. USA Cycling supervises the activities of the USCF (US Cycling Federation), NORBA (National Off-Road Bicycle Association) and USPRO (US Pro Cycling), and establishes selection criteria for the US Olympic Cycling Team.

USCF: US Cycling Federation; governs US amateur road and track racing. A division of USA Cycling.

USPRO: US Professional Racing Organization; governs US professional bicycle racing. A division of USA Cycling.

VELODROME: Banked bicycle-racing track; indoors or outdoors; made out of wood or paved.

VO2 MAX: Maximum amount of oxygen an athlete can process to produce energy, often scaled to mass and measured in milliliters of oxygen per kilogram of body weight per minute.

WAITING GAME: Tactic of slow riding in preparation for a sprint, Synonyms: Jockeying, loafing.

WALL: 1. Steep gradient. 2. See HITTING THE WALL.

WARM-UP: Work before a race or at the beginning of a workout to prepare for more intense efforts.

WASHBOARD: Ripply patch or rough riding surface with small bumps and undulations.

WHEELSUCK: Rest by drafting; not pulling or working. Synonyms: Sit in, suck wheel.

WIND TRAINER: Training device that does not move. A wind-fan provides resistance to pedaling.

WIND-UP: Accelerate up to speed. Less abrupt than a jump, or attack.

WORKING TOGETHER: Cooperation among riders, generally alternating taking turns at the front and drafting, as in a paceline.

ABC Publications

The following lists *ABC* publications referred to in this book.

These publications are available where you purchased this electronic book or at <http://arniebakercycling.com/>.

Books

- ACE (Altitude Climbing Endurance) Training for Cyclists
- HIT (High-Intensity Training) for Cyclists
- Psychling Psychology—Mind Training for Cyclists
- Skills Training for Cyclists
- Smart Coaching
- Smart Cycling

Handouts

- Bicycle Position
- Climbing & Descending
- Endurance Sport Nutrition
- Hill Time Trialing Disc
- Pacing (reproduced in this book, available separately)
- Recovery
- Riding Etiquette, Groups
- Time Trialing
- Training Logs (an Excel document)
- Warm-Ups

Slide Shows

- Attacking
- Blocking & Gapping
- Body Language
- Echelons
- Style