new views of

SPEED Training

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CONTENTS

FOREWORD

Speed kills, you say? It doesn't kill literally in the case of distance runners. But with them, the same fast running that builds them up when taken in judicious doses can tear them right back down when carried to extremes. It can kill the sprint in their legs and the spirit in their heads.

But don't blame speed itself for the damage. It's innocent. It's a plaything in the hands of runners and their coaches, to be freely used or abused. When damage is done, blame the extremists who try to carry fast running beyond its (and their) natural limits. The extremists have given speedwork its tarnished image.

There are extremists on both sides of the fence, giving perfectly good training methods bad names. One group says, "All I need is slow running—the more the better." The other feels, "If slow running is good, fast running must be even better." While taking opposite extremes, they both make the same mistake. Slow Joe gets so wrapped up in his LSD that he can't use the endurance he stores up. Fast Freddie ends up going so hard in his training that he drains his endurance rather than storing it. Neither races as well as he could by using a judicious mixture of slow and fast work.

This booklet intends to show just what a "judicious" mixture of slow and fast work entails. In the chapters to come, we'll deal in specifics. But before starting, we want to make one thing clear. There are no inherently bad ways of training. They are no better or worse than what we make of them. Unfortunately, running history is littered with methods that runners have abused, exploited and then discarded as useless—blaming the method instead of themselves.

This is a look at speed training—a close, positive look at speed. We're suggesting practical ways of gaining the speed and sharpness needed in racing, but without the drudgery that too often accompanies fast training. We hate to see any runner suffer needlessly, and there's a lot of needless suffering going on as interval over-trainers go through their daily 20 x 440 ritual as if it were blessed by the Pope. There are better ways—equally effective, less painful and considerably more humane—to gain and maintain racing sharpness. And this, after all, is where training—slow or fast—is supposed to lead.

Speed training need not and should not lead to a heavy drain on physical resources, high danger of injuries, and the discouragement that accompanies both. Running too fast, too often, on too drab a schedule is body- and soul-killing work. What we're trying to do here is remove speed training from the hands of 20-quarters-in-60 extremists. By going fast *sparingly* and with imagination, runners can remove their own speed training from the realm of "necessary torture" and give it the excitement it deserves.

New Views of Speed Training has as its theme the belief that no training—no form of training, *period*—needs to be a drag. This includes speed training. If yours drags you down, something's wrong. Not with speedwork. With the way you're using it.

Chapter One

Facts About Fast Training

Photo by Steve Murdock

THE NEED FOR SPEED

Training for speed. The theme of this booklet says in three words what training is all about—*for speed.* If you aren't training for speed—*i.e.,* for faster racing times—you aren't training. You're merely running—for fun, for health, or whatever. Of course, running alone is perfectly honorable, but it isn't training.

Every training method has an underlying speed emphasis. Even if the training itself is run at a leisurely clip, it has as its intent the development of long-run speed. "Slow now, fast later" is the theory. Fast trainers take a more direct route to this goal. But both routes are known to be effective.

So if you're training and you aren't getting fast, if training seems to be inhibiting speed rather than developing it, your training is defective and needs changing. The change may take one of several directions.

- **Adding speed.** Slow training—the LSD type taken straight—temporarily robs the runner of his racing sharpness. Particularly after long raceless spells, he needs a speed supplement.
- **Reducing speed.** Fast trainers can just as easily go flat by running too much speedwork. They can regain their sharpness by temporarily cutting out fast training.
- **Balancing training.** Few runners go to one extreme or the other—all slow distance, all hard speed. They take some of both. If racing speed slips, they should look carefully at the way the speed and endurance are combined, and rebalance them according to need.

Used properly, fast training makes you faster, slow training does the same, and a wise balance of the two can make you faster yet. Each can be used—and *misused.* It's up to you to analyze the effect on your racing. And the key to your analysis, again, is your racing times—the end product of training efforts.

We've been talking about "speed" and "slow distance" now for several pages. Okay, just how fast is "fast training"?

The term is relative. In this booklet, we aren't talking about all-out sprint speed. We're talking about maximum speed that can be carried through a middle- or long-distance race. Training for speed implies gaining the ability to race along at a fast yet controlled pace level.

Every race, even the marathon, involves some oxygen debt. In other words, the runner demands more air than he can immediately take in. Fred Wilt, the thorough running researcher, has found that every distance race from 800 meters to the marathon creates the same total oxygen debt. Every race involves a debt of approximately 18 liters. But of course a marathoner running for more than two hours takes in a lot more oxygen (about 30 times more) than a half-miler running for two minutes; much more of the debt is repaid en route as the distance increases.

In practical terms, this means that the longer a runner's specialty, the less he needs to do oxygen debt-type training. The scientists call this

"anaerobic" ("without oxygen") work. The longer a runner's racing distance, the higher percentage of "aerobic" (a pace that allows immediate satisfaction of oxygen needs) work he should do.

In simplest terms, speed is an *an*aerobic function; endurance is aerobic. And endurance is proportionally more important than speed as distances increase.

For our purposes in this booklet, "speed" is anaerobic running—running involving an oxygen debt; i.e., which doesn't allow normal conversation while you're running. The degree of oxygen debt depends on the speed of the run. In an all-out 100, for instance, Fred Wilt says there's a 100% oxygen debt. None of the debt is repaid while running, and obviously a man can't go very far in this condition. In a marathon race, the "debt" is only about 2½%—barely noticeable but still signigicant.

Fred Wilt has compiled scientific data on the aerobic-anaerobic components of various distance races—oxygen requirements, oxygen uptake while racing, and oxygen debt. These are potentially valuable aids in determining training emphasis. Note that these oxygen levels refer to world-class performances, and they vary somewhat with speed.

EVENT	TOTAL OXYGEN REQUIREMENT	OXYGEN UPTAKE	OXYGEN DEBT
Marathon (2:15)	763.0 liters (100%)	745 liters (97.5%)	18 liters (2.5%)
10,000m (29:00)	178.0 liters (100%)	160 liters (90%)	18 liters (10%)
5000m (14:00)	90.0 liters (100%)	72 liters (80%)	18 liters (20%)
1500m (3:40)	38.0 liters (100%)	20 liters (52.5%)	18 liters 47.5%
800m (1:45)	27.6 liters (100%)	9.6 liters (33.3%)	18.0 liters (66.7%)
400m (45.0)	22.1 liters (100%)	4.1 liters (18.5%)	18.0 liters (81.5%)
200m (all-out)	20.0 liters (100%)	1 to 2 liters (5-10%)	18-19 liters (90-95%)
100m (all-out)	8 to 10 liters (100%)	0.0 liters (0.0%)	8-10 liters (100%)

Keep in mind that few runners can go faster than seven minutes a mile aerobically, and only extremely talented individuals—Abebe Bikila for one—have been tested at an aerobic pace below six minutes a mile. Speed/anaerobic training, then, covers a vast amount of ground.

Widely printed as his thoughts are, New Zealand coach Arthur Lydiard and his ideas still are misinterpreted. (Later in this booklet, he goes a long way toward dispelling some of the myths surrounding his methods.) Because he recommends slowish road training for a good portion of the year, it's thought Arthur is anti-speed. He definitely isn't. His world record breakers of the early '60s did large quantities of speedwork during the "sharpening" phase of their training.

But Lydiard felt that speed wouldn't do any good unless it was placed on a solid endurance base. Hence the months and months of 100-mile-a-week roadwork preceding the sharpening. To Lydiard, the speed was a supplement—a final touch. Recently Arthur expanded on this idea:

"Most coaches have this training thing completely turned around. They notice that a fellow can't run a mile very fast, so they figure it's speed he has to to work on. That's wrong. Endurance must always come first. The only way to improve speed is first to improve endurance with lots of slow aerobic running.

"Like I said, things in this country (the US) are turned around. Coaches think long distance, marathon-type training is a supplement to speedwork. They think that 90% of the work should be on speed and only 10% on distance. It should be the other way around. Ninety per cent should be distance with 10% speed. Speed is important, to be sure, but it is a supplement that sharpens endurance."

In his 90% endurance, 10% speed ratio, Lydiard was throwing out a rough rule of thumb. He would vary the balance for different events, and for individual runners' needs. But the point remains that aerobic/endurance training should, in his opinion, make up the bulk of the distance athlete's diet, with anaerobic/speed as a final carefully-planned and executed addition.

Lydiard isn't alone. Every training theorist—even the most hardened LSD user—recongnizes the importance of speed. Even the most devoted speeder admits, on the other hand, that his method can be overdone. Several of them besides Lydiard suggest balances between the two types of training.

Ernst Van Aaken, a German doctor/coach who has preached (to an admittedly small congregation) the virtues of slow training since the 1920s, generally agrees with Lydiard. The two haven't collaborated, but they offer similar speed-distance ratios. Van Aaken says, "The length of endurance distances in relation to the total of tempo distances is between 20:1 and 40:1. The tempo distances are generally no faster than racing pace."

When translated into training mileage, this formula might mean that a six-miler training 100 miles a week should do about 2½ to five race-pace miles a week. In Van Aaken's thinking, then, it would appear that a man who races weekly needs no additional speedwork.

Dr. Van Aaken, whose leading pupil is Harald Norpoth (ex-world record holder at 2000 meters), obviously is a conservative on the speedwork question. While knowing its vital role, he only employs a bare minimum, feeling prolonged oxygen debt "suffocates the cells, using up the reserves instead of building endurance." The role of middle and long distance training, he says, is to increase oxygen absorption capacity, nor oxygen debt tolerance. He urges runners to train aerobically, using the small percentage (2½-5%) of speed work only for important yet minimal adaptation to racing rhythm and muscle toughening.

All these formulas, however, gets extremely technical and complicated. Perhaps too complicated for what you're trying to accomplish. Arthur Lydiard, who has spent his career attempting to cut through complicated theories, says, "All the fancy theories in the world aren't going to do you any good unless you have the endurance background. You can't use speed without an endurance base, and endurance comes slowly, with lots of slow running. Speed lets you use your endurance, and it comes quickly."

One final thought along this line. Since speed is a fleeting commodity, coming quickly, it also tends to slip away quickly. A runner will find it extremely difficult to cling to racing sharpness more than a few months. In Fred Wilt's year, intensive speedwork and racing occupy only about half the months. Arthur Lydiard recommends about a three-month speedy period leading to a "peak" race. Tom Osler, a self-made athlete, says in his book, *The Conditioning of Distance Runners:* "One can rarely maintain the high performance level resulting from (sharpening) training for more than three months." But Tom adds that "astonishing inprovement" can be seen in just a few weeks after switching from basic endurance training.

"Base training," Osler says in his excellent description of balancing endurance and speed work, "is like putting money in the bank; sharpening is like taking out the accumulated interest when done properly. When done improperly, it is like draining one's financial reserves."

European 800 champ Yevgeniy Arzhanov (522) trains on Lydiard lines and has 10.4 100-meter speed—a hard combination to beat. (Ed Lacey)

Fred Wilt is a spokesman for the faster group. The editor of *Track Technique* and author of several training books believes strongly in hard and fast training. He says: "It is my opinion that in the case of the middle and long distance runner, regardless of the aerobic and anaerobic requirements of his race, he should include at least some sprinting during most training sessions. Long, slow distance is better than nothing, but it's not nearly as good as long, *fast* distance.

"You should train only to run faster; never train to run slower. If you think you can go out and jog slowly and then race a fast mile, forget it. I believe you have to be fast. Any runner, even a marathoner, who does not do at least a little bit of sprinting is doing himself an injustice."

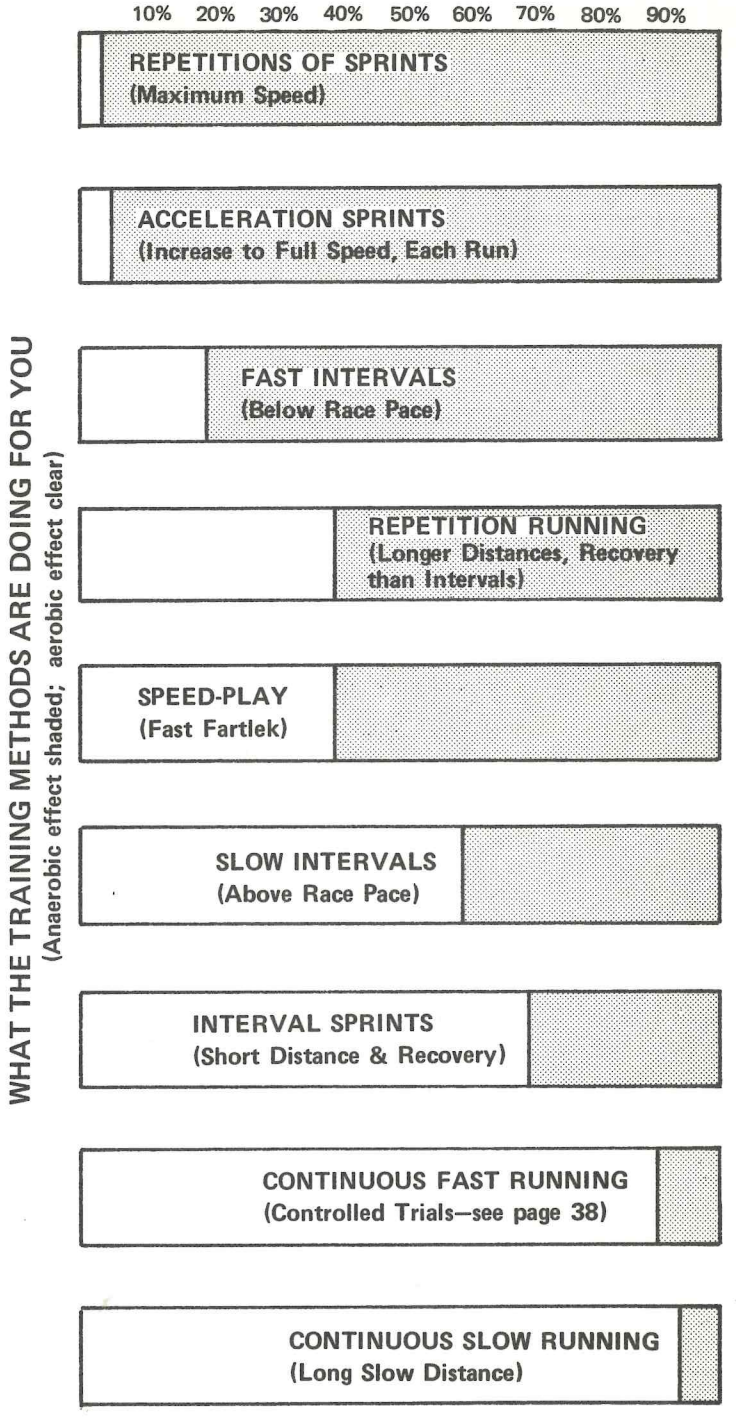
Yet even after these strong words, Wilt adds that no more than 10% of the marathoner's training need be anaerobic. He suggests that the ratio for a six-miler should be 80% aerobic-20% anaerobic; for a three-miler 70-30. Only in the two-mile and lower events does the major emphasis go to speedwork.

Here are recommended degrees of training emphasis, adapted from Fred Wilt's figures.

EVENT	SPEED (Anaerobic)	ENDURANCE (Aerobic)
Marathon	10%	90%
Six Miles/10,000m	20%	80%
Three Miles/5000m	30%	70%
Two Miles/3000m	60%	40%
One Mile/1500m	75%	25%
880 Yards/800m	95%	5%

Wilt has gone even further in his calculations. He says that no type of training is purely aerobic or purely anaerobic. Continuous slow running is only 93% anaerobic. The chart on the next page gives Wilt's speed-endurance breakdowns for nine different styles of training.

Using Wilt's three charts, let's work out a practical training problem. Our runner is a 100-mile-a-week six-miler. Wilt says he should do 20% anaerobic work , or 20 miles a week. His 50 miles of slow distance is worth about three anaerobic miles. A 10-mile slow-interval workout and a similar fast-interval one add 12 more anaerobic miles to the total. And workout-ending sprints add the rest of what Wilt indicates is needed.


WHAT THE TRAINING METHODS ARE DOING FOR YOU
(Anaerobic effect shaded; aerobic effect clear)
10% 20% 30% 40% 50% 60% 70% 80% 90%
REPETITIONS OF SPRINTS
(Maximum Speed)
ACCELERATION SPRINTS
(Increase to Full Speed, Each Run)
FAST INTERVALS
(Below Race Pace)
REPETITION RUNNING
(Longer Distances, Recovery than Intervals)
SPEED-PLAY
(Fast Fartlek)
SLOW INTERVALS
(Above Race Pace)
INTERVAL SPRINTS
(Short Distance & Recovery)
CONTINUOUS FAST RUNNING
(Controlled Trials—see page 38)
CONTINUOUS SLOW RUNNING
(Long Slow Distance)

KNOWING THE LIMITS

The surprising feature of distance running in the early 1970s isn't that it enjoys boom times. The surprising thing is that the sport survives at all. Distance running—a patient, paced activity—is basically out of step with an all-out, impatient society that worships speed, power and explosive excitement above all else.

Football. That's the true American sport, the one that best matches the character of the '70s. It offers long periods of impatient rest broken by brief outbursts of incredible violence. The fans love it because they can identify with it so easily; because long spells of inactivity and brief but furious outbursts of head-knocking speed and enthusiasm match their own life-styles.

American males appreciate the all-or-nothing action on the football field. Violence and speed excite them. But they find it much harder to identify with endurance, perhaps because they display so little endurance in the way they live. They don't spread their efforts over the long haul. They don't pace themselves. They don't enjoy a drawn-out, quiet, patient affair.

Americans, as a people, rely on muscle and speed. They hit hard and fast. This is their forte. But they find it hard to last out a long, quiet struggle.

Our national preoccupation with speed and power is most obvious on the highways, particularly in metropolitan areas. El Camino Real runs the length of the San Francisco Peninsula and passes a few blocks from the *Runner's World* office in Mountain View. It's said nearly every family in the area owns two cars. At five each afternoon, all of them seem to be crowded onto El Camino.

There's beautiful irony in this situation. As the 300 horsepower Fume-Belchers and Crazy-Eights jam up on the streets, their speed potential is useless. A one manpower runner on foot—maximum speed capacity (over a long haul) 10 miles per hour—can outperform the Dreams of Detroit, which have a capacity 10 times greater.

At 5 p.m., any runner foolish enough to endure the bad breath of the automobile can outrun one on a given stretch of El Camino Real. Potential isn't the key. It's how potential is applied. Without opportunity for application, high speed potential is meaningless.

A runner should keep this lesson in mind. Regardless of his capacity for fast racing, he's only as good as his witnessed and recorded performances. "What could have been" ain't worth a damn. Jim Ryuns and George Youngs are walking the streets—well, probably *driving* the streets—of every city in the United States. Potential four-minute-milers and 2:20 marathoners populate every track team. But only a tiny percentage of the street-walkers/drivers ever run at all. Most of those who enter running leave long before they've exploited their potential.

Paradoxically, the dropouts usually leave because they've done too much, too fast. But they actually quit before they've done enough. In

other words, they were too impatient. They didn't recognize that distance running is essentially a pacing exercise; that a career has to be viewed as a long race, effort has to be spread evenly over the years.

Young runners probably always have been impatient for success. They've probably always burned themselves out in the first quarter of their careers, as they do in the first quarter of their mile races. But now, with an ever-higher-speed environment working on them, the temptation to start too fast is even stronger. It's more vital that even to recognize speed limits.

Ken Doherty, author of *Modern Training for Running,* has warned against condemning speed per se. "Increased speed work is easily misused and overemphasized," he says. "But don't blame speed; blame the impatient coach or runner that wants to achieve in a few weeks what requires a few months, and in one year what should take two or three."

How true! Misuse and overuse are the culprits—in any training method, but particularly in speedwork where runners are pushing up closer to their physical limits. A runner has to keep a long-run perspective, sensible proportions, safety and joy in any type of running or he's going to run into trouble. He's going to run into it faster with irrational speedwork.

Recognizing limits is an important part of distance training. Know, for instance, that you've exceeded the limits when running touches on one of the 3-Ds: it's overly draining, discouraging or dangerous. (Training is a process of adapting to stress, and Dr. George Sheehan will discuss that in the article that follows.)

When training, think of yourself as an oversized rubber band. Like the rubber band, the athlete has great stretching capacity. But that potential is wasted when they lie limp and unused. Only when they're stretched (exercised) are they fulfilling their intended roles. The stretching, however, can go too far. When too much pressure pulls in opposite directions. . . snap! True, it takes a lot of stress to break a band or a man, but it happens.

The trick is to find a point of stretch, a level of activity, that holds plenty of resiliency in reserve. When emergencies (as in racing) arise, be able to face them by stretching out some more instead of by snapping.

Overstretching, unfortunately, is an essential part of the American character. We take in with our first gulp of mother's milk such homilies as, "Always do your best," and "If you're going to do it, do it right." (Too often these are translated, "Only the best should do it," and "I won't do it unless I can do it perfectly.")

Maybe this attitude evolves from our restless frontier heritage. We always must be pushing our limits or stepping past them. This may be a great way to "win the west" and "conquer space." But it isn't necessarily the road to contented, long-lasting distance running.

The psychologists have a pretty little word for this trait: self-maximizing. In earthier terms, this means a compulsion to bust your ass—being satisfied with nothing less than the best.

The lucky few who work this way and can walk the stress tightrope successfully are the runners who win Olympic championships and

break world records. These rare exceptions are our models—the standards by which all other runners are judged and after which most try to pattern themselves.

We hear little or nothing about the casualties—the unlucky thousands who've tried to walk the self-maximizing tightrope, only to have the line snap on them before they could get what they wanted from the sport. We should hold them up as models, too—of what *not* to be.

Running doesn't lend itself to ass-busting bursts of work. It's a slower thing, again a matter of pacing. In a single run or a career, anyone—everyone—who goes out too fast is going to pay double for his sins later on. The self-maximizer goes so hard so early that he often can't run when the real running starts.

It's a wise runner indeed who realizes and adheres to his speed limits. Our society, unfortunately, doesn't idolize this cautious-pacing individual. We hold in highest esteem the "pusher"—the businessman who, more likely than not, is pushing himself to an early grave; the athlete who may be pushing himself to an early retirement.

Percy Cerutty, who in his mid-70s is still very much alive, has said there are no rich men, no leaders of men in the graveyard. Only dead men. Neither in retirement, the graveyard of runners, are there any champions. Only ex-runners.

TRAIN WITHOUT PAIN

BY GEORGE SHEEHAN, M.D.

There's no getting around it. Fast running is hard work; the faster it is, the more work. When runners do speedwork, stress factors multiply. It's particularly important during the fast-training phase of his season that the athlete himself (1) recognize these stress factors; (2) know how to adapt to them, and (3) spot potentially disastrous signs of over-stressing.

Training, in proper amounts, builds. Training too hard and fast can tear down health and fitness. The runner's problem is knowing and pushing his limits, applying essential stresses of training that build, but stopping short of stresses that tear him down. Here, Dr. George Sheehan describes the theory of adapting to stress, and the charts list the symptoms of over-stressing.

Life, despite what the experts tell us, is really a simple matter. Man, like the hydrogen atom, was born to be a success. Both operate from a few simple universal principles. For the atom power lies in E=mc2; for man, power and speed and stamina lie in the General Adaptation Syndrome.–the basis of all athletic training.

The General Adaptation Syndrome (GAS) is a three-phase formula of stress and its effects first outlined by Canadian physiologist Hans Selye. It is based on the common and easily observable fact that man exposed to an unaccustomed strenuous task goes through three stages: experiences a hardship, then he gets used to it, and finally he can't stand it any longer, or as Selye terms the sequence, (1) alarm, (2) resistance, (3) exhaustion.

Translated into training this means applying increasing amounts of work (Stage 1) with a resultant improvement in performance (Stage 2) but stopping before exhaustion (Stage 3). The coach and his athletes must know that peak abitity means exhaustion and staleness are close at hand.

Now you would think a simple, widely-circulated theory conforming to the observable facts would guide physicians, coaches and trainers concerned with maximun performance by their charges. Not so. These men are specialists. And everyone knows that specialists know more and more about less and less. Minutiae, not universals, occupy their minds. Work and hard work is the order when things are going well and even more so when they are going badly. In the first instance there is danger; in the second, disaster.

Training for running and coaching runners is an art because the amount of work each athlete needs is highly individualistic. Bill Crothers, the great Canadian Olympian, won almost every major indoor race for three years in a row while restricting his between-race practices to an every-other-day fairly brisk 220. Another highly successful runner, George Germann, consistently anchored the Seton Hall two-mile relay team with 1:50 halves for an entire indoor season while he was unable to practice because of blisters.

The instances of planned or enforced curtailment of working with

SYMPTOMS OF OVERSTRESS

Running doesn't exist in isolation. It's but one of many "stresses" That the athlete has to cope with. Seven or more "families" of stresses combine to work as one:

- **Work Stresses**—These include the specific stress of running, as well as the general stresses that make up a day's physical and mental labor.
- **Emotional stresses**—anxiety, depression, boredom, etc.
- **Social stresses**—alienation, isolation, overcrowding, etc.
- **Dietary stresses**—too much food, too little, wrong type, etc.
- **Rest stresses**—inadequate recovery from hard work, sleep deprivation, etc.
- **Health stresses**—injury, illness, infection, etc.
- **Environmental stresses**—heat and cold, air, water and noise pollution, etc.

All these, working together, draw on the adaptation reserves. When the drain becomes too heavy, certain mild symptoms present themselves. These are warnings that more serious trouble might develop if care isn't taken:

1. Low-level and persistent soreness and stiffness in the muscles, joints and tendons.
2. Frequent mild colds and sore throats.
3. Swelling and aching in the lymph glands, particularly in the neck, underarm and groin areas.
4. Skin eruptions among non-adolescents.
5. Excessive nervousness, depression, irritability, headaches, and inability to relax or sleep.
6. Nagging fatigue and general sluggishness that lingers from day to day.
7. Aching stomach, often accompanied by loss of appetite and loss of weight.
8. Diarrhea of constipation.
9. Unexplained drops in performance levels.
10. Disinterest in normally exciting activities.

Take note of these gentle reminders, and take appropriate corrective action (which normally means simply lowering the overall stress level). Reminders get progressively less gentle; symptons more severe.

high-level output are numerous but mostly escape the notice of coaches and trainers. One notable exception is Oregon's Bill Bowerman, who says that if a runner is doing poorly the likelihood is that he is overtrained and needs rest.

"In every case," says Bowerman, "I would prefer to undertrain a runner rather than overtrain him." His list of sub-four-minute milers—the most in the world—attests to the efficacy of this policy.

Another highly successful coach, Jumbo Elliott of Villanova, once said that young two-milers are the chanciest runners to train. Up-and-down performances by this group are a well-known phenomenon.

The problem clearly relates to difficulties with overwork and staleness. The sequence is easy to relate. Start with a fine race, and who doesn't feel deep down that he can do better? Harder and harder workouts follow. The next step? The runner bombs. The reaction? The runner needs more work. Then ensues for the coach and trainer, and the runner a long period of frustration and discouragement.

The moral is simple. The next time you run out or GAS, fill up your tank with rest.

Chapter Two

Analysis From The Experts

Photo by John Goegel

GOING LYDIARD'S WAY

BY ARTHUR LYDIARD

A myth surrounds Arthur Lydiard and his methods: the idea that the New Zealand coach recommends slow training and slow training alone. It isn't so. "We do more fast running than many interval trainers," Lydiard says. "But we do it in proper amounts, at the proper time." Balancing the training—balancing distance running with shorter, sharper work—is essential, claims the man who took a small group of runners from his neighborhood in Auckland and made them world champions. His pupils Murray Halberg and Peter Snell both won Olympic titles in 1960; Snell won two in 1964. Among them, his men set nearly a dozen world records in the early '60s.

Out of active coaching since then, Lydiard now travels around the world spreading his message. He "coaches coaches," as he puts it. Here is a summary of one of those talks, wherein he describes how to balance distance and speed for best results.

If you're an athlete and the coach says, "Okay, go out and run 20 440s," you say, "Coach, why am I doing this? What physiological effects is this going to have on me?" If that coach can't tell you, then you go and get another coach because he's only going to hurt you. It's your career.

Very many people, coaches and others, are expounding theories on different approaches to training. Very many things are being said, even by physiologists, that in my opinion are incorrect. Invariably, the physiologist has a weakness; he lacks practical knowledge. There are a lot of people with theories who can't prove them.

I've learned about running through 25 years of practical experiences, training myself and then other athletes. I realized there was an imbalance in training. It was either too slow or too fast. Many athletes were being ruined because there was an imbalance. People didn't know what to do, how to do it. They didn't know why they were doing it. They didn't know the mechanical and physiological effects of what they were doing. Not even the psychological effects.

The important factor I learned, is first to lift the oxygen uptake—the steady state.

Take a sedentary person who sits around all day—who only walks to his car and back. If we were to test him for oxygen uptake, we'd find his oxygen uptake is down around one liter per minute. In other words, he is barely existing. If he does a little work, he's very quickly in an anaerobic state. He's creating oxygen debts he can't handle. It doesn't take much exercise to put him in trouble. Naturally, there's going to be a breakdown.

But it's important to understand that with proper training we can lift this same man's oxygen uptake to over *five* liters per minute.

The first thing we have to do is increase the supply of oxygen to the heart so the heart can *decrease* its work load. When an athlete comes to me to train,

I know the first thing I have to do. First, I have to lift his oxygen uptake. The important thing is not lung capacity but the capacity to utilize the oxygen that's taken in.

For the beginner, the exercise must be very easy and very low in expenditure of energy, but this exercise will develop superb cardiac efficiency. Let me illustrate.

While talking with potential joggers in New Zealand a few years ago, I made the statement, "If you can walk, you can run; if you can run, you can run 20 miles. I don't care how old you are. You can do it if you want to." Not that it's important to run 20 miles, but I made the statement anyway.

This old guy named Wills came up to me and told me he weighed 280 pounds. He said he was 74 years of age and had had coronary attacks. He asked, "Do you think I could run 20 miles?"

"I don't know if you can run 20 miles," I said, "but if you go to your doctor and get a clearance to exercise, and then train the way I tell you, you can surprise yourself and everyone else."

He wrote to me later and said he was in action. The doctor said it was okay. He told me he couldn't go 30 yards without walking the first time. I said, "Go to the park and exercise for 15 minutes. Maybe you will have to walk most of the time, but jog a little. Jog just to the point you are pleasantly tired. If you start to blow a little bit, slow down."

So he tried this. Six months from that day, that man, 74 years of age, actually ran 20 miles without stopping. He lost 40 pounds of weight in that six months. That guy's still running. He hasn't had any heart trouble. His blood pressure is down to that of a youth. He's now a vigorous, healthy guy.

I say this to show what you can do with the cardiac system if you go about training sensibly. You are a fool to run too fast, too early. You must run at your level. What we're trying to do in this conditioning period is run at our best aerobic speed. The best rate to get cardiac efficiency. It's not easy to know what your best aerobic speed is. All we can say is work to a "pleasantly tired" level.

In the US many people believe in the LSD method of running—long, slow distance. Let's realize that by running this way you're going to get fine cardiac efficiency. But you also have to realize that we haven't got 20 years to develop this efficiency. We have to use a few year's time to best advantage. Say you have a guy with an oxygen uptake of three liters. He should be working at speeds just under his maximum oxygen uptake. He should be working at a rate which puts some pressure on his heart. So what the LSD runner does in two years, maybe we can do in one year.

What we're trying to do when training for track is develop our capacity to run anaerobically. This is dependent on our capacity to exercise *aerobically.*

I went down to the track with my athletes one night and here was this guy rolling on the ground. He's moaning and puffing. I said, "What'd you do?"

He said, "I read that running is good for me and I came down here and sprinted a couple of 220s. Now I'm like this."

"No wonder, " I said. "You're lucky you didn't kill yourself." I told him, "Come down here every night. Don't run fast. Just trot around nice and easy. I'll tell you when you can run fast." He'd come down every night and trot around for 15 minutes or a half hour.

Then about five weeks later I said, "Now go and see how many 220s you can run.' He did eight, 10, no problem at all. In other words, we increased his aerobic capacity to exercise, which in turn increased his anaerobic capacity. We increased his oxygen uptake by slow running.

When Peter Snell first came to me to train in the late 1950s, I wasn't worried about how fast he ran. I just told him to go out and run for 30 minutes or an hour until he got running fit. It didn't take long. Then I put him over 22 miles course. The first time he ran, he did 3:08, and he was really tired. He lay on the ground and didn't move for half an hour. But after six weeks, he could run that course easily in 2:30. At the end of a year, he could run it in 2:05. This is the cardiac efficiency he developed, just by continually working at his own level and trying to go out with this in mind—that you go as fast and evenly as is comfortable.

Let's understand that we can develop very fine endurance. But let's also understand that it takes time to develop other qualities—to develop the muscular system as it should be and to develop the coordination that's necessary for fine athletic achievement.

We must realize that if we're going to get the most from ourselves as athletes, we must use this type of training, but use it economically. We must understand when to use it. I see people all over the world using anaerobic training in the conditioning period. I say, "What are you doing that for? You have seven months before the track season." And they say, "Yeah. But we'll lose our speed." This is another example of misevaluating exercise.

During the conditioning period, you develop your aerobic capacity. You develop the capacity to run and run and not get tired; you can go out and run it the next day. Then you add the *anaerobic* work. You "balance" you training to get maximum racing efficiency. It only takes four weeks of hard anaerobic work in volume. After that, anaerobic work should be intense but not in volume. You're putting the knife-edge on your anaerobic capacity. You're sharpening.

In your country, a lot of coaches were more interested in how fast their boys can run 20 440s in than what they could do in a race. On the German interval system, people try to create excessive oxygen debts, trying to stimulate the body's metabolism to create greater buffers against fatigue. They try to do quickly what I try to do gradually. I've tried to lay the foundation for this anaerobic work by getting the oxygen uptake to a very high level. Interval trainers have the idea that they could go on a running track and run repetition work night after night, week after week, month after month and still increase the capacity to exercise anaerobically. This is physiologically impossible.

Let's take two examples. One man doesn't train very much and he has an oxygen uptake of three liters. The other has an oxygen uptake of five liters. They both go on the track, and they both do the same intensity and volume of anaerobic training. The first is going to level off and then go down. The other is going to go on to a higher plane of fitness, then level off and maintain his form longer.

We know that if you go out and do lots of anaerobic work continuously, you begin to lower your blood Ph (resistance to lactic acid buildup). Any who have trained strenuously knows what acidity in the blood can do. If you go out and run a marathon and you don't exercise the next day—you sit in a car or a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bus—you're going to have sore legs for a week. This is the acidity in the muscles. Some people say, "The acidity goes very quickly." It doesn't go very quickly, unless you jog.

We know that if you continually lower this blood Ph, that if you keep knocking youself around, it affects your body metabolism adversely and it can undermine your health. This results in people getting "stale"—in getting edgy and nervous, bitchy. They're miserable people. They don't want to go on the track. They don't want anything to do with the sport because this continuous anaerobic training puts a strain on them. It upsets the entire system.

When I came the the US in 1970, I gave a talk at Abilene Christian College and mentioned that my athletes only ran 20 x 440 twice during the track season. They only did hard anaerobic work for four weeks. There was a little bald-headed guy there, a high school coach, who was popping up every five minutes asking questions. He came to me afterwards and asked further questions, and I found out he was a track nut and that he had a reasonable team of high school boys. I went to other places, up in Oklahoma, and he was there. Several months later I was up in Iowa, and he was there again.

When I got the stage where I was talking about anaerobic training, this guy got up and said, "I'd like to talk about this." I said, "Okay." So he got up and said in high school the previous year he had his athletes every week running 20 x 440. The best they did was 64, 65 seconds. So he got up on this occasion and said he decided to use my approach. Twice he gave the boys 20 x 440s. The first time he put them on the track, they couldn't run faster than 67 seconds. He said, "What the hell have I done? I've ruined them." He put them on the track two weeks later; the same thing—66, 67. But he said, when they raced, they all ran 11 to 13 seconds faster in the mile than they'd ever run before.

There are very many athletes in the US who train like hell. And when the seasons starts, they continue to train very hard. I used to train my athletes so they could race. We didn't train to *train*. When we started to race, we trained very lightly. The two key words are *fresh* and *sharp*. You have to be fresh and you have to be sharp if you want to race well.

When I was in Texas in 1970, I saw athletes from one university race at the Texas Relays. I went to this university the next day. We ran for two hours, which was good. The next day, they ran 6 x 660. The next 20 x 220, the next day 10 x 440, the next day jog, the next day they were expected to race again, and they couldn't figure why the hell they couldn't race.

I said, "Look, you're leaving it on the track. When it comes time to race, you should be ready to race. If you're not ready to race, you shouldn't be racing. If you haven't done sufficient training to race, you shouldn't be racing.

I used to take teams to Europe. Sometimes we'd race five times in a week, travel at night different foods, different conditions. We'd only jog and do leg-speed work. We'd see the boys we had to race against doing repetitions of 200 and 400 meters. They were tired when time came to race. In 1961, we toured

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LEFT: The summit of Arthur Lydiard's coaching career. His prize pupil, Peter Snell (466), is headed for his second gold medal—this one at 1500 meters—at the Tokyo Olympics. John Davies (467) will be second. (Shearman)

A TYPICAL LYDIARD WEEK

All Lydiard athletes train basically the same during the pre-competitive season. Half-milers, six-milers and marathoners go through the "marathon training" phase that includes 100 miles or more a week. They follow this by easing into a period of hill training—with strong uphill springing and long-striding downhill running. Only after this do they begin specializing according to race distance. Here's a sample, taken from "Arthur Lydiard's Running Training Schedules," of training for different events. This is what a typical week might be, two weeks before the "big race."

ONE-MILER

Monday—1-2 miles of 50-yard dashes.
Tuesday—10 x 300 yards "striding."
Wednesday—Race 100 and 660 yards.
Thursday—6 x 440 at mile race pace.
Friday—Sprint training and starting practice.
Saturday—Race mile.
Sunday—1½-hour jog.

THREE- AND SIX-MILER

Monday—2 miles of 50-yard dashes.
Tuesday—3 or 6 miles at one-fourth effort (about one or two minutes slower than race pace).
Wednesday—Sprint training and race 100 and 880 yards.
Thursday—6-mile time-trial.
Friday—Sprint training.
Saturday—3-mile race.
Sunday—2 hours of steady running.

MARATHONER

Monday—20 x 220 at one-fourth effort (9 seconds slower than best time).
Tuesday—15 miles at one-half effort (3-3½ minutes slower than best time).
Wednesday—3 miles at one-fourth effort (about one minute slower than best time).
Thursday—18-miles at one-half effort (about four minutes slower than best time).
Friday—6 miles at one-forth effort (about two minutes slower than best time).
Saturday—26 miles, run evenly.
Sunday—15 miles at one-fourth effort.

for two months. At the end of two months, my athletes were still breaking world records after competing four or five times a week. They stayed fresh and sharp.

In 1964, the last year I trained athletes, I used 20 440s twice, like I said. We trained in the winter in New Zealand. It wasn't very easy to train on the road in the rain. We didn't have any tracks. I couldn't sharpen them as much as I liked. This is why we did the second set of 400 meters after we got to Tokyo. Snell ran the fastest in 58 and the slowest in 61. John Davies ran the fastest of 61 and the slowest in 63. I didn't worry about the intervals. They just got in and did them how they wanted.

The same day, Bruce Kidd from Canada came on the track and ran 20 400 meters in 62. The Canadian press came up to me and said. "What do you think about that?"

I said, "I'm very pleased about that. He put the last nail in his coffin."

You know what happened to Bruce Kidd. He ran very badly. This is just the difference in evaluation. He'd been doing this type of training for months and months. He was starting to go down. My boys needed this. As you know, Snell was in the condition where he could run six races in seven days, and he was better at the end of that then he was at the start because he needed that anaerobic work. Bruce Kidd didn't need anaerobic work. The less he did of that the better he was going to be.

I was down at Northeastern Oklahoma Junior College recently. They started racing in February, and a boy ran 4:13 for the mile. It was the best he had done. After this, he started to get worse. By the time I got there in early April, this kid was running 4:24. He said, "What do you think is the trouble?"

"Well," I said, "to start with you're doing too much anaerobic training. Cut that out." So we just went jogging and just did some leg-speed work. We just got a little gradual slope downhill and worked on developing leg speed. He went 150 or 200 meters, concentrating on how fast he could move his legs and keeping relaxed. This boy who had done 4:13 early in the season and had gone to 4:24, ran a 4:10 mile, a 49.2 440 and a 1:52 half-mile after two weeks of this training.

You see what can be done when you first do the volume training then add small amounts of anaerobic work—at the right pace, in the right quantities, at the right time. Evaluate your exercise. Balance your training. Study your legs. (Never do speed training when your legs are tired). Realize that you're training to race; don't train to train. Realize that you can train very hard and throw it all away if you don't put it all together properly.

HINTS FROM HIGDON

BY HAL HIGDON

In his nearly a quarter-century of running, Hal Higdon has gone through it all. The Interval Era. The Lydiard-Distance Era. Any other era you want to put a name on. Hal has tried every form of training, and has found success with most of them. He was a near-Olympian in the steeplechase, then later the first American finisher in the Boston marathon, and later still a US Masters 10,000-meter winner. The well-known writer's thoughts on training—how much and how fast—obviously bear careful reading.

Perhaps the most cogent comment I can make on speed training is that the top runners use it too much and the bottom runners use it too little.

Concerning the top runners, I recall back at the time of Roger Bannister's first four-minute mile in 1954, everybody's mind was blown when they learned that he actually had run 10 quarters in 60 seconds. This impressed a lot of people almost as much as his actual time in the race. "Ten quarters in 60? Out of sight, man!"

At about the same time, Emil Zatopek was doing some really God-awful workouts, like 50 quarter-miles. That's about all the information we got on Zatopek's training. Later we found out that he was running relatively slow quarters—maybe 75 seconds or so.

But somewhere the notion came into being that if you combined the best of Bannister with the best of Zatopek, you could develop a superior runner. In other words, the man who can do 50 quarters in 60 seconds will really be able to let it all hang out in races. I think that's where we're at today, and I think this becomes a problem for some of our top racers.

Let me back up a bit and say that part of the advantage in what Bannister and Zatopek did was psychological. By achieving such a goal in training, this gave them the mental strength for their races. They could measure their strength by what they did in training, so it gave them as much psychological as physiological benefit over their opponents.

But the problem today is that a reverse psychology has developed. We now assume that *unless* you are running 20 quarters in 60, or covering 100 miles a week you probably can't achieve success. This is bull.

My feeling is that any more than 10 of anything in a workout is spinning your wheels. When you go beyond that number, you no longer are working on speed but are into the area of stamina. If that is your goal, you may be able to develop it by long steady running at a slower pace, with equal results and less chance of injury.

There are definite benefits to be had from running fast, however. Perhaps the main reason to do so is to develop your rhythm. If you're running the mile in 4:00, you need to know how a quarter in 60 seconds feels. This permits you to feel comfortable at that pace during a race. Again we are into the psychological area.

In seeking to develop speed, I feel that two types of workouts can have benefit. One is to simply do windsprints: 100 yards, balls to the wall, preferably on grass if you have a smooth football field or golf course handy. I have

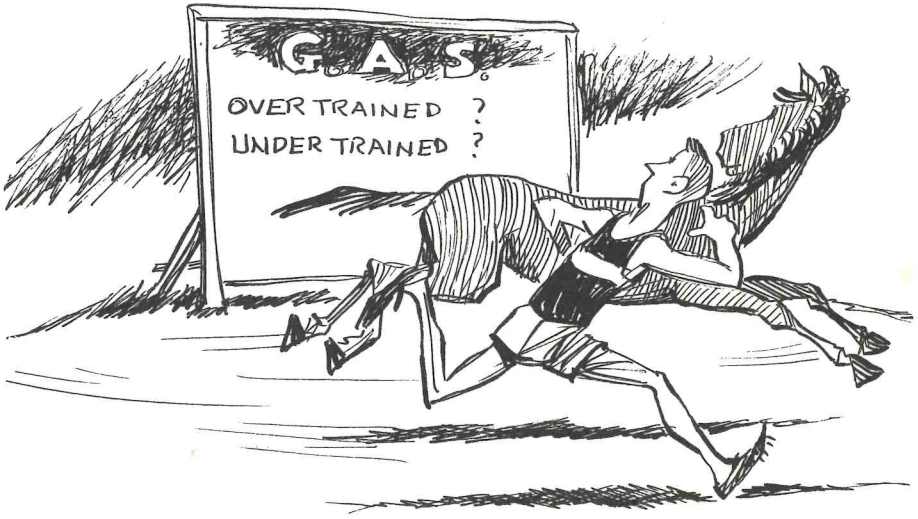
done as many as 40 of these sprints, broken up into sets of 10, with five 220s tossed in between the second and third set. But in looking back, this go to be more of a stamina than a speed workout.

Now I feel that 20 x 100 is sufficient, broken into two sets of ten. This permits you to concentrate on going at full speed, without worrying whether you can last through a large number. (One hundred yards is the only distance where I think more than 10 repetitions is justified.)

Another favorite workout of mine is three of something, fast as possible, with plenty of recovery time in between. This is a psychologically stimulating exercise. Sometimes it simply feels good to run fast. But even in this type of workout I find myself unable to generate the same type of speed I sometimes can uncover in competition.

In the six weeks prior to the US Masters meet in 1971, I went out on at least a half-dozen occasions and attempted to run fast quarters in this way as part of a workout. I found it impossible for me to get under 64 seconds, and on several occasions I'd go much slower than that while sprinting (I thought) all-out. Nevertheless, on the last lap of the 10,000 meters, I won by running 63.8. Because I knew it meant the difference between victory and defeat, I was able to reach much further down into my reserves.

I don't discount the value of an occasional ball-busting workout, maybe once a week to do some massive dose of a short distance. This can be of most value if you use this type of workout to peak in difficulty just before some major event. To do the same workout at the same level week after week, or do the same types of training day after day, may bring on a form of psychological staleness that becomes oppressive if the runners isn't winning, or improving. (When you're doing that, you can carry on through all sorts of drudgery in training.)



Cartoon by Bill Canfield

The other end of the stick is that, in objecting to speed training and praising LSD, many runners have gone too far. They are as hung-up with their long, long runs as some of the speed runners are hung up with their interval training.

Let me qualify my remarks by stating that if you are just out for fun, you should run in the manner that you think is fun. But even many of the so-called "fun-runners" like to see improvement and good performances. I feel that they could run better if they tossed some speed work into their training now and then.

Particularly in the warm weather, I think one workout a week consisting of some fast sprints can help bring down your times. These need not be killer sprints, but can be easy striding at a faster-than-usual pace on grass or track.

I think one of the reasons the LSD runners don't do this is that they are preoccupied with their own mileage. The LSD runners want to be able to look at their diary at the end of the week and state that they are doing 80-100 miles a week. If you spend an hour doing speed work, however, you may run only three miles compared to the eight miles that could have been covered during the same time going steady. You therefore have "lost" five miles. It doesn't make any difference to them that they may be impeding their progress by doing more rather than less mileage that week. Well, if you are turned on by total mileage, all right, but maybe you are ignoring some of the fun aspects of the sport.

I may be seeing things from my own prejudiced point of view since I did have some success at shorter distances in my college career, but there is a certain good feeling that you get by running short and fast that you don't get from going long and slow.

So my final bit of advice would be that the speed runners do less and the slow runners do more and maybe we'll all meet in the middle.

SPEEDING WITH SCOBEY

BY BILL SCOBEY

Bill Scobey is indeed a rare runner—in many ways. "Mad-Dog," he's nicknamed. In an era when interval training has lost much of its appeal and few runners do more than is absolutely required, Scobey takes it straight. Or nearly straight. At times, he'll go whole weeks on nothing but intervals. He doesn't have to; he WANTS to. He volunteers that he loves hard work, and intervals in the form he takes them are hard work. The training works for him. Bill is one of the few US distance men who can claim national-class times all the way from the mile to the marathon. Scobey himself describes his unique approach and attitudes.

Unlike most of the top US runners, I run speedwork/intervals because this is the only way I can get into excellent shape. I can run 20-25 miles of distance every day, but all it does for me is get me into shape to run 20-25 miles a day. For me, intervals are a necessary part—the *basic* part—of my training diet.

Some runners I've talked to hate to run intervals. Maybe that's part of the reason I like this type of running so much. I love to hurt during a workout, because the aftermath holds a feeling of accomplishment. It also gives me the confidence I need in a race.

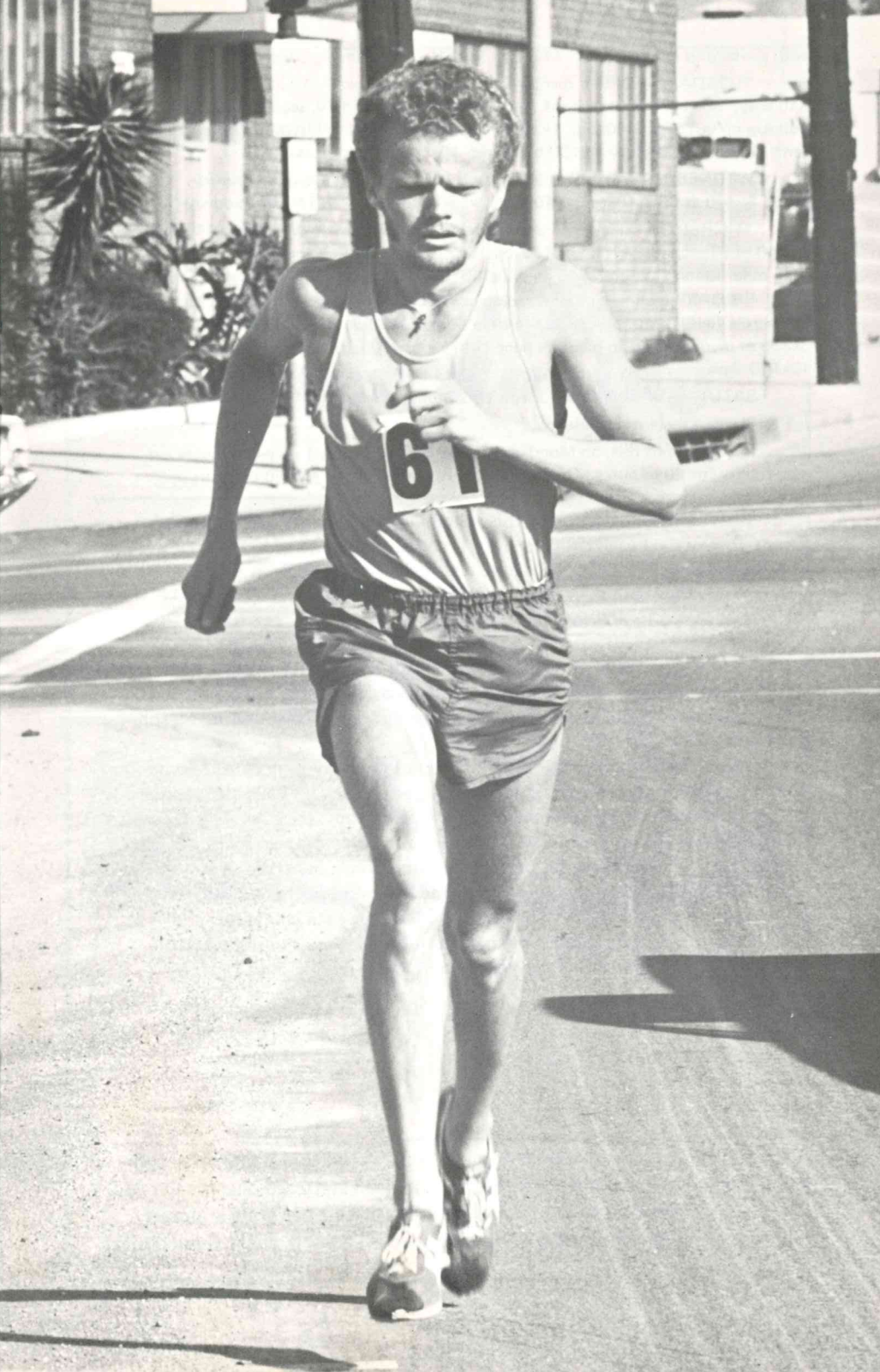
I do have a big problem, however. I'm not a dedicated distance runner. Sometimes I will go three to five days without running a step. I may feel quilty, but then I slough it off and try harder when I come back.

My cure for this is desire and a coach that can inspire me to run more and harder. I love to work when I can see a goal large enough to inspire me to run harder and longer. I've never really had a big goal, but 1972 will be one I'm sure. For the first time, I plan to devote 100% of my efforts to running the mile and getting ready for a fast 5000 and 10,000 in July. It has been my boyhood dream to run a sub-4:00 mile, so I will make a try in '72. (Best time through 1971 was 4:03.)

Let's get to some of the specifics of my interval training. I vary many of my intervals, but my warmup is always the same: two-mile jog; 6x110 at medium-easy pace (55-yard jog after each); 440 jog after the set; 4x110 at medium pace (55-yard jog); 440 jog; 4x110 accelerating to seven-eighths speed (55-yard jog); 440 jog, then start meat of the workout.

Now here is a sample of one week's pure intervals. This most likely would occur in the track season. During the summer I run intervals on Tuesday and Thursday only. During cross-country I run intervals every other day, alternating with 12-mile distance runs. I do five easy miles, every weekday morning.

MONDAY—4x440 at 65 seconds (110 jog); 440 jog; 5x220 at 28-30 (jog across field); 440 jog; 660—first 440 at 65-seconds, then 220 buildup; 440 jog; 5x220 at 28-30 (jog across field); 440 jog; 8x180 buildups to seven-eighths speed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with six-second rest between; 440 jog; 10x110 "shakedowns", very easy.

TUESDAY—5x330 at medium to medium-hard pace (110 jog); 440 jog; 110 easy; 50-yard jog; 110 hard; 1100 yards—first 440 in 70, second 440 in 65, buildup on last 220; 440 jog; 4x220 at 28-30 (jog across field); 440 jog; 1100—same as before; 440 jog; 8x180 buildups; 10x110 shakedowns.

WEDNESDAY—4x440 at 65 seconds (110 jog); 5 miles cross-country, hard; 4x440 at 65 (110 jog); 440 jog; 8x180 buildups; 10x110 shakedowns.

THURSDAY—mile, open up on straights, medium-easy on curves; 440 jog; 4x440 at 65 seconds (110 jog); 440 jog; 5x220 at 28-30 (jog across field); 440 jog; mile—same as before; 440 jog; 8x180 buildups; 10x110 shakedowns.

FRIDAY—easy five miles if racing on Saturday; if not, 5x220 at 28-30 (jog across field); 440 jog; 3x660—440 in 65, then buildup (jog 220); 440 jog; 5x330 at medium-easy to medium pace (110 jog); 440 jog; 8x180 buildups; 10x110 shakedowns.

SATURDAY—either race or run 15-20 miles as I feel.

SUNDAY—same as Saturday.

In addition to this, on Monday, Wednesday and Friday I do weight work on upper body for 20 minutes. On alternate days I do 50 situps and 50 pushups.

I have primarily stuck to this schedule, and I plan to stay with it. I want to work. I *love* to work. My favorite all-time workout was one Bob Bertelsen (1970 NCAA six-mile champion) took while at Ohio University. They call it a "step-down-and-up-the-ladder." It goes like this: mile at 4:40; 880 jog; 2x1320 at 3:30; 880 jogs; 3x880 at 2:20; 440 jogs; 4x440 at 70; 220 jogs; 3x880 at 2:20; 440 jogs; 2x1320 at 3:30; 880 jogs; mile at 4:40. At the finish of this, I'm usually completely dead and can barely do my easy shakedowns. I've only done it a few times and would *never* do it at the prime part of my running season. It's a killer. But I love it.

This is basically my speedwork. When I take my long runs, I sometimes come back and run one set of 440s, 330s, 220s, or 110s afterwards. If I run pure long ones, I gain weight, no matter how fast I run.

Intervals are my basic diet. I like them. They tell me things: what kind of shape I'm in; how far along in training I am; whether or not I'm ready for the upcoming season or race, and many more things. Maybe it's mental. But after you are in shape, 90% of the race is mental.

I am convinced that speedwork and intervals are the only way to *get ready for the big one.* Next year I want to be ready. And I *will* be on this program.

LEFT: Name the distance—mile to marathon. You'll find Bill Scobey competing there, and competing well. He has run 4:03 and 2:20-plus for the two extremes in distance. The significant feature is that he has done it almost exclusively on interval training of his own special style. (Donald Duke photo)

Chapter Three

Routes To Faster Racing

Cartoon by Bill Canfield

READ BEFORE YOU SPEED

Okay, so it's agreed now that a certain quantity of fast training is a necessary prerequisite to fast racing. Just what that quantity amounts to isn't so clear, but it's safe to say we need "some."

We're being purposely vague and are shying away from laying down absolute figures. The 20-x-440-at-race-pace-with-a-220-jog formula looks beautiful and simple on paper. However, it doesn't translate into action very well. The 20-quarter formula is too set, too rigid, too simple. It molds the runner to the formula instead of letting the runner mold training to his needs. Like 100 miles a week or any other inflexible standard, 20 x 440 becomes a master instead of a servant.

Understandably, few runners jump eagerly into straight, timed interval sessions on the track. When Bob Carman, a 40-year-old who has run half his life, says, "I'd love to get out and slam the hell out of a set of quarters," he's speaking from a minority viewpoint. Some runners barely tolerate the track quarters, feeling they're essential– though not enjoyable. But increasing numbers of runners are finding they can get the same results without the soul-killing sameness of strict track intervals.

If, like Bob Carman, you dig doing repeat quarters, for gosh sakes do them. We don't want to steal anyone's joy. But if you don't crave these seemingly endless sessions on the track, with the stopwatch hanging over you, there are plenty of alternatives. In this chapter, we're offering 10 variations on the speedwork theme. All are proven means to the same end–improved racing performance–but avoid the rigidity of the conventional interval approach.

These variations fall into three general categories: (1) racing-type speeding; (2) fartlek-type speeding, and (3) interval-type speeding. The choices range from the simplest (racing yourself fit) to some rather complex ones (what we call "free-form" intervals). But the message is the same for all of them:

They all give the speed needed for racing, but without asking you to be a high-speed machine. Runners need ask no quarter (or quarters) and expect none to be given. Speed is necessary. Spirit-killing speedwork isn't.

Don't let this booklet's several cautious and negative sounding articles throw you. We're definitely not knocking speed. Far from it. We're praising speed and it's potential benefit–but at the same time aren't overlooking its self-defeating nature when misused and overused. No, this booklet isn't knocking speedwork. It's trying to suggest wise and beneficial uses, and keep it from knocking you.

As already suggested by Dr. Sheehan and others, the faster the run, the greater the stresses involved. This means high-intensity work brings with it a greater threat of disabling injury, illness or cumulative fatigue. In fact, there's a double-barrelled threat. Not only does faster training increase the statistical chances of overstressing, but this comes at a time of year when the runner can least afford it–in his racing season.

The situation, though, isn't as grim as it sounds. Avoiding stress problems and maximizing the benefits of speed training are fairly easy to do if you keep in mind a few simple principles:

- **Change gradually.** Particularly if you've been on a Lydiard-type distance program in the conditioning phase of training, muscles aren't accustomed to fast bursts. Therefore this time of transition from distance to speed is the highest risk period. Make the change gradually, over a period of many weeks, with slow but regular increases in quantity and quality. Author-researcher Ken Doherty says,"If handled with discretion, a step-up in pace is no more dangerous or destructive than one in distance."

- **Stay fresh.** The aim now is sharpness, not strength. If you don't already have your endurance base established by the time racing starts, you're not going to get it this season. If you have stored up your endurance reserves, now's the time to put a racing edge on them and use them. Arthur Lydiard's classic "train, don't strain" advice is most pertinent here. Lydiard adds, "Never do speed work when your legs are tired. . . You're training to race; don't train to train." Stay hungry for racing.

- **Run non-violently.** There's little call, in distance racing, for violent surges of speed. And the dangers of tearing a tendon or a muscle are great. The speed needed in your sort of racing comes more sensibly and safely from runs involving smooth acceleration and self-control.

- **Recognize rest.** Hard speed workouts can be as exhausting as races, and adequate recovery is just as essential. Two running experts, Oregon coach Bill Bowerman and Dr. George Sheehan, recommend hard speedwork only about every third day. "The trick," Sheehan says, "is taking enough rest in between practices, and running within yourself in the speed workout."

- **Enjoy it.** No training—period—need be a grind. Speed can be as fun as any other, though we sometimes lose sight of that fact amid its many abusings. There are practical methods of keeping speed training flexible, spontaneous and enjoyable. We'll describe specific ways in this chapter. Basically, it's fun to go fast. Why else would we race so eagerly?

Actor Robert Redford isn't a runner. He's a skilled skier. But he describes an attachment to speed that transcends sport boundaries:

" I had always loved speed. Here was a scene that, to me, was using speed in the purest form; nature's own gravity—very little between you and the mountain, just two boards and some straps. You weren't bound to the dependence of a mechanic or a piece of machinery or an asphalt strip. . . It was raw fun."

SPEEDWORK AT A GLANCE

This booklet's contributors suggest 10 specific methods for gaining racing speed and sharpness. These 10 are summarized below, along with suggested total distances, numbers of repetitions, paces and frequency of application. Please bear in mind that these aren't absolute formulas—only general guidelines based on educated opinions. (The authors basically take a conservative stance on the amount of speedwork required.) "Racing distance" refers to the shortest commonly-run one. "Racing pace" refers to current level of ability at the distance for which you're preparing. The first four methods are race-type. The next three are fartlek-type. And the final three are interval-type.

Type	Total Distance	Number	Pace	Frequency
Racing	Any distance	1	Maximum	Every 1-2 wks.
Time-Trials	Half to twice racing distance	1	85-95% of race pace	Once-twice a week
Fast Finishes	Last 2-5% of endurance run	1	About race pace	Daily with slower runs
Supplements	Up to half of racing distance	1	About race pace	Daily with slower runs
Fartlek	50-75% of typical day's total	Up to 10 repetitions	Every variation	Every other day maximum
"Oslerians"	50-75% of typical day's total	Up to 10 repetitions	Accelerate to nearly all-out	Every other day maximum
Hills	50-75% of typical day's total	Up to 10 repetitions	Fast yet not all-out	Every other day maximum
Trackless Int.	Total racing distance or less	Up to 10 repetitions	Close to racing pace	Every other day maximum
Instant Int.	Total half or less racing distance	2-5 reps	Close to racing pace	As often as daily
Free-Form In.	Total racing distance or less	Up to 10 repetitions	Close to racing pace	Every other day maximum

RACE-TYPE SPEED

Initially it can be shocking and downright discouraging. You'd been led by writers all the way from Lydiard down to Henderson to believe that slow training is going to make a vast difference in your racing levels. You'd trained long and slow all winter, and fully expected big changes. But was it this kind of change they were talking about?

You waddled through your three-mile, wheezing at the unaccustomed pace and feeling as coordinated as a wounded water buffalo. You felt strong alright, but painfully slow. When the finish put an end to the struggle, you were 10 seconds slower than previously. This is the improvement the authors described?

Yes, in fact, this is part of it. This is the first slow step back to racing fitness. Don't quit now. Take the second and third and later steps, and you're likely to surprise yourself. If you're doing no other speedwork besides racing, and you haven't raced for awhile, you can figure on sacrificing this first one. It's a break-in race, used to regain the faster-paced rhythm and breathing ability that have temporarily slipped away. Check out next week's results before making any rash judgments.

Bob Deines is legendary for his slow training. In his daily two-hour jaunt, he rarely covers more than 15 miles. Yet Deines is a nine-minute two-miler, a 2:20 marathoner and the American record holder at 50 miles. He only runs fast when he has to, and when it counts.

Deines has said, "Regular racing helps keep me sharp. . . I think that two or three races are sufficient to recover any lost sharpness without doing any speed training. It works out to almost an exact formula with me. I'm usually a little sluggish in my first fast race. It may take 4:27 to run a mile. But if I run within a week or two, it's sure to be 4:17. The 10-second (per mile) improvement seems to be pretty standard."

Others have had similar experiences. Two other runners of considerably less ability were quoted in the book *Long Slow Distance.* One went from 15:45 in his first three-mile down to 15:18 (his best-ever) two weeks later—a 27-second improvement, or nine seconds a mile. Another recently went from 15:50 to 15:23 (his best) under similar circumstances—nine seconds a mile. (A significant footnote here is that neither ran as fast when training extensively on speedwork.)

The key work here is "regularity." *Regular* racing is what brings the sharpness sprinting back in these cases. Evidence suggests that a race is needed every week or two. Otherwise, racing speed wanes again and must be re-won.

There is scientific evidence that regular racing provides adequate sharpness. German doctor Ernst Van Aaken, you'll recall, said earlier in this booklet that speedwork should be taken "only at a ratio of between 20:1 and 40:1 of the distance runs." He added that this faster training need be no faster than racing pace.

What Van Aaken's ratios mean, in practical terms, is that a 50-mile-per-week trainer needs only 1¼ to 2½ miles a week of race-pace work. In

other words, a two-or three-mile race each week, or a three-or six-mile every other week is adequate in Van Aaken's estimation.

There's a philosophical aspect, too, in limiting fast running to races. Many runners don't like to run fast every day, but they still like to race fast. Joe Henderson explained in his book *LSD:* "A quick race or two sharpens the speed right to where it was before, if not higher. And this is the pleasant means for regaining it. Just thinking about a race stirs the imagination, gets the blood and adrenalin pumping a bit faster. There's a crowd, the company of other runners, prizes at stake—even if only times on a watch. Fatigue is submerged in the excitement for the moment.

"Contrast the excitement of racing with the unnecessary dread that often goes with fast *training.* There's nothing at stake. In the isolated training atmosphere, the mind returns to concerning itself with tiredness and no doubt doesn't like it."

Running this way gives the activity something of a split personality. But far from being psychotic, this can be a creative and rewarding split. Dr. George Sheehan has described running as being both "test and therapy." Under this system of racing himself to sharpness, the runner's races are his tests, his daily runs are his therapy. And twain seldom meet.

"You become anxious to see how you can do—either good or bad," says Ed Winrow, a slow trainer yet highly competent racer and successful college coach. "Usually the runner is surprised by a good time."

Maybe you'd prefer not going into racing "cold turkey," without any speedwork at all. The shock might be too much, particularly if you have a history of leg ailments. Or maybe regular races simply aren't available, or the available ones aren't the proper type and distance. A miler, for instance, may have a choice in his off-season between 15-mile road races and nothing. Neither is going to prepare him adequately for his early miles.

If the idea of conventional speedwork doesn't particularly turn on this type of runner, but he still knows he needs the faster work, controlled trials may be his answer.

Don't let the word "trial" put you off. Time-trials have a poor image. That's because too often they're pseudo-races—with all of racing's speed and stress, but none of its rewards. "Controlled" is the key word in the trials we're offering here—controlled, moderate pace and effort.

Perhaps "in-between runs" would be a better description. The speed falls somewhere between that of hard racing and soft endurance work. Controlled trials—taken, say, once or twice a week—provide a mild transition between the two extremes of running pace.

You might not have given them a fancy title like "controlled trials," but you've taken this type of run. Every runner uses them. A hasty study of statistics from distance runners shows that most of their basic aerobic training is done at below 80% speed (see the percentage chart on the next page). True LSD is below this level. For instance, a 60-minute 10-miler might run 75 minutes or slower for his 10 LSD miles. Runs of more than 80% speed, but still below 100%, fall into the "controlled trial" range.

Marty Liquori or Jim Ryun, in fact, take these types of runs when

GUIDE TO PACE CONTROL

"Controlled trials" aren't races. They're faster-than-normal training runs, designed to give racing's feel without all of its energy expenditure.

Arthur Lydiard talks about three-forths effort, one-half effort and the like. "Effort" is a subjective concept, therefore somewhat confusing. Percentage of SPEED is straightforward. Any runner can easily figure what's 90% of his maximum speed, or 85%, or 80%. It only involves mathematics, not subjective feelings.

"Controlled trials" then involve runs of something more than 80% level and something less than all-out. Normally, they'd fall somewhere around 90%, but that of course is up to the individual.

This chart simplifies the process of figuring speed percentages. It lists per-mile paces at the various levels. You're left to translate this to the distance being run. Take our 60-minute 10-miler, for instance. He races at six minutes per mile (divide 60 by 10; this one is simpler than most). Say he wants to take a 90% trial. He'll want to go 6:40 miles, or 66:40 for the total distance.

100%	95%	90%	85%	80%
4:00	4:13	4:27	4:42	5:00
4:10	4:23	4:38	4:54	5:12
4:20	4:34	4:49	5:06	5:25
4:30	4:44	5:00	5:18	5:37
4:40	4:55	5:11	5:29	5:50
4:50	5:05	5:22	5:41	6:02
5:00	5:16	5:33	5:53	6:15
5:10	5:26	5:44	6:04	6:27
5:20	5:37	5:56	6:16	6:40
5:30	5:47	6:07	6:28	6:52
5:40	5:58	6:18	6:40	7:05
5:50	6:08	6:29	6:52	7:17
6:00	6:19	6:40	7:03	7:30
6:10	6:29	6:51	7:15	7:42
6:20	6:40	7:02	7:27	7:55
6:30	6:50	7:13	7:39	8:07
6:40	7:01	7:24	7:51	8:20
6:50	7:12	7:36	8:02	8:32
7:00	7:22	7:47	8:14	8:45
7:10	7:33	7:58	8:26	8:57
7:20	7:43	8:09	8:38	9:10
7:30	7:54	8:20	8:49	9:22
7:40	8:04	8:31	9:01	9:35
7:50	8:15	8:42	9:13	9:47
8:00	8:25	8:53	9:25	10:00

they ease through 4:10 mile "races" against minimal competition. For them, that's 95% speed or less. Derek Clayton's 2:25 and 2:30 marathons in practice, amazing as they sound, are only 90% speed for him. Keep in mind that pacing on these trials is a relative matter, based solely on the all-out speed of the individual.

Arthur Lydiard makes frequent reference to "time-trials" in his schedules. Most coaches and runners take this to mean all-out, race-like efforts. However, Lydiard himself warns that they should only be controlled runs at steady pace. He doesn't say anything about going for personal records in practice.

In fact, putting that kind of effort into the trials would in all likelihood defeat their purpose. Running too hard would drain away racing reserves rather than adding to racing sharpness. Remember Lydiard's words: "Train to race; don't train to train." Fast time-trials look wonderful in your training diary, but they don't count in anyone's race results.

If you've ever taken a horse on a ride through the countryside, you know what happens when he turns for home. He smells water and his stall almost immediately. The closer he gets to them, the faster he goes. And in the last mile or so you can hardly hold him back.

Runners have a similar animal sense. A mile—more or less— from home, they smell the finish. They gradually and naturally speed up towards the end until they find it hard to hold themselves back. This is especially true on a long and slowish run of non-exhausting proportions.

In the sharpening phase of training, we can use this natural inclination to fine advantage. Giving in to temptation and cutting loose at the end of endurance runs can give the necessary quota of speed for racing. It is extremely simple and informal—so much so that it hardly needs mentioning here, except to point out its use and effectiveness. It requires no break in the continuity of the run, no measurements or timing—simply an acceleration to a fast yet manageable (non-violent, non-exhausting) pace. The pace may resemble that of racing. The distance may be anywhere from several hundred yards to a mile or more.

Keeping in mind Ernst Van Aaken's distance-to-speed ratios of 20:1 to 40:1, a daily race-paced half-mile tacked on the end of a 10-mile run would adequately fulfill the speed requirement. (However, Van Aaken recommends a more formalized approach, which will be explained in the following section.)

Fast finishes accomplish several worthwhile objectives. Besides providing anaerobic stimulus and racing rhythm, they simulate racing psychologically in that they ask you to push after you've gone miles and miles. And they get you home sooner.

If spectacular international successes and flamboyant personalities mark the world's leading coaches, Ernst Van Aaken doesn't qualify. West German Van Aaken doesn't claim full credit for any world records (though he has advised Harald Norpoth, ex-record holder at 2000 meters) or Olympic championships. And the 70-year-old Van Aaken is a decidedly quiet, behind-the-scenes individual.

However, if painstaking research and fresh discoveries mark the world's leading coaches, Van Aaken ranks right with the best of them. Van Aaken is a medical doctor—an expert in sports medicine with a huge reservoir of practical experience in distance running.

The good doctor, for instance, was recommending "speed through endurance" as far back as the 1920s—when Arthur Lydiard was barely a teenager. Van Aaken held fast to his methods during Germany's interval madness of the '50s and finally saw the majority of the world's runners going his way (though he wasn't getting his share of the credit).

The basic theme of Van Aaken's method has from the outset been: while speed is essential, speedwork itself is vastly overused. Proceeding on this theory, Van Aaken increased the proportion of endurance work and reduced the speedwork to the oft-quoted ratio of 20:1 to 40:1. With over 40 years of experience and testing to back him up, he's rather sure of his figures.

Van Aaken's primary recommendation for speed supplements amounts to a formalized version of the fast finishes. He writes, "At the end of the daily long runs, there follows through the whole year a speed run over part of the racing distance, at a speed not exceeding the racing speed envisaged."

In effect, he says the runner should maintain a balance of endurance and speed year-round. Instead of blending a fast finish in with the long run, there's a brief break before the runner strides through a timed segment. (Although Van Aaken doesn't say so, we interpret "racing distance" to mean the shortest event in which a runner normally races, and the supplements are no more than half of that distance.

So a six-miler's workout may look like this: First comes his 10-mile slow run. He tops that off with a short, mildly-fast run—theoretically as long as three miles, but more likely somewhere between a quarter and a mile.

When Tom Sturak was training for his first US Masters race (the 5000 meters), he figured he needed speed. He hadn't done significant amounts of speedwork in years and was concerned about reviving old and dormant injuries. He read of Van Aaken's methods, and they struck him as a sensible approach.

Sturak added a daily speed supplement—normally a timed quarter-mile—to his otherwise pure distance routine. After placing third in the tough Masters 5000 with good time, Tom commented: "While I dreaded interval training, I look forward to a single run. It's a change-of-pace—mentally as well as physically—at the end of my run, and it gives me a great lift. I'm able to go faster than I think is possible."

Provided the preliminary endurance run isn't overly taxing, the speed supplement is surprisingly easy and refreshing. And as Sturak says, a single not-really-challenging run doesn't appear at all imposing—not nearly so much as an interval session.

What this single supplement amounts to, really, is a very short burst of speed at the end of a very long warmup. You'd be surprised. Eight, 10 slow miles or more get you so loose that you'll be breaking speed limits unless you consciously hold back.

By now you can see a pattern developing in the speed workouts. In the racing section, users advise gaining speed simply by racing. Next, the theory of the controlled trials is to run approximately racing distance (half to double) at reduced *speed.* And in the last two—fast finishes and supplemental speed—the idea is to run racing speed for reduced *distances* (less than half the racing distance). In effect, all are based on racing or *practice* racing.

Methods get a bit more complex from here on, with introduction of the varied world of repetition running.

FARTLEK-TYPE SPEED

English-speaking runners hesitate to use the term in mixed company. "Fartlek." It's a perfectly clean Swedish word for a perfectly sound system of training. It makes more sense perhaps when we call it by its English translation—"speed-play." In fact, it sounds quite pleasant. It conjures up images of children romping on playgrounds.

That's a worthwhile analogy because fartlek does, in a way, take the runner back to his youth—to the days when he ran without knowing of schedules and techniques and such. Children are the true runners. We can look to them for guidance as much as we look to number-oriented theory-pushers.

Kids have no schedule, no stopwatch, no inhibitions. All their actions spring directly from their feelings and needs of the moment. Much of the running is slow and easy—a pace they seemingly can carry for hours. But when a child is so moved, he can turn on a sudden burst of speed. Fast, though never very long and always with adequate recovery afterwards. Instinct guides him.

Fartlek has the same instinctive basis. Make no mistake. Done properly, it's a hard and fast workout. But it must be done on an unplanned, untimed basis. The speed-burners are a key part of fartlek, yes, but they are inserted as the impulses of the moment dictate. If taken in a rigid pattern, it still may be a good speed workout. But it won't be fartlek.

Fartlek means speed-play. And "speed" and "play" are the inseparable components of this running method. We can't give a "fartlek schedule" because that's a contradiction of terms. Fartlek is as varied as the individuals who use it, and the circumstances under which they use it. The best we can do is offer general descriptive guidelines.

The Swedes of the 1940s developed and practiced fartlek in their woods. A Scandinavian forest is an idyllic setting, but not a must. Actually you can practice fartlek anywhere—parklands, golf courses, roads, even—if you must—the track.

Following a brief spell of success for the Swedes, fartlek generally

fell into disrepute. Running theorists criticized its lack of structure and lack of control, saying, "Only the most self-motivated of individuals has the will to put enough speed into it."

That's the general state of fartlek now. Runners describe as "fartlek" a gentle run through the countryside with a half-hearted hundred-yard acceleration thrown in every five miles or so. This may be a good endurance run, but it isn't fartlek and does little for speed.

Fred Wilt, one of the sport's most respected students, says, "A short race and a day of fartlek (each week) is adequate for the marathoner in terms of speed. However, I am skeptical of fartlek because the athlete tends to let it degenerate into a long, slow jog in the woods."

To avoid this tendency that has tarnished fartlek's good name, view these workouts primarily as *speed* builders. Give the emphasis to that (while retaining the *play* factor), and consider these suggestions:

- Cut mileage to 50-75% of the normal daily total. Even in the 100-mile-a-week period, Arthur Lydiard recommends a fartlek day each week—distance 10 miles (or 5-4 below the daily average).

- Count on as much as half of the fartlek run being done at hard pace—but with adequate recovery from the bursts.

- Follow the proven system of Oregon's Bill Bowerman. Don't run hard speed days more often than every other day. Fartlek, done properly, is hard speed work and can be too draining if done too often.

With these guidelines in mind, let your imagination and intuition run wild. Change the pace endlessly. Charge the hills. Stretch out going down. Accelerate. Sprint. Stride. Jog. Walk. Let fartlek bursts occur naturally when: avoiding onrushing cars at busy intersections. . . responding to the challenge of a jogger who thinks he's Jim Ryun. . . escaping an enraged dog. . . or just when feeling particularly bouncy for no particular reason.

As long as the fast runs are free, controlled, rather short and there's a change to recharge once they're ended, they enrich the running diet as well as sharpening speed.

Look back at the kids. The only way to tire them is to give them too much running, too fast. Left to their own devices, they never wear down. Runners would do well to observe what those devices are, and imitate them.

Tom Osler has been described as "philosopher" and as the "savior of the common runner." Although the glowing tributes bear some truth, Tom actually is but one of us—a decidedly common runner who made more of his native ability than many Olympians do. In 1967, wrote a skinny little booklet about his experiences called *The Conditioning of Distance Runners.* The booklet never got the circulation it deserved, but one reviewer called it "an underground classic."

Osler, a college mathematics professor from New York state, struggled along in the road racing pack for years. Suddenly, he won a couple of national championships, and ran a sub-2:30 marathon at Boston. Friends who'd seen the transformation asked, "What happened?" And when told, they urged Tom to write about it.

Essentially what happened was that he ran lots and lots of miles, which he called his "base work." This made a big difference, of course. But what really boosted Tom the final distance to his new level was his particular brand of speedwork. Though Tom wouldn't have given them this title, they've come to be known as "Oslerian pickups."

These pickups are a flexibly structured form of fartlek. As with fartlek, the fast runs are simply inserted at will into a long session. But here, unlike fartlek, the runner goes into his workout with a rough plan.

Osler suggests doing a series of short, sharp runs—50 to 200 yards—and half-mile accelerations en route. The short bursts aren't all-out. They're merely looseners. The half-mile accelerations are the meat of the workout. Tom prefers to take three of them, starting at normal slow-distance pace and building steadily to nearly top speed at around the 660. Then he tails off gradually. "Nothing is done violently," he says. "No quick, jarring accelerations or decelerations." With violence, the runner invites injuries. Osler hasn't had an injury "of any type" since 1964, despite a heavy racing load and the use of this speedwork method several months each year.

Use it selectively, he says, and it works. By selectively, he means no more than three months at a time, and rarely more than three days a week during that period. Okay, so what results can a runner expect?

"In about six to eight weeks from the start of this sharpening program," says Osler, "the runner can expect to improve from 10-20 seconds per mile. . . I was able to bring my 10-mile time down from 56 to 53 minutes and my marathon from 2:40 to 2:29. My two-mile performance improved from 10:10 to 9:45."

Obviously the pickups work for their creator. But how about others? Amby Burfoot, who won the 1968 Boston marathon, offers this testimonial:

"I spent the fall (of 1968) training five or six times per week. My weekday runs were 15 miles, while on the weekend I got out for longer runs, including a 38 and 36. I averaged 86 miles a week through this period and got over 100 only once. Yet I was feeling good and began doing 'Oslerian pickups.' On my 15, I would run easily for two miles, do 7 x 880 pickups the next 10-11 miles and then do hard, short pickups the last two miles."

Burfoot ended the fall by running a 2:14:28 marathon in Japan—his best by nearly eight minutes.

Opinion on the role and value of hill training is sharply divided. You'd have a hard time getting Ernst Van Aaken or Tom Osler to admit that hill running is good for more than getting you up a hill. Arthur Lydiard and Art Coolidge, on the other hand, invest hills with magical qualities that are invaluable to the overall training process.

We aren't trying to settle the argument. In all likelihood, as in most training matters, there isn't a right or wrong. We're describing here what hill training *can* do and *has* done by looking at its advocates.

Art Coolidge is one of the true believers. With his recent experiences, he should be. After graduating from Kent State University in 1969, Art had let his distance condition slip away. Then, a year later, he spent a summer in Montana. He hiked and ran the mountain trails, rekindling his interest in active running. Art returned to New York and trained for a few

months, then turned to cross-country skiing for the winter. With this background, let him carry on the narrative:

"In January, when I was training for cross-country skiing four or five days a week and running *once* a week, I ran an 8:58:1 two-mile indoors—then my best-ever. I was surprised at the result. . . I'd only run once a week for two months.

"Significantly, I think, that once-a-week run was a hard hill workout—which Barry Brown, the steeplechaser, introduced me to last fall. We both feel that it has influenced our competitive results. . . The hill workout is run on a paved road which goes up a half-mile long hill. It includes seven to 10 repetitions of running up at hard effort and jogging back down again."

The original intent of the once-a-week hillwork, Art says, was to "keep my shins and ankles hardened up for running greater mileage in the spring on the pavement." But within a few weeks of his return to full-time running, his condition was at its highest level ever. On five weeks of training (which included hard runs on hilly courses in addition to the formal hill workout), Coolidge finished sixth in the Boston marathon with 2:23:23—five minutes faster than he'd run previously.

Traditionally, hill running has been viewed as resistance work designed to build strength. Coolidge apparently used it during the 1970-71 winter for that purpose. In earlier years, it was a staple of Percy Cerutty's strength-building. And later on Arthur Lydiard brought in hill training for muscle toughening.

But Lydiard recognizes its speed qualities. That's perhaps why he inserts hill training—repetitions both up *and* down hills—into the transition period between endurance and sharpening work. In his article in this booklet, you'll recall, Lydiard tells of giving a runner only "jogging and some leg-speed work. We just got a little gradual slope downhill and worked on developing leg speed. He went 150 or 200 meters, concentrating on how fast he could move his legs and keeping relaxed."

We can look at hill running as simulated speedwork. An uphill run doesn't require the same violent burst as a flat dash, but it has the same effect on the wind. In other words, on a steep hill even a seven-minute mile pace can be heavily anaerobic. On the other hand, on downhill running it's possible to run faster than normal—to really stretch out and go—without the pushing requires on the flat.

For a slow trainer, hilly running can be particularly valuable since his capacity to tolerate oxygen debt and his muscle coordination (for high-speed running) sometimes slip. Running in the hills can keep him closer to racing sharpness.

Hill work is hard work, and like any type of demanding exercise it requires a certain amount of caution. But this type of running carries in it a reward not found on a fast flat run. Hills give the symbolic satisfaction of getting to the top, and after a tough run up the view from the top is extra nice.

INTERVAL-TYPE SPEED

Let's say for the sake of argument that a quantity of interval training is essential to the training process. Even if you accept this premise, you aren't tied down to a drab routine of 10 or so timed quarters on the track, day in and day out. Intervals offer a thousand variations on the basic theme. They're as flexible as the mind of their user.

Interval training merely implies that a pattern is followed—one that involves control over distance, interval, repetitions and time (*DIRT* for short). Nothing in the rules states that 440s are inherently superior to 390s, that 20 of them are vastly better than 19, or that running them on an asphalt track gives far better conditioning than running them on an asphalt road.

You say you don't mind intervals but can't stand circling the track for a solid hour? Or you say you'd like to do intervals but you don't *have* a track? Well, you can get rid of the idea that tracks and interval training are inseparable. Trackless intervals can be effective and a lot more pleasant than those run on that oversized treadmill, the track.

Escape to the open spaces, and take your intervals with you—to the golf course, the park, the road. Stake out distances if you must, and time them if you feel pace is a crucial factor.

An even simpler procedure, though, is to wear a wristwatch. Decide on a pattern for yourself. Say, one-minute fast runs with a minute's jogging between them. This roughly approximates quarters with a little less than 220 jogging. Then just start and stop each time the big hand is on 12. You never knew interval training could be so uncomplicated, did you?

The feature distinguishing interval training from the fartlek-type work in the last section is the strict attention to the recovery phase. Many researchers say this "rest interval" is as important as the fast segment. Recovery during the rest interval generally isn't complete, and the distance jogged (or walked) is rarely longer than the fast run.

The theory behind "classical" interval training, as Dr. Ernst Van Aaken has pointed out, is "running long distances with rhythmical changes of pace." The jogging/walking breaks allow the runner to carry on a higher than normal pace during certain segments of his run.

These rhythmic, patterned changes of pace can fit in particularly well with the natural terrain training of a cross-country or road runner, and may provide a pleasant variation for the trackman.

The primary aim of trackless intervals, as with all the methods outlined here, is to produce racing sharpness—to put the racing edge on endurance. This aim regulates their content.

• **How much?** Hal Higdon has one view. He says anything more than 10 repetitions is ineffective as a speed-builder. The widely-experienced distance man reasons that once a runner goes over 20, his pace drops so low that he's no longer building speed. He's in the endurance range, and more pleasant methods of endurance-building are available. Higdon says hit up to 10 reps good and fast, then abandon the workout. Following Higdon's suggestion, you get a short, sweet, speedy workout.

• **How fast?** "Racing pace" is a reasonably good guide in pure interval practices like this. After all, that's the aim—to get accustomed to holding race pace. Of course, this term doesn't mean much to a marathoner—who runs his race pace on his daily slow runs. Would he run 10 one-minute runs at race pace and call it a solid speed workout? Of course not. If he feels the need for intervals, he'll need faster ones. Overall effort is the guide: fast yet controlled, demanding yet not exhausting.

• **How often?** Users of intervals feel the greatest need for speed and will have the greatest faith in this system. But even the most ambitious of speed theorists, Fred Wilt, now recommends only about a 50-50 aerobic-anaerobic ratio for a miler—proportionally less for longer distances. Generally, this means that a miler needs speedwork only about every other day. "A short race each week and a day of interval training," Wilt says, "is adequate for the marathoner in terms of speed."

Experts agree. It's the content—the amount, pace and frequency—of intervals that make them work, not the format. The body absorbing them can't really distinguish between training on the track and in the open spaces. But the mind can.

So you find interval training to be bitter medicine, hard to swallow in one big gulp. Maybe it would go down better if you took it in diluted form, mixed in with a more palatable type of running.

Devising tastier interval workouts is a rather easy matter. It can be as easy as chopping them down into smaller portions that aren't as frightening to contemplate as full sessions or as tiresome to work through.

Fred Wilt admits, "I doubt many long distance runners would want to devote an entire workout to sprinting." And he goes on to recommend merely supplementing endurance runs with a dash of speed—a quick set of intervals.

The common way to do these "instant intervals" is to tack maybe a few 220s or a couple of quarters on the end of a long run. Taken this way, they are an extension of the fast finishes and speed supplements ideas outlined earlier.

But Wilt is cool to this idea. "I am very skeptical," he says, "about doing sprinting after a long road run. I think (in the case of the long distance runner) it is better to take a good warmup, then run speedwork, and *then* do some roadwork."

Anyway, wherever the instant intervals are inserted, they have value as a sharpening tool even though they may require no more than five minutes to complete.

Fred Wilt uses the work sprints, but the instant intervals aren't sprints in the way an all-out 100-yard-dash is a sprint. Accumulating oxygen debt on the intervals, due to incomplete recovery, keeps the runner from maintaining maximum speed.

Wilt himself favors an acceleration type of instant intervals: "I personally think one of the best ways for the long distance runner to get speedwork is to use the acceleration sprint," he says. "This means jog, stride and finally sprint, then walk (not jog) for recovery afterward. I like to use 150-yard acceleration sprints for the marathoner and road runner some-

times—not too often. Here is how I recommend it: jog 50, stride 50 (at 70-second 440 pace or faster) and finally sprint 50, then walk 50 and repeat. I consider this absolutely necessary sometimes to build strength and range of movement in the runner."

A basic ingredient in the Arthur Lydiard system is a brief but intensive set of 50-yard dashes. His runners take them this way: 50 yards hard, 60 yards "coasting," then back into another hard 50 and repeat for several laps. Lydiard athletes of the early 1960s often went two or more miles this way.

Even Ernst Van Aaken, the cautious endurance man from West Germant, has picked up on the Lydiard speed plan. "Interval sprints, their number considerably diminished, were adapted from the New Zealand training as a valuable addition," Van Aaken says. "Theoretically, they cannot entail any major oxygen debt. In (our) training they are used occasionally, only as a final polish."

The Wilt-Lydiard-Van Aaken recommendations for 50-yard "sprints" in fact have scientific backing. Dr. George Sheehan reports that exercise physiologists have discovered eight-second intervals develop optimim oxygen uptake for the distance runner. They stimulate him without overtaxing his oxygen capacity.

Dr. Sheehan mentions two minutes as another recommended interval run. "This apparently represents the optimim mixture of aerobic and anaerobic running," he says. The two-minute level works out to 500-800 yards, depending on the runner's ability. And 3x500 meters at racing pace happens to be one of Van Aaken's favorite instant interval workouts. Coincidence?

Routine is the lifeblood of distance running training. The quality of race results rest on a foundation of regular training of proper quantity and quality. Without regularity, the best method is all but useless.

A routine, though, is one step away from a rut. And once the runner steps from routine to rut he also cuts into his racing effectiveness. It's tempting at this point to come out with a flat statement that straight intervals, round and round the track, same distance, same time and recovery for each one, takes runners straight into the rut. Not necessarily so. Research for this book uncovered several runners who thrive on this routine.

But the fact remains that interval training's sameness turns off significant numbers of distance men. If you fall into that group, but still recognize the value of intervals, there are many alternatives. Two already have been suggested—trackless and instant intervals. Here we're offering a third called "free-form" intervals.

Bill Scobey is one of the interval-lovers. He detailed his schedules earlier in this booklet. Though not completely free-form, his intervals tend in that direction. He pre-plans his distances, paces, etc., but they're highly variable and fragmented. During the basic part of his workout, Bill never runs more than five repetitions at on distance/pace before switching to a fresh one.

Perhaps it's his variety that allows Scobey to enjoy his intervals and to run so many of them. That may be the case, too, with the runners who

train under famed Hungarian coach Mihaly Igloi. Igloi dishes out huge portions of interval training—amounts that sometimes total 20 or more miles a day. Yet, like Scobey, the Igloi athletes rarely get many repetitions before there's a break and/or change in routine. A workout covers the spectrum of distances and paces, and only Igloi knows for sure what is to be involved. The athlete rarely knows whether he has one more 220 or a half-dozen. Thoughts of, "Oh man, X more to go!" don't weigh on him. He may run in suspense, and a bit of dread but not in the boredom of knowing full-well what must be done.

Scobey is tied by a common thread with Jack Bacheler and a number of other leading US runners. The thread is Atis "Pete" Petersons, a southern California club coach. Pete coached Scobey in junior college several years ago. In 1968, Petersons strongly influenced Bacheler while the two were at the Olympic Training Camp.

Jack adopted the Petersons system (which is based, by the way, on a "run for fun" concept). Bacheler describes his free-form intervals this way:

"Generally I alternate (days) between distance runs and tnterval training. Interval workouts are always run on one of three grassy fields, without a watch. I run on the track about twice a month. Interval workouts are designed with sets of different distances run at several paces, thus keeping the workout more lively and free of boredom.

A typical workout might include some straights and curves (the long sides of the field being the straightaways), a set of 660s (three, easy), a set of 165s (one easy, one hard), a set of 440s (three at about 62 with 220 jog), a second set of 165s, a set of 220s (four at about 27 with 220 jog). I usually jog a lap or so between sets, avoiding any walking till the workout is finished.

Jack adds that "training has always been a pleasurable experience for me. I try to make workouts both easy and short enough to keep them pleasant."

If we've tried to get across a "message" in this booklet that you can carry away, that would be it. Train for speed, by all means. That's the name of the game. But keep the speed in a perspective that retains its pleasantness. That's an equally important part of the game.

INDEX

NEW VIEWS OF SPEED TRAINING

Speed kills, some runners say. It kills the sprint in their legs and the spirit in their heads.

But speedwork itself isn't to blame for the damage. It's an innocent playthings in the hands of runners and their coaches, to be freely used or abused. Damage comes from carrying fast training beyond natural limits.

When used properly, fast training builds the sharpness demanded in high-speed racing. "Properly" is the key word, and this booklet shows ways to make speedwork both profitable and enjoyable.

New Views of Speed Training has the theme that no training needs to be a drag. This includes speed training. If yours drags you down, something's wrong. Not with speedwork, but with the way you're doing it.

Included are chapters on how fast to go, how often, and in what quantity. Special attention is given to fartlek and interval training methods, as practiced by some of the leading coaches and athletes in the world. The highlight is an article by the famed New Zealander, Arthur Lydiard.

This is a close, positive look at speed. The writers suggest practical ways of gaining the speed, but without the drudgery that too often accompanies fast training. The "new view" is that speedwork does not have to be body- or soul-killing.

(Cover photo by Bob Foster.)

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