

Racing Techniques



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Racing
Techniques

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COVER: Steve Prefontaine reflects, apparently not too happily, on the techniques of his race. (George Beinhorn)

FOREWORD

The things written and said about running usually miss one point. They dance around a central issue without really stopping to give it a close look.

That central issue, for racing runners, is the race. The race is a "Moment of Truth." Yet you'd hardly know it. That's because running talk splits about equally between what leads up to the race (training), and what comes from it (results). Little is said of the racing techniques in between—without which solid training is wasted and satisfying results are not forthcoming.

Once the race arrives, your limits are set. Racing techniques decide what you make of the training. Once the race is over, you can't change the result. Racing techniques decided it.

This booklet is intended to fill the gap between where the trainers leave off and the statisticians take over. It talks about racing itself, and getting the best results from the training foundation. The suggestions here are practical, and have personal application.

- **Chapter 1** tells of adapting to the special pre-, mid- and post-race demands—physical and psychological—of racing.

- **Chapter 2** deals with pacing, and how best to spread limited resources over a fixed distance.

- **Chapter 3** has to do with another kind of pacing—this time seasonal and year-to-year rationing of effort.

- **Chapter 4** is about results, but not in the usual sense. Here the emphasis is on the individual's times, and how he can analyze, compare and profit by them.

We have more than the usual number of time charts. These aren't statistics for the sake of statistics. They are meant to help measure the times that are most important to the runner—his own—and to improve those marks.

We stress times for good reason. Times can provide any runner, regardless of ability or rank, with an objective standard. Times offer everyone a measure of success, no matter what the finishing place. Once a runner learns to interpret his times, he can be all the more successful on his own terms.

Races and race times/places have importance completely out of proportion with the time spent on them. The race lasts anywhere from a few seconds for the sprints and a few minutes for the middle distances to a couple of hours for the longest runs.

But the race itself only the most visible part of a long-term chain of events. Each race is backed by a career's worth of training—in a ratio, distance wise, of about 10 parts training to one part racing.

The race may only last seconds or minutes, but good races both come from years of effort and reward it. Good races may be fleeting things, but they fill a memory bank that gets you through darker days ahead.

These brief races have long-term consequences focussed in them. They deserve at least the same precise study that training and results get.

Chapter One

Taking Pains



The immediate result of racing. (George Beinhorn photo)

EXCRUCIATING ECSTASY

Racing could be called organized, self-sought torture. There are different types and degrees of pain. Some of it is physical, obviously, but much of it is also psychic. A race can hurt as much before and after as it does during the run. Sprints have a different kind of suffering than middle distance races, and miles hurt differently than marathons.

Pain is dressed up in fancy names and it is often rewarded. But the common denominator of all racing is still pain. Racing means hard, painstaking work. But, oddly enough, these words aren't always synonymous with "unpleasant." Pain, when it takes a constructive course, often actually sharpens pleasure.

In this case, though, pleasure isn't something a racer feels while he's racing. He may get pleasure while training at an easy pace, but he'll seldom feel it before or during the race. Only after. And even then the immediate feeling may be more relief than pleasure.

Kenny Moore, who is both an Olympic distance runner and a prominent writer, has described the differences between easy running and hard racing—and the pleasures-pains of each.

"Jogging through the forest is pleasant," Moore writes, "as is relaxing by the fire with a glass of gentle Bordeaux and discussing one's travels. Racing is another matter. The front-runner's mind is filled with an anguished fearfulness, a panic, which drives him into pain.

"Frank Shorter ran 140 miles per week all fall with consummate non-chalance. A 30-mile day does not strain his prodigious physical resources. Yet, in Fukuoka (Japanese marathon, which Frank won), he said, 'The ordeal is between 20 miles and the finish. My only doubt is that my mind is ready to put my body through that.'

"Exploring the forest is easy," Moore says. "Exploring the limits of human performance is excruciating."

Moore wrote about the marathon—where racing pain is most obvious—for *Sports Illustrated*. He quoted Australian runner John Farrington as saying, "Marathoning is like cutting yourself unexpectedly. You dip into the pain so gradually that the damage is done before you're aware of it. Unfortunately, when awareness comes, it is excruciating."

There's that word again: "excruciating."

Frank Shorter nodded in agreement. "That's why you have to forget your last marathon before you run another," he said. "Your mind can't know what's coming."

Racing looks good from a distance. It's exciting to think ahead to it. It's pleasant looking back on it. But when you're involved in the immediate preliminaries and the race itself, the reality of it hits home. By the time you realize it's unpleasant, though, it's too late to turn around. There are one of two ways out—and both involve a degree of pain.

Either you (1) plunge in and push on, or (2) you pull out or pull up. And the only thing that hurts worse than the mental-physical pressure of staying the distance is not doing it.

Pain in running, whether resulting from lack of oxygen or lack of confidence, is a key limiting factor. However, it is by no means a constant. In other words, as conditioning improves, times improve without additional suffering—and sometimes even less.

One of the fallacies of racing is the idea that “the more you hurt yourself, the faster you’ll be.” Ron Clarke, for one, discounts this philosophy. The multi-record setter’s calm appraisal of pain in *The Unforgiving Minute* bears repeating.

“...a runner’s performances improve without any conscious increase in track effort. As a world record holder, for instance, I don’t feel as though I’m exerting myself any more in a race than when I was being beaten in much slower times. One has no sensation of running faster or of withstanding greater strain. Although more consistent training has had a beneficial effect, the athlete has no dramatic feeling of added speed and strength.

“But, of course, no matter how much he improves, an athlete still has to hurt himself if he is continually to raise his standards. Although the main objective must always be to win a race, a runner who clears away from a field is faced with the job of pushing himself to improve on his previous performance. And this demands a certain will-power.

“I would soon get bored with distance races that I won easily if I felt there was no incentive to put in a maximum effort. After shaking off other runners, the real spur is an eagerness to improve on my previous best. And since my previous best at present happens to be the world record, I am often trying to reduce a record.

“Consequently, in all my races I feel some degree of pain. This is not particularly remarkable because any physical activity in which a person extends himself to the limit causes pain. Sometimes it is an agonizing pain which is scarcely tolerable, and when it comes an athlete has to cope with it as best he can—even if it means deluding himself. I remember in my first marathon the only way I could struggle over the last few miles was from lamp-post to lamp-post, promising myself that each lamp-post would be the last.

“The pain in a race is caused by complete exhaustion. And the more intense it is, the greater the sense of achievement in overcoming it. Most people succumb to fatigue before they need to because they have not conditioned their minds to cope with it.”

THE PRE-RACE RITUAL

The mind plays tricks as the race approaches. It distorts time and magnifies little, unimportant things into big, crucial ones.

The waiting is the worst. You can't wait to get started, yet at the same time you don't know if you want to start—or will be able to. The last hours drag unmercifully, and a troubled mind fills them with a month's worth of worrying. Every thought and move seems to pass under a microscope.

"Should I eat this? It might upset my stomach?"

"Oh, no. My shorts are rubbing. What will this do to my crotch after a couple of miles?"

"God, I've got to get some sleep. How can I run if I can't keep my eyes open?"

"My left shoe has a flaw. Will my skin survive the race?"

"Nausea. Could it be the flu?"

"Uh-oh, a twinge in my calf."

"Diarrhea. What if I don't get it all out and have to stop in mid-race?"

"Is that a wind I hear?"

"Look how fit and relaxed those other guys are."

Robert F. Jones, a sportswriter, went back to relive his glory as a swimmer after 15 years away from the sport. Instead of the glory, he rediscovered long-suppressed feelings of fear and dread that were an equal part of his races. He speaks the mind of all racers when he says:

"I looked at my watch when I felt *it* start; just 23 minutes after noon on the day of the relay; regular as clockwork, as they say, just like it was in the old days. At first it was only a flicker, a brief preoccupation, a butterfly emerging from its cocoon. I helped it along with some of the old rituals. A few curses, as obscene as I could make them, directed not only against my opponents and my coach but against myself for letting me get into so grave a confrontation.

"The butterfly grew stronger with every obscenity. I fed it further with a mug of hot, strong tea, so thickly laced with honey you could feel it in your wrist when you stirred. I hadn't shaved or brushed my teeth that day, another of the old rituals. Makes you meaner and tougher, we used to believe. The butterfly began to flap its wings down at the base of my spinal cord, and pretty soon there were a dozen more ticking and flapping at the top of my gut."

Jones found the right word: "ritual." Jittery pre-racing runners concoct an odd mixture of science and superstition both to prepare themselves and calm themselves before races. It is more superstition, in most cases, than science. And the ritual probably is used more to put their minds at ease than benefit the race.

Tapering down on training and psyching up mentally can have some effect on the race's outcome (though basic training already has set the limits). Pre-race diet and warmup can help. The idea is to get to the starting line fit, fresh and ready to run. If the ritual serves these ends, it has served well.

However, the main role of pre-race priming is probably mind-settling. It is an attempt to grasp onto things familiar before plunging into the unknown.

Race plans have basically the same purpose. The unknown can't be planned, of course, but it is comforting to have a general idea—based on past experience—of what's going to happen, and how you'll react. Once the race starts, the plans are used, changed, or thrown away—according to unforeseen developments. The plan has already done its main job. Looking back later, the runner probably wouldn't have wanted to know exactly what would happen, anyway.

There's no easy way out of the little worries that come before races, any more than there's an easy way to get through the race. Deep down, runners probably wouldn't want an easy way out. Racing runners are funny people. They worry about jock itch and hangnails and tummy aches—anything that might block them from experiencing the real agony of distance racing.

MAN'S NATURAL LABOR

BY GEORGE SHEEHAN

What makes cowards of us all is not conscience as Shakespeare suggested, not fatigue as Vince Lombardi claimed, but pain. Pain and fear of that pain is our undoing. Nowhere is this more evident than in athletics.

For the trained athlete, pain is his major enemy. Already disciplined to the long training schedule, the curtailment of social life, and the separation from other interests, the athlete even at the top of his powers still must endure pain beyond his imagination and capacity if he wishes to get maximal performance.

"Your stomach feels as though it's going to fall out," writes Don Scholander, "every kick hurts like hell—and suddenly you hear a shrill internal scream. Then you have a choice. Most swimmers back away. If you push through the pain barrier into real agony, you're a champion."

Runners have told of the same tortures. The muscles gradually hardening up into painful leaden stumps. The breath shortening to convulsive gasps. The chest filled with dry fire. The stomach threatening to explode in agony.

And again the difference between athletes is the peculiar ability—Roger Bannister describes it as a capacity for mental excitement—which enables the runner to ignore or overcome discomfort and pain.

"It is this psychological factor—beyond the ken of physiology—which sets the razor's edge between victory and defeat," Bannister says, "and which determines how closely an athlete comes to the absolute limits of performance."

The barrier that pain puts up to those absolute limits was known as far back as the days of William James. "Beyond the very extremity of fatigue and distress," James wrote, "we may find amounts of ease and power we never dreamed ourselves to own, sources of strength never taxed at all because we never push through the obstruction."

All this was in my mind recently when I ran in the Eastern Regional 50-and-over mile championship. Now the Eastern Regional championships are no big deal. The number of 50-and-over milers is small enough to put us on the endangered species list of the Department of Interior's Wildlife Bureau. But we are no different from young eastern milers. We want to do our best. And we want that best to be better than the west coast. The west coast, you see, has everything we want: bright sunny days, low humidity, beautiful tracks and a feeling of superiority—but that's another story. What is important is the west coast 50-and-over mile, they call it the national championship, was won in 5:02.0. How to beat that mark and survive became the problem.

Being a physical coward of long standing (I was once sent home from a dentist's waiting room never having gotten into his chair) the expectation of pain is, alone, enough to unsettle me. I am living testimony to Mary Baker Eddy's claim that "disease is fear made manifest in the body." And all I had for encouragement for those final suffering seconds of a race was the alarming advice of two great coaches, the late Pete Waters and the irrepressible Percy Cerutti. "Any race you can walk away from," Waters used to say, "is a bad

race.” And before you passed out, you could remember Cerutti’s words: “If it hurts, make it hurt more.”

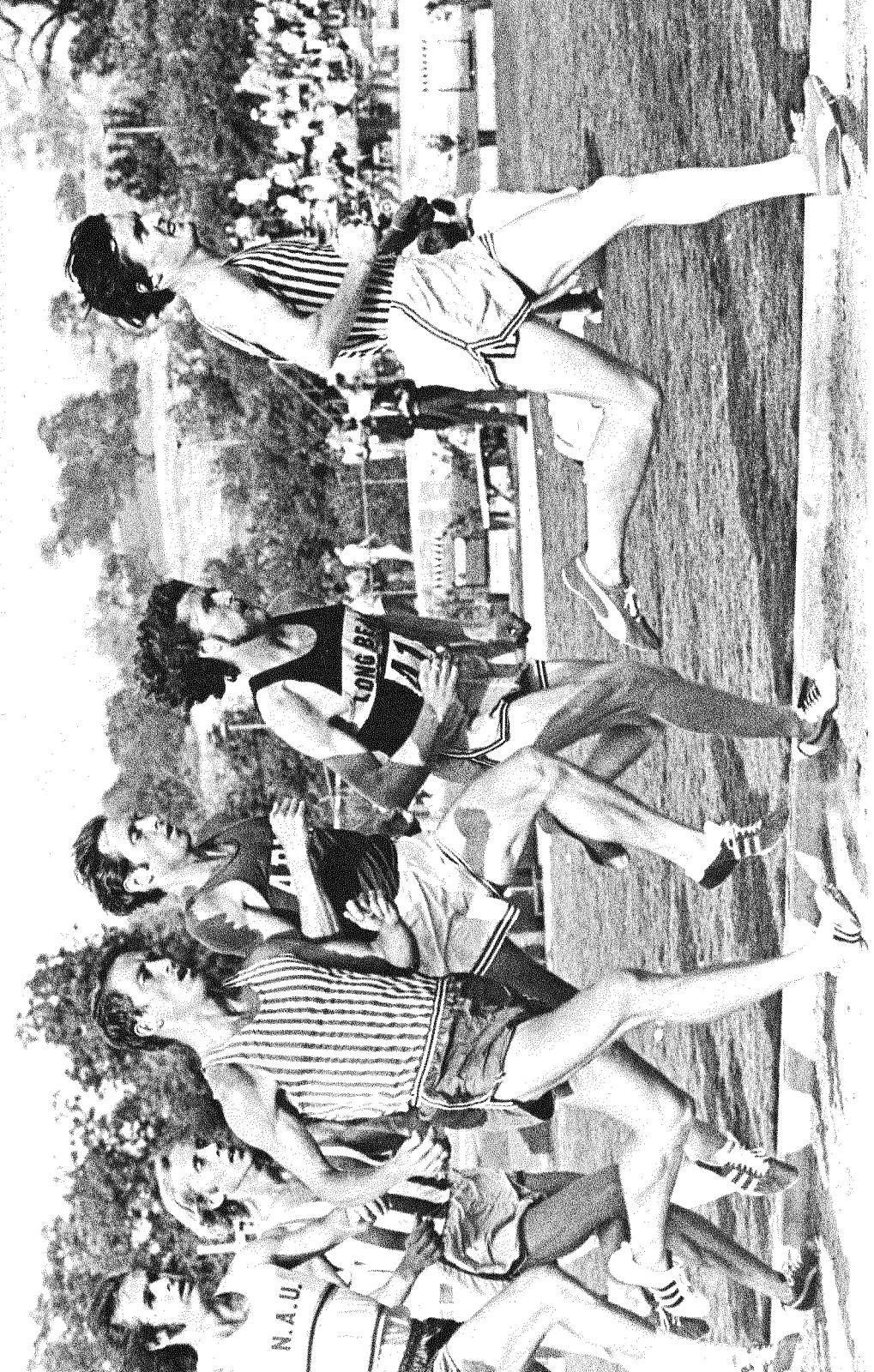
Help for this coward came from an unexpected quarter. Grantly Dick Read. Grantly Dick Read probably doesn’t know who Cerutti is, or even that 50-and-over people run miles. Pregnant women are his specialty and natural childbirth is his game. *Childbirth Without Fear* is the Read text—and I was going to change that to *Miling Without Fear*. It was, to pardon the expression, a natural. Surely only labor and delivery among daily experiences could come up to the pain I was enduring in the last quarter-mile. And only that among life’s common experiences exposes us to the same fear and apprehension. Grantly Dick Read, the man who made childbirth a conscious joyful act, was about to make his debut in athletics.

So here I was on the line - looking forward with joy and happiness instead of dread and apprehension. The race will not only be painless, I told myself. It will be a wonderful human experience. (Suggestion and autohypnosis, according to some painless labor advocates, can raise resistance to fatigue by more than 20%.)

Oddly enough, it *was* a wonderful experience. The first three-quarters was beautiful: 3:44. Only a 75-second last quarter and we could send a sub-five-minute mile back to our west coast friends. Down the backstretch, I started to get the signals. In the chest, the legs and the stomach. But now I knew. These were not pains; they are the feelings of any body when it is functioning at its best. Into the last turn, and now what in the past was pain was a warm spreading feeling something like a hot shower after a workout.

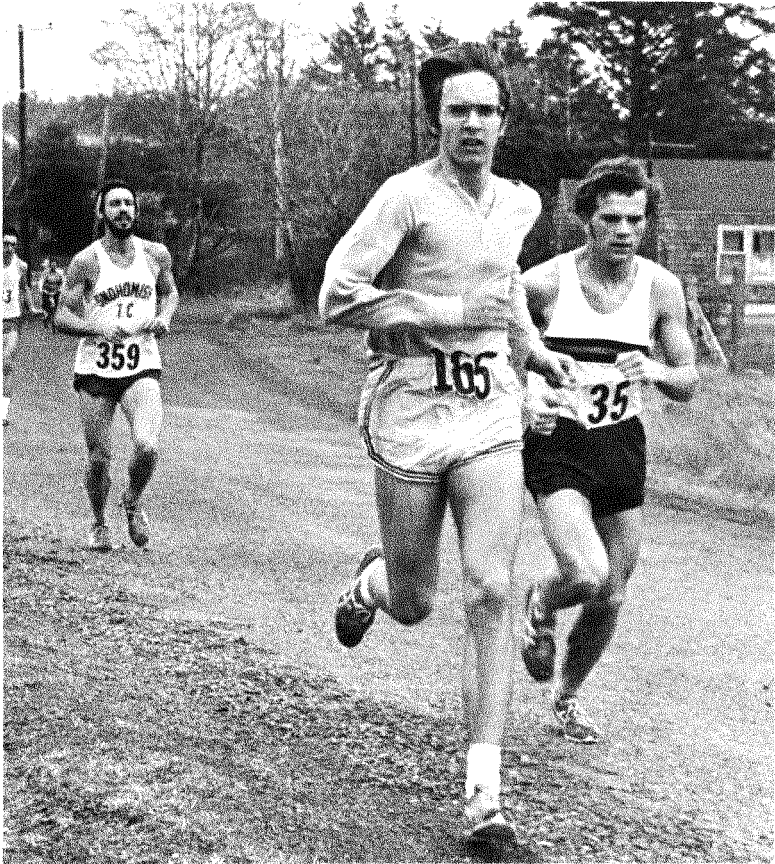
The last hundred yards was the best. I was past pain. I won driving and in another world: 4:57.8. It was a big day for the east coast and the west coast and all aging milers. For which I thank Grantly Dick Read. And my daughter, whose 12 hours in joyful natural labor made me believe.

NEXT PAGE: The effort and concentration of middle distance racing is written on the faces of these runners. Traditional front-runner Gerry Lindgren leads. Among his followers is George Young (fourth here), who prefers to wait and kick. (Stan Pantovic photo)



Chapter Two

Racing and Pacing



Runners in road races such as this one tend to get away from the bunched-up tactics of track and find their own pacing level. (Sharran Herriot photo)

TIME-TACTICS SURVEY

The way you run a race depends on what you want most from it. Competitive runners want one of two things (often both, but usually one more than the other): high placing or fast time.

Simply stated, runners come in one of two types:

- “Racers”—whose main goal is to win the man-vs.-man test, or if he can’t win it to come as close to winning as he is capable.
- “Pacers”—who are most interested in the man-vs.-stopwatch challenge. They want to run faster than they’ve ever run before, or at least as fast as they’re capable under current conditions.

Marty Liquori typifies the “racer.” He has said, “You have to hold a gun to my head before I’ll go for a fast time.” But whether the time is 4:10 or 3:55, Marty seldom loses a mile race.

John Landy of Australia, the second man to break four minutes, was a “pacer” by nature. Landy said, “I’d rather lose a 3:58 mile than win one in 4:10.” Landy ran many fast miles, but won few big races.

As we said, though, this is a simplistic view of racing. There are definite types like these. But there are also others: the “tortoises” who plod along at a reliable pace vs. the “hares” who dash out faster but run more erratically; or the “leaders” who compulsively run from the front and must control the pace vs. the “followers” whose style is wait-and-kick.

However, as competitive stakes go higher, the lines between the different types of racers are blurring. Speed is the reason. Races—all races—are pushing closer to the outer limits of speed, leaving little room for games.

“Tactics can still be used,” wrote Arthur Lydiard of New Zealand in his book *Run to the Top*, “but their days are numbered.” Lydiard said this 10 years ago, and it’s more true now. He pointed to the 1956 Olympic 1500-meter final, where the entire field was so close together with a half-lap remaining that it could have been covered by a large beach towel. Races like this were rare in the 1960s, and appear to be growing rarer.

In today’s high-speed racing, with packs of highly-conditioned runners, it’s a rare individual who can “steal” a race with tactical bursts—as Vladimir Kuts did so effectively in the 1950s. And it’s a rare runner who can spring from the field like a dashman in the last 50 meters to win—as Ron Delany did in the Melbourne Olympic 1500.

Lydiard had a reason for predicting that plotting, jostling, “burn-’em-off” and “sit-and-kick” racing is doomed. When racers are racing at their limit and pacers are pacing at theirs, their “tactics” become very much the same. They are trying to make fullest and most efficient use of energy resources. Whether they’re trying to beat another runner or beat the clock, they have to get from Point A to Point B the fastest way possible. And for reasons we’ll get to, the best way to do that is to groove in on maximum efficient pace and hold it.

The race against men and against time isn’t always—or even frequently—to the swift, but to the smart. Swiftiness is important to be sure, but it’s wasted if you don’t know how to—and how not to—use it.

This may seem to be more a “pacing” than a “racing” booklet. This is somewhat true. More emphasis is on pacing technique than on racing tactics, but only because the two are becoming more and more alike. The people who do the best racing are the ones who do the best pacing, and vice versa.

A number of physiological/psychological/philosophical/practical factors explain this blending of the two types of competitive running.

- *Speed, not distance, is the killer.* High-mileage athletes have no problem going long. They go long every day. But no matter how well prepared they are, they have trouble when they go long *and* fast. The faster the pace, the more it hurts. And the closer one comes to all-out speed, the less room he has for pacing errors.

- *The most efficient pace is even pace.* As the premium is put on faster (i.e., more demanding) racing, there is a leveling of pace and a tendency for each runner to run at his own level. Nearly all the current world records have been set at remarkably even speeds, with only slight variations in the first few and last few yards.

- *The effects of unwise pacing multiply.* A super-fast start isn't “money in the bank.” It's a severe drain on limited reserves. Physiologists have estimated that every second faster than level pace in the first half of the race costs a second or two at the end; two seconds costs you four or more; three seconds slows you by... Well, they say there's a geometric progression.

- *Pacing problems grow as distance grows.* There's not much we can say about the sprints—through 440 yards. They're either all-out all the way, or so close to it that it's unnecessary to analyze them. But starting with the half-mile, early restraint is increasingly critical. The reason is simple: Running too fast too soon is painful, and in longer races you have to endure the pain for a longer time.

- *“Momentum.”* This is something of a physical factor, and something of a psychological one. Momentum is the feeling of commitment, progress, and of holding firmly to a pace or place. It isn't easy to define, except to say when you have it you know it; you feel power and drive. When you've lost it, you know it too; you drop out of the race mentally, falling into a resigned “survival shuffle,” if not actually stopping physically.

- *The race is a whole.* This may sound too obvious to mention. But runners still have a hard time remembering this when they're racing. Too many run the race as if it were fragmented—as if prizes were given on the basis of how they ranked at the end of the first quarter, how long they stayed with the leader before dying, or how fast they sprinted the last hundred yards. Pace and/or place for the whole distance are all that count.

“Survival of the fittest” is the best way to describe most middle and long distance races. The classic pattern runs as follows.

Say it's a mile. At the end of the first quarter, all 15 runners are bunched within a few yards. At the half, five have dropped off and are slipping back. At three-quarters, five more have fallen away from the front runners. Three more slip away on the backstretch. Now, coming off the final turn, two men are left. The strongest and fastest of the two wins the race for the tape.

A good race, you might say. Sure it was—for the leaders who could hack the pace. But what about the other 10 who tried to stay up and couldn't? They started too fast for their abilities. They lost "contact"—and probably momentum with it—and ended up shuffling home slower than if they'd let the leaders get away at the start.

Dreams of glory are fine, front running is fine—if you have the ability to carry through on them. In any race, however, only a few runners are capable of handling front-running pace. The majority will be hurt by it. The beginner gets hurt most by his dreams and his impatience.

Arthur Lydiard advises: "(The novice) should firmly resist the temptation to try to go with the local champion for the first half-mile. Let him go. The ideal starting pace is the pace he knows he can maintain all the way.

"Only among top athletes who are fighting for championship honors should it be necessary for tactics to enter into it. Between them, fast takeoffs in an attempt to break up the field are expected and warranted, but we take good care to warn our learner not to get tangled up in this sort of cut-throat running. He is the one whose throat will be cut first."

"Contact" is a concept still applied in racing to some degree. The reasoning goes, "You have to go out with the leaders. Once you lose contact with them, you're dead." However, from what Lydiard has said and from what you've read already, "contact" may have cut far more throats than it has saved.

There's no reason whatsoever why only the fastest and fittest runners should survive races and be satisfied with them, and that the slower ones should always be the victims.

Lydiard says that by running intelligently, the slow man may even be able to do a little innocent victimizing of his own. "If he bats along at his best comfortable pace and finds towards the finish that he has a useful reserve of energy left, by all means uncork it. A flying finish might bring him back within sight of the fast-starting bunch of champions."

This beats the "survival shuffle," anyway.

You never need to lose a race. And you never need to keep anyone else from winning, because everyone can win. The way to win all the time is to concern yourself mostly with yourself. This is the one factor you can control. Let other people worry about themselves. They are uncontrollable as far as you are concerned. Thinking this way, any runner can maximize himself without reducing anyone else's chances to do the same.

Two nice features about running make this possible.

- *It has objective standards.* Times offer a measure of success, and a comparison that transcends the immediate competitive setting.
- *Races are personal.* The longer ones particularly are more a struggle with the man inside than the men outside.

Comparative times give every runner meaningful personal standards. He doesn't have to beat anyone to reach them; only to control himself. No matter how many other runners finish before him, he has won if he has met his own standards.

PHYSIOLOGY OF PACE

In simplest terms, we can't run all-out indefinitely because we can't breathe fast enough. The body's appetite for oxygen increases as speed increases, and at high speeds the supply can't match the demand.

Physiologist Rodolfo Margaria, who has studied oxygen intake in exercise, explains: "When exercise is raised to a strenuous level at which energy can no longer be provided in sufficient quantity through oxidation (because of the limit on the rate of delivery of oxygenated blood to the tissues), the muscles begin to supplement the energy supply by means of glycolysis."

What he is saying is that the runner can find energy from other sources, but only temporarily. He can survive for short periods in a state of "oxygen debt," but this debt condition has unpleasant side effects. It creates lactic acid. Lactic acid produces fatigue, and when fatigue progresses to a certain point exercise must cease.

All races are, to some extent, anaerobic. They have higher oxygen demands than supplies, and have a certain degree of oxygen debt/lactic acid accumulation. The amounts vary with the distance and pace of the race. The faster the race, the faster fatigue builds (and the less distance you're able to run at that rate). If you want to go longer, you have to go slower.

Tests have shown that the 100-yard sprinter runs his entire race anaerobically. He has a 100% oxygen debt. That drops progressively with distance, however. The miler carries about a 50% debt. At the marathon distance, the oxygen debt drops to 2.5%.

It isn't important to memorize the figures, unless you're a physiologist. The important thing to know is the process at work: (a) speed creates oxygen debt; (b) oxygen debt leads to fatigue; (c) fatigue limits the use of speed and endurance.

Except in the pure speed-burning sprints—100 yards and possibly 220—thought has to be given to pace regulation. Otherwise, drastic buildups of fatigue products can wreck the best-laid plans.

Physiologists have found that in the first stages of every run, no matter how slowly the runner starts, there is an oxygen debt buildup, followed perhaps by a small accumulation of lactic acid. The significance of this fact to the racer is that it doesn't seem to matter how fast he starts. His bodily reaction is going to be the same. So he might as well get away quickly and put himself in good position from the beginning.

Rodolfo Margaria says the oxygen debt rises sharply at the start of a run. However, the lactic acid production mechanism is "rather sluggish" in the first 15 seconds and doesn't have a significant fatiguing effect. If the pace then drops there should be no problem continuing the run.

However, Margaria adds, if the runner tries to hold all-out pace after 15 seconds, he'll reach the limit of his energy by the time he has gone the next 15 or 20 seconds. In other words, a man can only run 300-350 yards at top speed before "lactic acid production has reached its maximal rate."

Once a runner has reached this maximum, Margaria notes, he will need at least an hour—probably more—before he recovers enough to run efficiently

again. A runner who reaches it in the first 30 seconds of a half-mile or mile race is certainly not going to recover before the race is over. The effects on his late-race pace will be obvious.

For these reasons, pacing in races above 220 yards is a physiological necessity. Attention to controlling speed throughout the race can keep oxygen debt within tolerable limits.

Richard Amery, an Australian physical educator, describes the practical significance of these findings for a middle or long distance racer:

“From the physiological evidence presented, the most efficient method of attaining the fastest time for a run over 800 meters appears to be (1) a fast start followed (2) by as near even pace as possible for the remainder of the race.

“Why a fast start? The reasons are both practical and physiological. From the practical viewpoint, it places the runner in a position where he has fewer competitors to pass during the race, thus his total distance run will be less. The physiological effect of a fast start is that it will serve to rapidly raise both oxygen intake and recovery oxidation to their maximum values. Lactic acid accumulation will occur, it is true, but it occurs in both the slow and the fast starter—without the slow starter gaining any of the advantages of the fast one.

“Once past this initial ‘fast-start’ phase, why should even pace be adopted? Because for a given work output, when working to exhaustion, lactic acid build-up proceeds at a uniform rate to its maximum value—whereon work ceases.

“Since oxygen requirement varies with the cube of the running speed, it is imperative that the runner remain within strict limits of his capacity. Only a minor variation in speed may be crucial if trying for a fast time. The faster the total time (and hence closer to the athlete’s limits), the more significant this becomes.”

Amery reviewed the world’s fastest times and found them to be quite close to even pace. World records almost always showed splits that varied no more than one second per 400-meter or 440-yard lap—except for the first and last laps. “As has been pointed, out,” Amery says, “the faster-than-average first lap is probably more of a help than a hinderance, while the last lap will always remain an unknown due to factors such as competition, spectator support, etc.”

The physiological points that Margaria and Amery make are most important. Putting yourself so far into oxygen debt early in the race that you’re bankrupt in the final stages is a foolish investment.

PSYCHOLOGY OF PACE

Richard Amery is to be congratulated for his insight. He's a physiologist, yet he is wise enough to say that the physiological principles of pacing must be tempered by psychological ones.

"For the true even-pace runner," Amery says, "his biggest problem will be psychological. It is one thing to plan a race for even pace running. It is quite another to do it. If a person plans to run steady 70-second laps for 5000 meters, it will require great mental effort if, after two or three laps, he is 10 seconds behind the leader."

Runners don't race in isolation—themselves against the stopwatch. As long as there are human instincts flowing in him, the racer can't run exclusively to the beat of the watch.

The "racer" personality has the most problems, and more runners are "racers" than "pacers." The racer's efforts are keyed to his competitors. He runs against them first, the watch second. He forgets that by tailing along with them at a wicked, erratic pace, they all may be running like lemmings headed for the brink.

It has been said that "erratic pace may not be the way to break records, but it is the way to break hearts." Many hearts are broken in the course of a race, and it happens as often to the runner who sets the style as to his intended victims.

Discouragement can't be measured. The effect on the psyche of losing sight of the leaders in the first 440 can't be put in numbers, any more than you can time what happens when a runner lets go of the pace at halfway.

Confidence, enthusiasm and momentum are delicate states of mind. Everyone has them when he's up front, running fast, and feeling run left in his legs. But they can vanish in the space of 50 yards. It takes an even bigger load of faith in your pacing method when you're starting from a hole and digging your way out.

"For even pace running," Richard Amery says, "the athlete must have great faith, both in himself and in the method he is using. He must be certain in his own mind that in the closing stages he will have caught the tiring front runners and be fresher when he has done so."

Unless a racer can go slow when everyone else is going fast, confident that he'll switch roles later on, he's probably better off going with the leaders and risking a heartbreak. Better to have one later than from the beginning.

As long as we're still men racing men instead of clocks, there will be measurements of good and bad races other than time. And there will be energy sources as well as pain sources that can't be identified in a physiologist's laboratory.

Why else would a winning race always hurt less than a losing one?

NEXT PAGE: There's a psychological reason for staying together like this. Dropping back often shatters confidence. (Jeff Johnson)



PHILOSOPHY OF PACE

Hungarian coach Mihaly Igloi used to say that preparing for a race was like building a house. Each mile of each run was a brick, and the total number of bricks—skillfully put together—formed the structure of the race.

If everyday, sub-maximal runs are the building blocks of running, all-out races are the hammers that smash them. Runners who race are building to destroy. There are values in racing, and there are rewards, but when you get down to the guts of it, the race is quickly and efficiently reducing to rubble what you've so slowly and carefully put together.

There is symbolism in the fact that races begin with a gun and end with a rope, because from start to finish there is self-punishment—planned self-punishment—that is almost suicidal in intent. A good race is one in which the last ounce of effort is used on the last step. This is what we usually mean by “pacing.”

No committed racer is going to cut out this self-destruction, nor should anyone ask him to. The thing to do is strike a balance that is constructively self-destructive. This isn't as much a contradiction of terms as it sounds.

Pacing is more than just what happens during a race. The pacing of a single race is a few bricks in the foundation and walls of a running career. The way all the bricks fit together determines the strength or weakness of the wall. If it is well-built, a few bad pieces won't hurt—if you take care to replace them.

Constructive self-destruction is a matter of long-term pacing. It means keeping a close watch on the number of races in relation to the number of easier runs. Keep the walls and the foundation strong by building faster than you destroy. Before every race, see that there are no obvious cracks or dangerous stress points. During the race, keep damage to a minimum. Afterwards, take time to repair or replace the broken bricks, then when that's done start adding some more.

This advice isn't new. The Bible says the same thing, in so many words, and those words went into a popular song a few years back. The idea must have merit.

*“To everything, turn, turn, turn.
There is a season, turn, turn, turn.
And a time for every purpose,
Under heaven.*

*“A time to be born, a time to die.
A time to plant, a time to reap.
A time to kill, a time to heal.
A time to laugh, a time to weep.*

*“A time to build up, a time to break down.
A time to dance, a time to moan.
A time to cast away stones.
A time to gather stones together.”*

Finding the elusive balance between building and destroying is the difference between erecting higher, stronger structures and leaping off of them.

USING THE PRINCIPLES

Every race is really two races. The parts are about the same size, but they're drastically different in content.

The first half seems easy—too easy. You know you should be saving something for later, but your body is crying “faster.” It's hard to hold back.

Then comes the second half, which is a different problem altogether—almost a different race. This is where you begin to hurt. Where did all that speed and energy go? Your body now cries “slower,” and you know you should be going faster. It's hard to hold on.

Bad races are the result of a common human failing: running fast when we feel speed in our legs, and slowing when they start to hurt. Good races, on the contrary, are largely the result of ignoring instincts of freshness and pain—holding back when we feel best, and saving energy to spend when we feel worst.

The difference between a good and bad race is the way the last part is run. The first half merely sets the stage; the last half is where the main performance takes place. The strength of the final performance rests on the groundwork that was laid down at the start.

The race and the racer both have to take on split personalities in pacing. The race has two distinct halves, demanding separate responses. Ideally, a racer treats the stage-setting half with coolness, care and restraint of a technician. There's a definite job to do here, within certain time limits, but this is the businesslike part of racing.

Going into the second half, the race shifts in character, and the racer changes roles. Now he's an artist, an actor in full view of others and himself. He has to live on and with the stage that has been set. He has to throw off inhibition and race with all he has left. If the technician has done his job, the artist can run his good race. If not, the mistakes of the first half will spoil the second.

Enough analogies. Let's get down to some hard facts about this concept of split-personality pacing. Pacing starts to become a key consideration at about a half-mile (or 800 meters). As distance gets longer, early restraint becomes more important.

Arthur Lydiard described mile pacing like this: “In my opinion, the best way to get the full benefit of ability in the mile is to go out with the attitude that it is a half-mile race and, as far as you are concerned, the time to start putting on the pressure is when the first half-mile is behind you.”

Lydiard wasn't talking so much about a slow start as about a *cautious* one. “The ideal starting pace,” he says, “is the pace (the runner) knows he can maintain all the way.” At first it will seem easy; later, not so easy.

The New Zealand coach, whose athletes have held world records from 800 through 5000 meters, adds, “The three and six miles are far more exacting than the mile, and the athlete has to exercise more caution. It is far easier to go too fast too soon in the six-mile than in the mile. The average speed of the six-mile is not what you would call ‘fast running.’ ”

And the longer distance man obviously has to have even more self-con-

PACING IN RECORD RACES

Nearly all the current men's outdoor world records have been run at remarkably even paces. Here is a breakdown of times for the best marks.

Times for the first half and the second half of the races are compared, using the following formula: slow half minus fast half; difference divided by the race's distance in miles. The result is the "split" listed in the right-hand column: + indicates a slowdown in the latter half; - indicates a speedup.

These are the world records through June 1972.

Distance	Record (Runner)	1st Half	2nd Half	Split
800m	1:44.3 (Snell)	50.7	53.6	+5.8
	1:44.3 (Doubell)	51.5	52.8	+2.6
880y	1:44.9 (Ryun)	53.3	51.6	- 3.4
1000m	2:16.2 (May)	1:07.3	1:08.9	+2.5
	2:16.2 (Kemper)	1:08.0	1:08.2	+0.3
1500m	3:33.1 (Ryun)	1:49.0	1:44.1	- 5.4
Mile	3:51.1 (Ryun)	1:58.9	1:52.2	- 6.7
2000m	4:56.2 (Jazy)	2:29.2	2:27.0	- 1.7
3000m	7:39.6 (Keino)	3:49.3	3:50.3	+0.6
2 miles	8:17.8 (Puttemans)	4:08.0	4:09.8	+0.9
3 miles	12:50.4 (Clarke)	(during 5000m race below)		
5000m	13:16.6 (Clarke)	6:37.0	6:39.6	+0.8
6 miles	26:47.0 (Clarke)	(during 10,000m race below)		
10,000m	27:39.4 (Clarke)	13:45.0	13:54.4	+1.5
10 miles	46:37.8 (Drayton)	23:15.0	23:22.8	+0.8
20 kms.	58:06.2 (Roelants)	(during hour race below)		
Hour	12m 1474y (Roelants)	6m 617y	6m 799y	- 2.1
15 miles	1:12:48.2 (Hill)	(during 25 km. race below)		
25 kms.	1:15:22.6 (Hill)	37:30.0	38:52.6	+5.3
30 kms.	1:31:30.4 (Alder)	47:57.0	46:33.4	+5.2
20 miles	1:39:14.4 (Foster)	48:48.0	50:26.4	+4.9
2 hours	23m 1071y (Alder)	11m 1500y	11m 1331y	+1.2
Marathon	2:08:33.6 (Clayton)	1:03:50	1:04:43.6	+2.1
50 miles	5:01:01.0 (Hampton)	2:25:56	2:35:05	+10.4
Steeplechase	8:22.0 (O'Brien)	4:11.0	4:11.0	0.0

trol. Pacing mistakes that would mean a low finish on the track will be more likely to produce a non-finish on the road.

“Undoubtedly,” Lydiard says, “even pace running is the best way to get the best out of yourself.” The reasons for this are explained in detail in other parts of this booklet. Here, we’re simplifying the even-pace concept into a first-half/second-half comparison.

“Even-pace” means that the times for the two halves are very close to equal. But this doesn’t mean that effort is equal. Running this way, there is holding back early and pushing late.

In theory, the closer the two halves are to equality, the more efficient the pacing has been. If you start faster than you finish, you lose considerably more speed in the last half than you gained in the first. However, it’s possible, too, to drop so far behind even pace in the early stages that the lost time is impossible to make up.

The “safety range” is apparently about five seconds *per mile* on either side of even pace. For instance, a 9:00 two-miler can run between 4:25 and 4:35 on his first mile and still reach his goal. With anything faster or slower than that, however, he’ll have trouble.

These figures haven’t just been pulled from the sky. Take a look at the chart of current men’s world records. Nearly all of them fall within—or quite close—to this “safety range.” (See accompanying chart.)

- One man—Kerry O’Brien in the steeplechase—ran exactly equal splits.
- The majority—13 of 25 records—were run with the second half slower than the first, but well within acceptable tolerances. Six were within a second of being equal.
- Another four times were run with the second half faster than the first, but within the five-seconds-per-mile limit.
- Both Jim Ryun’s 1500-meter and mile records were run with the second half considerably faster than the first: in per-mile terms, 5.4 and 6.7 seconds faster, or slightly outside the theoretical limit.
- Five records had a finish five seconds or more slower (per mile) than the start, though all but one of them was within a second. (The 50-mile was far outside the limit, but complications of pit-stops and heat arise towards the end of such ultra-marathons.)

We of course can second-guess the world record setters and can ask, “Would so-and-so have finished even faster if he had started a bit slower?” or “Would such-and-such have had a better time yet if he had gone out at a stronger pace?” These are fair questions, but the fact remains that almost all of the world records have been run at very nearly even pace.

If this method applies to the fastest and finest conditioned runners in the world, it should apply to the little man, too. Perhaps attention to pacing

NEXT PAGE: George Young (left) and Steve Stageberg, like most runners of world class, tend to race at even pace—the major variation being a significant acceleration near the end. (Stan Pantovic)





is even more crucial to the runner with less basic speed, less training background, and far less to gain from bold tactical gambles.

Runners in all classes can profit by timing at least the halfway split of races, and analyzing pace. Find the five-seconds-per-mile tolerances by using this simple formula:

Slow half minus fast half; divide the difference by the distance of the race (in miles).

For example, if a runner goes 2:20 for the second half of a mile and 2:10 for the first, he has slowed down by 10 seconds. The slowdown factor of 10 seconds is quite high. Next time, for the sake of more economical pacing, he might consider an easier start.

This is an oversimplified view. There are other factors to consider when analyzing and planning races, such as responses to competition, terrain and weather changes, and sudden changes in condition. Statistics can't account for everything, nor would we want them to. Every race has a personality of its own—a *split* personality. And the racer needs some schizoid characteristics of his own to cope.

Plan the first half, then let the second half happen. Run slower when you feel like going fast, and faster when you feel like slowing. Run the first half with the caution of a scientist, and the last half with the creative abandon of an artist.

Chapter Three

Long-Range Planning



Distance runners have a year-long season. (l-r) Rita Ridley, Eileen Claugus and Joyce Smith all race efficiently on the track and in cross-country. (Ed Lacey photo)

PLAN FOR ALL SEASONS

A runner can't sow and reap at the same time. Or, as Arthur Lydiard says, "You can't race well the year-round because your condition will only take you so far. When you're racing hard, you can't train hard. If you compromise, you can hold your form for three or four months. But (then) you're going to have to go back and start to build up again."

This is another way of saying there must be a time for building up, and it must be in greater proportions than the tearing down. There are seasons for each.

In the United States, the racing year divides into four seasons that roughly parallel the climatic changes. Each has about three months. The racing year starts in September or October with cross-country. The indoor season runs through the winter. The outdoor track season is in the spring, and the summer has national and international meets for those who are capable, informal racing for the rest.

Some runners, either by choice or commitment, try to be men for all seasons. They try to race year-round, which appears to be impossible without sacrificing either training background or maximum racing edge.

The people who can least afford to overrace are the ones typically called on to race the most. These are the international-class runners in all events, and the distance runners at all levels.

Demand for a Jim Ryun or a Marty Liquori runs high. They can literally make a meet for a promoter, and a team can't do without them. Take Liquori, for instance. He raced cross-country for Villanova in the fall of 1970. Indoor racing came immediately afterwards, then the relay meets of spring, then the outdoor nationals, then summer invitational meets in Europe and the 1971 Pan-American Games. Following that, Liquori went into cross-country again. Then he reinjured a heel. He eventually had to abandon Olympic plans. We can only speculate about the connection between his heavy racing schedule and his injury.

Overracing is tempting—even necessary—for nearly all distance runners, with cross-country, indoor and outdoor track and summer all-comers and road races to run. Races are available all year, and they're hard to resist. But they take a toll. The longer the distance being raced, the more background a runner needs and the longer it takes him to recover afterwards. With the schedule leaning too heavily to racing, corners are cut in training and in rebuilding.

Few, if any, runners can race at maximum efficiency in all four seasons. Most, apparently, can't even operate well in two or three consecutive hard seasons.

Arthur Lydiard says a racer can hold his form for "three or four months" before going back and starting to sow new racing seeds. Tom Osler, author of *The Conditioning of Distance Runners*, has reached the same conclusion. Osler writes, "One can rarely maintain the high performance level...for more than three months. (Heavy racing) must, therefore, be terminated after about three months or when symptoms of energy depletion are first observed."

Osler has found, with himself at least, that his running goes in roughly six-month cycles. During each, there is one "high" period of about three months, and one "low" period the same length. He finds the highs best for racing, and the lows best for training.

Tom says, "I have observed the following features of the 6MPC (six-month performance cycle):

"1. Since the entire cycle lasts six months, there are two complete cycles each year (two peaks and two low points per year). For example, if the runner is at the peak of his cycle in January, he can expect to be at his low point in April. Another peak and low point should follow in July and October, respectively.

"2. Its duration is not exactly six months. Sometimes it is longer, sometimes shorter. But on the average it seems to be six months.

"3. The peak of the cycle seems to last about one month, during which time you are, as it were, super-alive. You experience: (a) An increased alertness to everyday situations; you feel more awake and alive. (b) You work better at your job. (c) You have heightened sexual awareness. (d) You feel generally better.

"4. During the low point of the 6MPC, you have reactions opposite to those just listed. In fact, I find it easiest to predict my next peak by observing the period of sexual depression; the peak follows in about three months.

"The 6MPC is of importance to the runner for several reasons. For one, it allows him to predict which times of the year he will perform best. Likewise, it allows him to determine when he should take a less serious attitude toward racing... Knowledge of one's own cycle is important, for a running effort which is easily tolerated at the peak of the 6MPC might be far too much during the low phase. Harder, shorter, faster runs can be tolerated during the peak phase and can produce dramatically improved racing performances."

Osler concludes that an individual should race seriously not more than three months at a time, and that each hard racing period be at least three months apart. This, as far as is practical, is a way of cooperating with body rhythms. "In brief," he says, "easier, slower, longer training runs are best during the low phase. Harder, shorter, faster runs can be tolerated during the peak phase and can produce dramatically improved racing performances."

On the other hand, if races are kept in proportion and in season, there may be no better way to prepare for peak racing than by *racing*. Only there does a runner experience and adapt to race-type stresses.

George Young has realized this. He says, "There's no better way to get in speedwork than running a race. You talk of speedwork in terms of quarters and all those other things, but you don't get the speedwork (there) that you gain in a race. You just never really reach the pain barrier, or whatever you call it, in any other way than running the race and hurting that way."

Runners often pace their seasons the way they pace their races, starting with the slower, less important races and working up to the big, fast ones when they count most. Early races set the stage for later ones.

Track & Field News' annual world rankings list all major races that rated individuals ran during the season. They may have run additional races, or they

may have run at other distances, but these figures indicate the minimum number of serious runs undertaken at their specialty.

The total number of races, and the point in the season where the runner got his best time is shown here event to event.

These are the figures for 1971 (averages of 10 runners per event):

Distance	No. of Races	Best Race
100y/100m	10.3	6th
200m/220y	8.0	5th
400m/440y	8.6	7th
800m/880y	11.7	8th
1500m/mile	9.4	7th
3-mile/5000m	7.7	7th
6-mile/10,000m	4.4	4th
Marathon	2.5	2nd
Steeplechase	8.0	5th
High Hurdles	11.0	8th
Intermediate Hurdles	9.2	7th

Through three miles, the number of races run per man was fairly constant. Then in the longer distances, the totals dropped significantly. At all distances, the runners tended to run best at or near the end of the season—i.e., at the time of the biggest meets. Of the 110 runners, only six got their best times in their initial races. Most of these were long distance men, who probably raced at shorter distances during their buildups.

Again, it's a matter of finding the balance between enough and too much.

Running is an individual sport that suffers when it is dressed up in team colors. There's nothing wrong, of course, with running for the good of the school or club. But too often this translates into hurting the individual for the good of the team's total score.

Team scoring is the culprit because emphasis is put on *quantity* of performance rather than *quality*. Running for points instead of times leads to running too many races—not only too many meets, but too often within a single meet.

Doubling, or even tripling, is the problem. It may be possible when the runner can or wants to run less than his best. If he can take it easy and still score points, fine. But that isn't possible very often any more. Running talent has spread too far.

Even if it is possible to coast through a lot of races just for the points, the wisdom of it is questionable. Ron Clarke observed many years ago, "Americans for a long period didn't show anywhere near the same ability in distance races as in other athletic events. The weakness derived from the crowded American college season, in which good distance athletes usually have to contest two or more events in one day. To conserve themselves, they must necessarily adopt the 'sitting' tactics. Even today, the successful American distance athletes are not the college men, but the high school boys like Jim Ryun and

Gerry Lindgren, and the post-college athletes like Billy Mills, Jim Beatty and Bob Schul.”

The situation hasn't changed significantly since Clarke wrote this in the mid-1960s. It might be pointed out now that a top US distance man is Steve Prefontaine—a collegian. But Steve is in a special situation. He very rarely doubles. Runners at the University of Oregon almost never do—with the blessing of their coach.

Bill Bowerman says, “Overracing can cause the same complications as overtraining. Because of this, Oregon runners seldom run two races in the same meet. A runner like Steve Prefontaine is capable of doubling very well. But I think a fellow who tries to carry the whole load is doing a disservice to another who might want an opportunity. He not only is denying this other fellow an opportunity to win the pot, but he himself is going to reach the point where he says, ‘Oh my gosh, here I go again—two races.’ It takes a lot of the joy out of it.”

That's a factor, and it's related to another—physical recovery. One-hundred-yard sprinters recover in a matter of minutes. They can run repeatedly, as long as they don't go too far. But as distance grows, so does the problem. Physiologist Rodolfo Margaria has found that, “A trained runner sprinting 400 meters at top speed will finish the race with a state of acidosis that will require a rest of at least an hour and a half for recovery.”

Many meets don't last more than 1½ hours. So two races for a quarter-miler would be maximum. Time limits obviously preclude full recovery for anyone at longer distances. Yet runners do miles and halves, or miles and two-miles within an hour.

It is practically impossible for a runner to do his best in races above a quarter-mile if his energy and attention are divided. Repeated runs without adequate recovery are a severe drain on stamina and spirit without a corresponding return from performances. Few runners thrive on a lot of mediocre yet exhausting races.

Ironically, in the long run the team suffers along with the individual.

The word “veteran” is a fading phrase, seldom applicable any more to the runners at the top. At the same time, there has been a new phenomenon—the One-Year Wonder.

These two trends are related. The odds against getting to the highest levels of running are increasing. The stakes are higher and so are the effort and luck needed to get there. Once there, the stay at the top isn't a very long and secure one.

Think how many runners there are in the world—several million, maybe. Then realize what an infinitesimal percentage of them ever reach, say, the top 10 in their event.

We followed the progress, or lack of it, of world-ranked athletes over a five-year period (1967-71). From year to year, the turnover rate on the *Track & Field News* lists was 53.3%. What this means is that each year at least half the runners disappeared from the top 10, never to return. (In post-Olympic 1969, the percentage shot up to 72%.)

The typical life-span at the top is one year. About 57% of the individuals spent only one season on the list. A total of 83% were at the top for two

seasons or less. A mere six runners were able to spread themselves over the entire period: Edwin Roberts (200 meters), Lee Evans (400m), Kipchoge Keino (1500m), Jurgen Haase (10,000m), Akio Usami (marathon) and Willie Davenport (high hurdles).

American marathoners show similar turnover rates. Only 42% of the runners who broke 2:30 in 1970 could run that fast again the next year.

There are many reasons for the relatively quick rises and fades of leading runners. The main one, however, seems to be this: the effort that gets them this far is so demanding that it's hard to sustain over long periods. (Secondarily, the mentality that pushes a man to the limits won't let him settle for anything less than that. Once he starts slipping, good-bye running.)

One road runner of modest ability makes this observation: "You have to look at your career as if it's a race, then pace yourself accordingly. If you're planning to run indefinitely, you don't blow everything by sprinting the first mile. You find a pace you can comfortably carry all the way. One year to me is like the first mile of a marathon, and I have to be careful not to go out too fast."

HOW MUCH IS TOO MUCH?

Tom Osler puts it straight.

“While sprinting, and running long distances at an easy speed, are natural activities for man, racing long distances is not. One could appropriately describe participation in long distance racing as an act of self-abuse. Thus, the runner must consider carefully the frequency he will engage in this unnatural activity. He must also take special precautions to see that his body recovers from racing as quickly as possible.”

Osler, a former national champion road racer, effectively outlined the Overwork-Injury-Disinterest-Early Retirement Syndrome in his booklet, *The Conditioning of Long Distance Runners*.

Too much racing tears the runner down, Osler says. But he isn't discouraging racing. He also says one must run at race-pace rather frequently if he is to race most effectively. It's a question of proportions. The obvious next question is, “How much is enough, and how much is too much? Where do we draw the line?”

The answer to that isn't definite. But by reviewing general principles of racing and training, perhaps we can distill a workable general theory.

The principles:

1. Every all-out effort over full racing distance must be backed by far bigger portions of sub-maximal work—either fast runs at shorter distances, or slow runs at longer distances.
2. The shorter the racing distance, the more often you can race it—and more often you must race it to maintain speed or “sharpness.” Recovery is quick.
3. The longer the racing distance, the less frequently you can run it—or need to run it. Recovery slows.
4. To a point, increased training loads improve recovery rates. The more you train, the more often you can race.
5. It is better to err on the side of too little racing than to race too much. With too little, the penalty is unsharpness—which can be corrected fairly easily. With too much, physical and psychic breakdowns can occur—and these aren't so easily remedied.

Two of the leading thinkers in running, Arthur Lydiard of New Zealand and Ernst Van Aaken of West Germany, offer possible formulas for balancing racing output with training input. Both rely somewhat on the five principles.

Lydiard says, “Ninety per cent (of the total work) should be distance, with 10% speed. Speed is important, to be sure, but it is a supplement that sharpens endurance.” We can take “distance” to mean basic, sub-maximal work in this instance; “speed” means the all-out, race-like efforts. His ideal ratio is 9:1—nine parts training to one part racing.

Van Aaken, a notably cautious man when it comes to applying speed, says, “The length of endurance distances in relation to the total of tempo (racing pace) distance is between 20:1 and 40:1.” So he thinks race-type efforts should make up only 2-5% of the total.

Using the recommendations of these two coaches, the “ideal” percent-

tage of racing (in relation to total running) appears to be no more than about 10% and no less than 2%. We're not quoting these figures as gospel. But they are a starting point in applying the five principles of racing.

- **Principle One:** Surprisingly, the ratio seems to stay constant for different racing distances, mileage levels and abilities. That's because it is self-adjusting. For instance, a man training 10 miles a week is allowed fewer races than one doing 100. A sprinter does more races, more frequently, to reach his "quota," but he does no more total fast work than a distance man.

- **Principle Two:** Sprinters need more races than distance men do. But because the races are shorter, they're able to race more often. In fact, they must—just to race away 2-10% of the total running load. Say a 440 man is running 10 miles a week. He needs from one to four hard quarters a week, theoretically, just to maintain sharpness. A 100 man may need up to 18 hundreds a week. However, these aren't so demanding that he can't bounce back quickly.

- **Principle Three:** In the middle and long distances, races are more tiring. They are of necessity fewer and farther between. But here again, the ratio self-adjusts. A miler running 50 miles a week can, in theory, get minimum speed from one hard mile a week. A six-miler doing similar training needs a race as little as every six weeks.

- **Principle Four:** High-mileage training speeds recovery rates, and the more a man trains (within reason) the more often he should be able to race. This again fits in with the theory of the 2-10% formula. A marathoner going 100 miles a week may race four a year, while a man doing half that much mileage may only be able to handle two of them.

- **Principle Five:** The ratios may appear conservative. They aren't. It is a rare and strong runner indeed who can maintain the 10% figure for an extended period of time. Imagine a 10-mile-a-week 100-yard sprinter doing 18 such dashes, week after week; or a 50-mile-a-week miler racing a mile every day or two; or a 100-mile-a-week marathoner racing that far every third week.

Now that we have a neat sounding formula (summarized in the accompanying chart), several qualifications are called for. No formula can apply perfectly to all runners, all the time.

First, not all race-type work is in racing itself. Some of it is disguised as training, though it involves the same stresses as racing. Take this into account when figuring your own best racing-training balance.

Second, racing stresses are specific. You don't get marathon stresses in a 100-yard dash, or vice versa. Carryover benefits apparently come only from those races which are roughly half to twice the main distance. Example: If you're a miler, you can profit by racing an 880 or two-miles, but there's less value in races shorter or longer.

Third, the 2-10% figures are estimated averages. They are nothing more than educated guesses—rough approximations. Every week of every season won't be and shouldn't be right on these percentages.

No runner should let himself be run by a formula, particularly one as tenuous as this. This is simply a start at locating the point between "too little" and "too much"—where the runner races best, and abuses himself least.

SUGGESTED RACING FREQUENCY

This chart is based on a minimum of 2% race-type running, and a maximum of 10%. Racing distances are listed vertically; total weekly mileage is shown along the top (with the weekly racing "quota"—2-10%—converted below). For instance, a 50-mile-a-week runner can handle about 1-5 race-type miles weekly. By matching your racing distance and weekly mileage, you can find recommendations for minimum and maximum racing frequency. Example: A miler running 100-miles a week can safely race as often as every 1-3 days. (Note that a sprinter may need to average more than one "race" a day to get his suggested total.)

Distance Raced	10 miles (0.2-1.0)	25 miles (0.5-2.5)	50 miles (1.0-5.0)	75 miles (1.5-7.5)	100 miles (2.0-10.0)	125 miles (2.5-12.5)	150 miles (3.0-15.0)
100	1-2 days	1 day					
220	1-3 days	1-2 days					
440	2-7 days	1-3 days	1-2 days				
880	3-17 days	1-7 days	1-3 days	1-2 days	1-2 days	1-2 days	1-2 days
Mile	1-5 weeks	3-14 days	1-7 days	1-4 days	1-3 days	1-2 days	1-4 days
2 miles	2-10 weeks	1-4 weeks	3-14 days	2-10 days	1-7 days	1-5 days	1-4 days
3 miles	3-15 weeks	1-6 weeks	4-21 days	3-14 days	2-10 days	2-8 days	2-7 days
6 miles	6-30 weeks	2-12 weeks	1-6 weeks	5-28 days	4-21 days	3-16 days	3-14 days
10 miles		4-20 weeks	2-10 weeks	2-7 weeks	1-5 weeks	1-4 weeks	1-3 weeks
15 miles		6-30 weeks	3-15 weeks	2-10 weeks	2-8 weeks	1-6 weeks	1-5 weeks
20 miles			4-20 weeks	3-13 weeks	2-10 weeks	2-8 weeks	2-7 weeks
Marathon			5-26 weeks	3-18 weeks	3-13 weeks	2-10 weeks	2-9 weeks
50 miles					5-25 weeks	4-20 weeks	3-17 weeks
100 miles					10-50 weeks	8-40 weeks	7-33 weeks

A CASE OF OVERRACING

After 15 years of almost continuous racing and training, Lee Dorsey has learned a lot about running, and has lost most of his illusions about himself as a runner.

He knows his long history as a racer is unspectacular, that he has even less to crow about now, and that the future doesn't promise much change. But Lee also knows exactly where he has been, where he is, and where he wants to go. We should all be so lucky.

Lee Dorsey isn't his real name. He is no more modest than the next runner when it comes to talking about himself and his experiences. But the only way we could get him to expose his ideas in print was with the promise of anonymity.

He reasons, "Nobody who reads it will know who I am, or care. That doesn't matter to me. They don't need to know me. I want them to read these things as they might apply to *them*, not as they happened to me."

Lee is a Californian (by way of various points east of there) in his early 30s. By profession, he's a statistician, and his running records show the same care he gives to his job. Every workout, every race time and place, every split is there in his 15 notebooks—one for each year of running. Year for year, he's as experienced as any runner in the country.

Dorsey appears to approach his running as a rational scientist—except in one significant respect. He has a blind spot when it comes to racing. He can't stay away from them. In all, Lee has run over 500—at distances as short as 100 yards and as long as 100 kilometers. For several years, he was averaging almost a race a week, year round.

This racing mania has caused Lee no end of trouble. His legs bear the scars of overindulgence. He realized in the mid-1960s that he had to slow down his training or he'd wreck his legs. He practiced LSD (long slow distance) long before the published prophets of this concept had issued booklets.

Self-preservation drove him to this conclusion about training. It took him longer to complete a similar lesson about racing. Pain finally was the catalyst there, too. Independently, Dorsey reached many of the same conclusions about race pace and frequency that this booklet does.

"Pain burned one lesson into me right at the start," Lee says. "This was in 1957. I was a freshman in high school and had enough confidence to take on Herb Elliott. I had been running a slow mile each day for two weeks, and I figured I was ready to race that distance."

It was a small invitational meet in Missouri. Lee imagined he had a chance to place, and lay awake the night before thinking that maybe, just maybe, he could win it.

"My dreams came down hard," he recalls. At the start, the big boys tossed him around from elbow to elbow like a dead leaf in a hurricane, then dumped him near the rear of the pack. He struggled along in their wake. Before a lap was gone, he was breathing in short, hot, desperate gasps.

At the 440, a faraway voice cut through young Dorsey's descending curtain of pain and self-pity. It said, "70." Seventy seconds was a flat-out quarter for him at that time.

"I ran through the next bend, only to get clear of the crowd. Then I stopped. For all I cared, I was stopping running for good. My pride hurt worse than my legs and lungs, and they hurt pretty bad."

Lee's coach jogged up. He couldn't look the coach in the eye. He hung his head, hoping he wouldn't start blubbering.

"What's wrong?" the coach asked, more with concern than scorn.

"I...I just can't run that fast," Lee said, still not able to look up.

Then Dorsey had to face his older brother, a non-distance man but a keen student of the sport. He wouldn't be so easy on Lee. He gave Lee a hard look.

"I guess I wasn't meant to be a miler," Lee told him, trying to smile but only grimacing.

"Quit feeling sorry for yourself," the older Dorsey said with brotherly directness. "There's nothing wrong with you that a little pacing won't fix. You were stupid to start that fast, and you deserved what you got. Next time, hold back and run your own race. You may not start as well, but at least you'll finish the damn thing."

He had said the right things. "I knew then," Lee says now, "that there would be a next time, and how I'd be running."

There have been hundreds of "next times" since 1957, and Dorsey is still pacing them all the same way—holding back at the start and running his own race. He doesn't run many fast races perhaps, but he seldom blows one, either.

He learned the hard way that imprudent pace *during* a race kills quickly. That became obvious in race number one. But just recently, 15 years later at race number 500-something, he found out that pacing *between* races is at least as important. Starting too often kills more subtly than starting too fast, but the damage is just as sure.

Lee also learned this the hard way.

"What I'm talking about," Dorsey says, "is racing too much and too hard, without taking enough recovery/rebuilding running in between."

Now Lee digs into his statistical lists, which he has been itching to show off.

"Look at this," he says, pointing to neatly ruled charts. "The last four years break into distinct two-year periods. The years 1968-69 were best for racing. I was setting personal records nearly every time I ran, over distances as short as a mile and as long as 20 miles.

"But then I went on an incredible two-year racing binge, marked by frequent illness and injury, and generally disappointing racing. Finally, my legs rebelled and brought me to a limping halt."

While nursing the most serious leg injury he'd ever encountered (it forced his longest raceless period ever—over three months), Dorsey started making mental connections. He read what three of his training-theory heroes were writing.

"I noticed Arthur Lydiard said that not more than 10% of running should be at racing pace. Ernst Van Aaken was even more conservative. He put the figure at 2-5%. Tom Osler said overracing is a form of 'self-abuse.' Well, my medical history from the last two years was proof that I was abusing

myself somehow. I figured out my racing percentages for the last four years.”

Lee leafs through his notebook and pulls out another chart. He says the figures are “revealing.” He explains that he runs right at 200 LSD miles a month, every month. That doesn’t vary. What has varied are his total number of racing miles, his percentage of racing mileage, and his average racing distance. With an uncharacteristic dramatic flourish, Dorsey says, “They have escalated dangerously.”

The chart:

Year	Miles/Mo.	% of Total	Races/Mo.	Ave. Race
1968	16.9	8.4%	1.9	8.9 miles
1969	16.8	8.4%	1.5	12.5 miles
1970	37.8	18.9%	2.5	15.1 miles
1971*	42.3	21.1%	2.4	17.6 miles

(* = only first 10 months; no racing in November and December)

“The unavoidable conclusion,” Lee says, “is that I seem to race best when I race least—or at least less than 10% of my total running miles. When I get above 10%, I seem to undermine not only my racing ability, but good health itself. No telling what would happen if I took races as sparingly as Van Aaken recommends (2-5%). I’ve never been that low. That hasn’t been my problem.”

Looking back, Dorsey sees that the very best races of the good period came between May 1968 and June 1969. By accident, not design, the racing ratio then was below 8%—his lowest ever. “It was a heady time,” he recalls. “For the first time in my life, I was running fast without really trying.”

It wasn’t meant to last. The fast period ended with an achilles tendon injury (“from bad judgment, not overracing”). When that healed, racing mileage spiralled.

“In September, I raced my heaviest ever. In October, I came down with severe bronchitis. The lesson was lost to me. Racing mileage really jumped in 1970. Combining the Lydiard, Van Aaken and Osler formulas, I figure 20 miles a month is my absolute limit. If I go over that in a particular month—say I try a marathon—I need to compensate by lightening the next one.”

He didn’t. He raced more often, and the races were longer than ever. He demanded more recovery but was getting less. Between December 1969 (post-bronchitis) and October 1971 (pre-leg injury), there were 23 months. All but four of them contained “too much” racing.

“Knowing what I do now,” Lee says, “some of the percentages show incredible stupidity. One month hit 50%, another was over 40%, and another topped 30%. In all, 10 months had 40 or more miles of racing—or double my theoretical limit. I was racing like hell and not really getting anywhere.”

When a 50-mile racing month injured Lee in October 1971, it may have put him out of as much misery as it created.

“It has taken a long time,” Dorsey sighs, “but I’ve finally learned the second half of the lesson about racing pace. I’ve known my speed limits *during* races. Now I know the time limits *between* them. It only took 15 years, 50 races, and uncounted ailments to put the two pieces together.”

He pauses and sighs again, “I hope it’s not too late.”

Chapter Four

Comparing Times



At any distance or in any language, one of the first things runners talk about after they finish is their times. These sprinters are saying it in German. (Tony Duffy photo)

PURDY SCORING TABLES

A nice thing about running times is their mathematical perfection. Combine a mathematician with a set of running times, add a computer to sift through the data, and he can come up with formulas that have practical value to all runners—number-oriented or not.

Gerry Purdy did this. It isn't necessary to know that he spent nearly five years researching and working up the right program for his computer, or exactly what the program involves. For our purposes, you can take it on faith that he worked his butt off to make sure it was mathematically and athletically correct.

Purdy is a Ph.D. in computer science. He is also a distance runner. In 1970, he and Jim Gardner combined their profession with their hobby to produce the book, *Computerized Running Training Programs*. Gerry now works in Kenneth Cooper's Aerobics Institute in Dallas, where he's computerizing the results of Dr. Cooper's testing.

Purdy's driving interest is in track and field scoring tables, such as the type used in the decathlon. He claims the official IAAF tables (as well as the much-quoted Portuguese charts) are inaccurate. He says they don't give correct comparisons of performances, they don't give proper weight to varying performance levels within an event, and almost all long distance events are excluded.

Purdy designed a better scoring table. Just the tiniest sampling of his work is in the charts on the next three pages. His full track and field point tables—100 events broken down point-by-point from 1600 to 1—would fill a dozen booklets this size.

At any rate, this is the first time any of Purdy's final work has been published—and the first time scoring tables of any kind for many of the long events have appeared in print.

The tables are based on a simple physiological principle: runners slow down at a regular and predictable rate as distances increase; this slowdown rate can easily be plotted on a graph.

The scoring tables have two practical applications for the runner:

- **Relative ranking of times.** You can see immediately how your times rate alongside the times of other runners, event by event.
- **Identifying best events.** Just check the distance or distances in which you score highest.

The 20 men's events here and 10 for women are listed in 50-point increments. To get a finer breakdown of point levels, you'll need to interpolate. (There wasn't room for the metric track distances. To convert marks, subtract about one second from 100-meter marks; add 0.1-0.2 to 200 meters; add 0.3-0.5 to 400 meters; add 0.7-1.0 to 800 meters; add 17-20 to 1500 meters; add 35-40 to 3000 meters; subtract 25-30 from 5000 meters; subtract 60-70 from 10,000 meters.)

POINTS	100Y	220Y	440Y	880Y	MILE	2 MILES	3 MILES	120y HH	440Y IH	STEEPLE
1200	9.14	20.15	45.15	1:44.5	3:53.8	8:18.2	12:51.4	13.35	49.5	8:24.6
1150	9.20	20.27	45.45	1:45.1	3:55.2	8:21.0	12:56.0	13.43	49.8	8:27.4
1100	9.26	20.41	45.75	1:45.8	3:56.6	8:24.2	13:01.0	13.51	50.1	8:30.4
1050	9.33	20.55	46.05	1:46.5	3:58.2	8:27.6	13:06.4	13.60	50.45	8:33.0
1000	9.40	20.71	46.4	1:47.2	3:59.9	8:31.2	13:12.2	13.70	50.8	8:37.2
950	9.48	20.89	46.8	1:48.1	4:01.7	8:35.2	13:18.6	13.81	51.2	8:41.0
900	9.56	21.08	47.2	1:49.0	4:03.7	8:39.8	13:25.8	13.93	51.65	8:45.2
850	9.66	21.29	47.6	1:50.0	4:05.9	8:44.6	13:33.8	14.06	52.1	8:49.8
800	9.76	21.52	48.1	1:51.1	4:08.4	8:50.2	13:42.8	14.20	52.7	8:54.8
750	9.88	21.79	48.7	1:52.3	4:11.1	8:56.6	13:53.0	14.37	53.3	9:00.6
700	10.02	22.09	49.3	1:53.7	4:14.3	9:03.8	14:04.8	14.55	54.0	9:07.0
650	10.17	22.44	50.1	1:55.3	4:17.9	9:12.2	14:18.8	14.76	54.7	9:14.2
600	10.35	22.85	50.9	1:57.1	4:22.0	9:22.4	14:35.4	15.01	55.7	9:22.8
550	10.56	23.34	51.9	1:59.3	4:27.0	9:34.6	14:55.8	15.30	56.7	9:33.0
500	10.83	23.94	53.2	2:01.9	4:33.0	9:49.8	15:21.2	15.66	58.1	9:45.0
450	11.15	24.69	54.7	2:05.1	4:40.6	10:09.2	15:54.0	16.10	59.7	10:00.0
400	11.58	25.68	56.7	2:09.2	4:50.2	10:34.8	16:36.8	16.67	1:01.9	10:19.2
350	12.15	27.04	59.3	2:14.7	5:03.1	11:09.2	17:33.8	17.45	1:04.7	10:44.2
300	12.96	28.96	1:03.0	2:22.2	5:21.0	11:56.0	18:49.8	18.53	1:08.7	11:18.6
250	14.15	31.79	1:08.5	2:33.0	5:46.5	12:59.4	20:29.8	20.12	1:14.6	12:06.8
200	15.97	36.01	1:16.7	2:49.4	6:23.4	14:24.4	22:39.6	22.49	1:23.3	13:15.2
150	18.77	42.38	1:29.2	3:14.3	7:16.5	16:16.8	25:27.8	26.01	1:36.3	14:52.4
100	23.18	52.22	1:48.7	3:52.8	8:33.2	18:48.2	29:09.0	31.35	1:55.8	17:09.4
50	30.69	1:08.64	2:20.9	4:54.4	10:27.5	22:18.8	34:08.6	39.82	2:26.8	20:26.2

MEN

POINTS	6 MILES	15 KMS.	10 MILES	20 KMS.	15 MILES	25 KMS.	30 KMS.	20 MILES	MARA.
1200	26:58.4	42:53.8	46:11.6	58:05.6	1:10:56.8	1:13:38.8	1:29:35.8	1:36:42.0	2:10:08.0
1150	27:09.0	43:12.4	46:32.0	58:33.0	1:11:32.8	1:14:17.0	1:30:25.8	1:37:37.6	2:11:32.8
1100	27:20.2	43:32.2	46:53.8	59:02.6	1:12:11.6	1:14:57.8	1:31:19.4	1:38:37.2	2:13:03.0
1050	27:32.4	43:53.8	47:17.4	59:34.6	1:12:53.2	1:15:41.6	1:32:16.6	1:39:40.8	2:14:39.4
1000	27:45.6	44:17.0	45:43.0	1:00:09.0	1:13:38.2	1:16:28.8	1:33:18.4	1:40:49.4	2:20:13.0
950	28:00.2	44:42.4	48:10.8	1:00:46.4	1:14:26.8	1:17:20.0	1:34:25.0	1:42:03.2	2:18:13.6
900	28:16.2	45:10.2	48:41.4	1:01:27.2	1:15:20.0	1:18:15.6	1:35:37.4	1:43:23.4	2:20:13.0
850	28:34.0	45:40.8	49:15.0	1:02:12.0	1:16:18.0	1:19:16.6	1:36:56.2	1:44:50.6	2:22:22.6
800	28:54.0	46:15.0	49:52.4	1:03:01.6	1:17:22.0	1:20:23.8	1:38:22.8	1:46:26.2	2:24:43.4
750	29:16.6	46:53.2	50:34.2	1:03:57.0	1:18:33.0	1:21:38.0	1:39:58.2	1:48:11.4	2:27:17.4
700	29:42.4	47:36.4	51:21.4	1:04:59.0	1:19:52.2	1:23:01.2	1:41:44.4	1:50:08.8	2:30:06.8
650	30:12.4	48:25.8	52:15.2	1:06:09.4	1:21:21.8	1:24:34.8	1:43:43.2	1:52:18.4	2:33:14.6
600	30:47.8	49:23.2	53:17.6	1:07:30.2	1:23:03.8	1:26:21.2	1:45:57.4	1:54:45.4	2:36:44.2
550	31:30.0	50:30.6	54:30.6	1:09:04.0	1:25:01.4	1:28:24.0	1:48:31.0	1:57:33.0	2:40:40.2
500	32:21.8	51:51.2	55:57.8	1:10:54.8	1:27:19.0	1:30:47.2	1:51:28.6	2:00:46.0	2:45:09.0
450	33:26.6	53:29.4	57:43.8	1:13:07.8	1:30:02.4	1:33:36.8	1:54:57.0	2:04:31.8	2:50:18.6
400	34:49.4	55:32.0	59:55.4	1:15:50.8	1:33:02.2	1:37:20.0	1:59:06.0	2:09:00.4	2:56:21.2
350	36:37.6	58:08.6	1:02:42.8	1:19:15.2	1:37:25.2	1:41:15.4	2:04:09.8	2:14:26.6	3:03:33.2
300	39:01.0	1:01:33.6	1:06:21.0	1:23:38.4	1:42:36.6	1:46:36.8	2:10:29.8	2:21:12.6	3:12:20.2
250	42:11.6	1:06:07.6	1:11:12.0	1:29:26.6	1:49:24.6	1:53:36.8	2:18:40.6	2:29:54.8	3:23:22.8
200	46:24.2	1:12:20.2	1:17:47.8	1:37:20.8	1:58:37.6	2:03:05.6	2:29:39.4	2:41:31.8	3:37:50.0
150	51:58.4	1:20:53.0	1:26:54.2	1:48:24.8	2:11:36.8	2:16:27.8	2:45:08.2	2:57:52.0	3:57:51.4
100	59:25.0	1:32:49.2	1:39:41.6	2:04:21.8	2:30:42.6	2:36:12.4	3:08:22.0	3:22:31.4	4:28:04.2
50	1:09:37.0	1:49:57.6	1:58:10.6	2:28:14.0	3:00:18.8	3:07:04.0	3:46:13.4	4:03:26.2	5:20:47.4

MEN

POINTS	100Y	220Y	440Y	880Y	1500M	MILE	2 MILES	100M H	200M H	MARA.
1200	10.33	23.15	53.15	2:03.2	4:16.5	4:38.2	10:08.0	13.45	27.16	2:34:30
1150	10.39	23.29	53.35	2:03.9	4:17.8	4:39.6	10:11.6	13.53	27.31	2:36:45
1100	10.46	23.44	53.7	2:04.6	4:19.3	4:41.2	10:15.4	13.61	27.48	2:39:15
1050	10.53	23.60	54.0	2:05.4	4:20.9	4:42.9	10:19.4	13.70	27.66	2:41:45
1000	10.61	23.77	54.4	2:06.3	4:22.6	4:44.8	10:23.8	13.80	27.85	2:44:30
950	10.69	23.97	54.8	2:07.2	4:24.4	4:46.8	10:28.8	13.90	28.06	2:47:15
900	10.79	24.18	55.3	2:08.2	4:26.5	4:49.1	10:34.2	14.02	28.29	2:50:30
850	10.89	24.41	55.8	2:09.3	4:28.7	4:51.5	10:40.2	14.14	28.55	2:53:45
800	11.00	24.66	56.3	2:10.5	4:31.3	4:54.3	10:47.0	14.28	28.83	2:57:15
750	11.13	24.95	57.0	2:11.9	4:34.1	4:57.4	10:54.8	14.44	29.15	3:01:00
700	11.28	25.28	57.7	2:13.4	4:37.3	5:00.9	11:03.8	14.62	29.50	3:05:15
650	11.44	25.66	58.5	2:15.2	4:41.0	5:04.9	11:14.2	14.82	29.92	3:09:30
600	11.64	26.11	59.4	2:17.2	4:45.4	5:09.7	11:26.6	15.06	30.40	3:14:30
550	11.87	26.64	1:00.5	2:19.6	4:50.5	5:15.4	11:41.6	15.34	30.96	3:19:45
500	12.15	27.29	1:01.8	2:22.5	4:56.8	5:22.4	12:00.0	15.69	31.65	3:25:45
450	12.50	28.10	1:03.5	2:26.0	5:04.8	5:31.1	12:23.6	16.12	32.51	3:32:30
400	12.95	29.16	1:05.6	2:30.5	5:15.0	5:42.5	12:53.6	16.67	33.62	3:40:00
350	13.56	30.60	1:08.4	2:36.5	5:28.7	5:57.7	13:33.0	17.41	35.11	3:48:30
300	14.41	32.63	1:12.3	2:44.7	5:47.6	6:18.5	14:24.0	18.45	37.19	3:58:30
250	15.67	35.59	1:18.0	2:56.5	6:13.9	6:47.4	15:29.8	19.95	40.19	4:10:30
200	17.56	39.99	1:26.4	3:13.9	6:50.4	7:27.1	16:53.0	22.17	44.62	4:25:30
150	20.43	46.51	1:39.2	3:39.4	7:40.0	8:20.4	18:37.8	25.44	51.14	4:44:00
100	24.87	56.37	1:58.4	4:17.0	8:47.4	9:32.2	20:50.6	30.28	60.74	not
50	32.14	72.14	2:28.8	5:13.4	10:20.6	11:10.5	23:41.4	37.74	75.46	computed

COMPUTING POTENTIAL

The Purdy Tables have the world's best performances—actual and projected—as their foundation. Mathematically and with the computer's help, Purdy extracted a curve that shows the optimum rate of slowdown as distances increase. The point tables, based on the curved line on a graph, allow any runner to compare himself with the world's best runners.

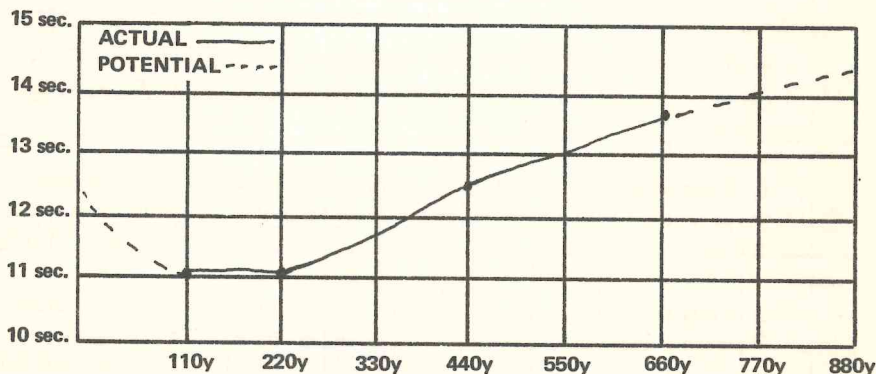
Another type of chart is far simpler, less scientific, but perhaps more valuable to the individual using it. This is a graph which helps a runner measure his own marks. It is also based on a curved line on a graph.

You don't need a mass of marks or a computer to construct this one. All you need are your best times. There are more exotic "Potential Charts," but the one described here is the simplest to make.

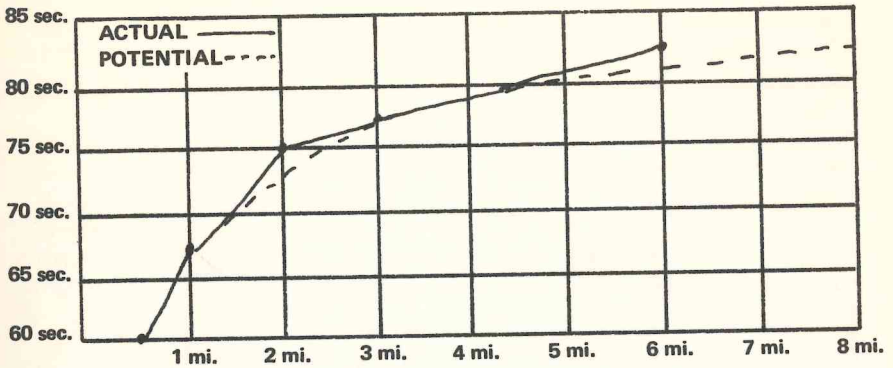
Follow these steps:

- List your best times for all distances.
- If you're a sprinter (100-660 yards), figure average times for each 110 yards of each race. If you're a middle distance runner (half to six miles), use 440-yard times. If you specialize in long distance (above six miles), average out mile times. Metric distances—100m, 400m, or 1000m—can be substituted.
- On graph paper, list pace per 110, 440 or mile on the vertical scale. List racing distances horizontally.
- Plot the pace per 110, 440 or mile at each of the distances.
- Connect the dots with straight lines. (This line, probably a ragged one, is your *actual performance line*. It alone isn't too valuable.)
- Several low points along the line will stand out. Find them (at least three; the more the better) and connect them to form a smooth, sweeping line. This is your *potential curve*.
- Mark all racing distances along the curve.

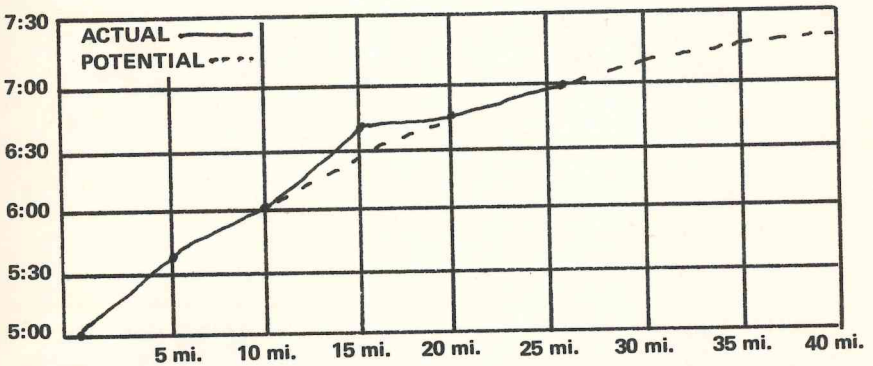
SPRINTER—The sprint curve is distorted by the start, which slows the short races somewhat, in relation to slightly longer ones. The sprinter charted here has best times of 11.0 for 110 yards (10.0 hundred plus one second), 22.0 for 220, 50.0 for 440, and 1:22.0 for 660.



MIDDLE DISTANCE RUNNER—This runner has best performances of 2:00 for 880 yards, 4:30 for the mile, 10:00 for two miles, 15:30 for three miles, and 33:00 for six miles.



LONG DISTANCE RUNNER—This runner's best times are 5:00 for the mile, 28:00 for five miles, 1:00 for 10, 1:40 for 15, 2:15 for 20, and 3:03 for the marathon.



- Figure potential times, as needed, by multiplying the pace times the distance.

- Make adjustments to the chart when new personal bests are set.

On the next page are sample charts for a sprinter, middle distance runner and long distance runner.

Such graphs have two main values:

1. They help you compare your marks at different distances—actual times vs. potential times—and they're particularly useful in finding how an "odd-distance" performance rates. Say you run 8.4 miles. What's a good time for 8.4 miles? The graph can tell you instantly.

2. They tell current capabilities. No runner runs his best time in every race. That isn't necessary. Say you're not completely fit. You run a mile averaging 70 seconds per quarter. You know from the chart that your normal

slowdown between a mile and two miles is 10 seconds per lap. So add 70 and 10, and figure you'll average 80 seconds a lap for two miles. Regardless of your condition, time differentials between events don't change much. Use them as a guide.



When runners race at 800 meters on the international level, as these are, abundant natural speed at the shorter distances is essential. All these women are good 200 and 400 runners as well. (Shearman)

RACING SPEED LIMITS

It is an oversimplification to say that the faster a runner is in the short distances, the better he will be in the long ones. And it is just as wrong to think that a runner can improve indefinitely, regardless of his basic speed.

Carrying these ideas to extremes, we could assume that Lee Evans has the potential to be the world's greatest marathoner. In fact, Evans has been known to tie up dramatically even when he steps up from a quarter- to a half-mile. Training background and body build regulate the use of speed over distance. The best sprinters in the world may have no more natural endurance than the man on the street.

It's just as illogical to think that a miler with a best quarter of 60 seconds could put four such times back to back for a four-minute mile. Physiology stands in the way.

There is always going to be a slowing of pace when going from short distances to long ones. This spread can be a valuable indicator of an individual's endurance: the lower the spread, the better his endurance. It is also his individual "speed limit," indicating how fast he can realistically hope to go at longer distances. The spread can only go so low before improvement stops. A wide spread, on the other hand, indicates there is adequate room to improve.

Three basic distances give good indications of potential in longer ones. A sprinter (220-440 yards) should know his 100-meter or 110-yard time—adding a second to his 100-yard mark gives a close enough approximation. Basis for half-mile and mile speed is the 440. The mile is a guide for all the longer races.

These "test distances" take into account the kind of speed used in the runner's specialty. A sprinter finds his limits in the all-out speed of a hundred. The half-miler/miler employs the more controlled speed of the 440. The longer distance runner needs the endurance-speed of the mile.

Applying these test distances to leading runners, we can find a set of speed limits. In short, no runner is likely to register slowdowns smaller than these.

- 220 yards—110 average equal to best 110 time.
- 440 yards—110 average one second slower than best 110 time.
- 880 yards—440 average five seconds slower than best 440 time.
- One mile—440 average 10 seconds slower than best 440 time.
- Two miles—mile average 15 seconds slower than best mile time.
- Three miles—mile average 20 seconds slower than best mile time.
- Six miles—mile average 30 seconds slower than best mile time.
- Marathon—mile average one minute slower than best mile time.

To end on a positive note, it should be mentioned that few runners ever get this low. And since endurance is easier to improve than speed, there's always hope.

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