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More runners than ever before—from elites to midpackers—are talking about running technique and debating its importance. Which begs the question: Should you change your form? That depends...

BY **PETER VIGNERON**
PHOTOGRAPHS BY **EMBRY RUCKER**

Matter?

Does Form

CATCH THE WAVE
Harry Hollines, on a trail near Denver, is one of the growing number of runners rethinking their form.

One of the problems with sports, not least running, is that when something incredible happens, it is often hard to understand why. Still, people try. ■ Soon after Ryan Hall became the first American to run under 60 minutes in the half-marathon, in January 2007, sportswriters began offering opinions about his stride. The magazine *Marathon & Beyond* wrote that Hall was "a study in minimalism. His legs, slender and long, appear to float, rather than churn." *Outside* said Hall was a "loping wolfhound in a field of shuffling terriers." When Hall later won the 2007 U.S. Olympic Marathon Trials, *Los Angeles Magazine* wrote that he was "fluid" and "rhythmic." In 2008, just prior to the Beijing Olympics, *Runner's World* profiled Hall and wrote of "the immaculate nature of his footfalls."

To journalists, at least, Hall's form is fluid, floating, immaculate—maybe even perfect. But recently, the elements of his form have attracted additional attention. In April 2010, two students from Peter Larson's biology class at Saint Anselm College in New Hampshire went to the Boston Marathon, where they set a high-speed camera alongside the course at mile 17.5. Hall was competing in the race, and the students recorded as Hall and a thousand other runners made their way to the Newton Hills.

Larson, an evolutionary biologist and marathoner, turned his attention to running form and stride mechanics two years ago.

AIR APPARENT
At the 2010 Boston Marathon, high-speed cameras captured the much-talked-about (and envied) stride of American Ryan Hall.

As a runner, he was naturally interested in what science understood about the activity—which, at that point, was limited. In the scientific literature there are two published papers on observed footstrike patterns, and one focuses exclusively on elites. "The only other study in a race situation is from 1980," Larson says. "It's old data, and it's a slow camera, so I'm a little suspicious about it." Larson had experience with high-speed cameras, so he decided to begin recording runners on his own.

By the time Hall reached Larson's students, he had drifted behind the lead pack and was running alone in ninth place. The high-speed camera recorded at 300 frames per second, and the video makes it possible to examine each element of Hall's form a fraction of a second at a time. In slow motion he almost appears to bound. He keeps his upper body still, leaning slightly forward, with his back straight, his arms half dropped, and his palms open. He lands on his midfoot, not his heel. Even at 300 frames per second it is hard to tell exactly when he touches down—it is a gradual, fluid motion. At the same time, his opposite leg extends backward, drifting along behind his body until he pulls it forward and back into service. "Hall has a very distinct arm carry," Larson says. "And while I have no data on this, my sense from looking at the videos is that he has more air time than some of the other guys." That may explain why Hall appears to float.

Larson now uses his video of Hall when he lectures on biomechanics at Saint Anselm. "How his foot hits the ground and how his leg is oriented—in a lot of ways," Larson says, "it's the ideal."

Most of us don't run like Ryan Hall. (Most of us don't set American records, either.) We flail our arms, we land on our heels, and since we don't go very fast, we don't really float. For years, nobody seemed to mind. Runners cared about other things—stretching, strength training, hydration, nutrition, *running*. The conventional wisdom was that trying to change the way you run—to run more gracefully, perfectly, like Hall—would likely cause you more problems than it was worth. The form you had was the form you had.

In most sports, technique and performance are closely linked. Take golf, for example: Golfers derive power from their hips, so hip engagement and rotation are pretty well correlated with how

Courtesy Peter Larson (3 Video Stills); Victor Sailer/PhotoRun (Ryan Hall race photo); Hulton-Deutsch Collection/Corbis (top border)

ALL IN STRIDE
In his lab, Peter Larson studies running form, in real-time and in slow-motion video.

Photograph by JOSH CAMPBELL

far and accurately a golfer can drive a ball. Running is different. How fast somebody runs is mostly about bioenergetics—the internal stuff, like the strength of the heart and efficiency of the muscles—not biomechanics, which is how individual body parts move together. If you wanted to go fast, you were better off lining up for intervals, not perfecting your arm swing.

Recently, however, the hands-off approach to running form has been called into question throughout the sport, from scientists like Larson and Harvard's Daniel Lieberman to elite coaches like Alberto Salazar. Meanwhile, chatter on the topic fills running forums and blogs. Form, it seems, suddenly matters.

"Until just five or 10 years ago, the people who took a look at biomechanics seriously were the top one-half of one percent," says Pete Rea, a North Carolina coach who works with professional and recreational runners. "Now, interest in form is spreading across the spectrum of age and ability. There is a marked increase in interest in the field of biomechanics."

Danny Dreyer has noticed the change. For years, Dreyer has promoted, with mixed success, what he calls Chi Running, a style that emphasizes landing softly with a slight forward lean. Even this magazine has paid Chi scant attention. "In 12 years, this is the first time *Runner's World* has reached out to us," Dreyer says. He has been talking about form since 1999, and he says his book *ChiRunning* has sold 300,000 copies. "When I first came out with this stuff, it was like swimming upstream. It has been like that until very recently."

Things began to change in spring 2009, when Christopher McDougall wrote *Born to Run.* A *New York Times* best seller, the book has helped inspire the barefoot and minimal-shoe revolution. McDougall believes that modern running shoes cause injuries, and for a while, the revolution was just about footwear. Vibram's barefootlike FiveFingers have become staggeringly popular, selling 2.2 million pairs in the U.S. last year. In recent months, however, the conversation has expanded, perhaps in part because McDougall's central claim, that it is both possible and desirable to run without shoes, ultimately relies on a claim about *how* we run when barefoot—which is to say, our form.

But what is good form? According to McDougall and others, running with good form means landing on the middle of the foot, near the body's natural center of mass; maintaining aligned, straight posture; not landing on the heel with a straight knee and an outstretched leg; and avoiding excessive lateral motion—not rotating the upper body or kicking the legs out to the side.

While learning proper technique has appealed to recreational runners, professionals are paying more attention, too. In November 2009, Alberto Salazar, the former New York City Marathon champion turned Nike coach, began rebuilding the form of one of his runners, Dathan Ritzenhein. Ritzenhein is a fragile but enormously talented athlete, and shortly after he switched coaches and joined Salazar's training group in mid-2009, he went on a tear, lowering the American record for 5000 meters and winning a bronze medal at the world half-marathon championships. That success notwithstanding, the pair began making corrections to Ritzenhein's footstrike, hip angles, back kick, and

The Elements of Good Form

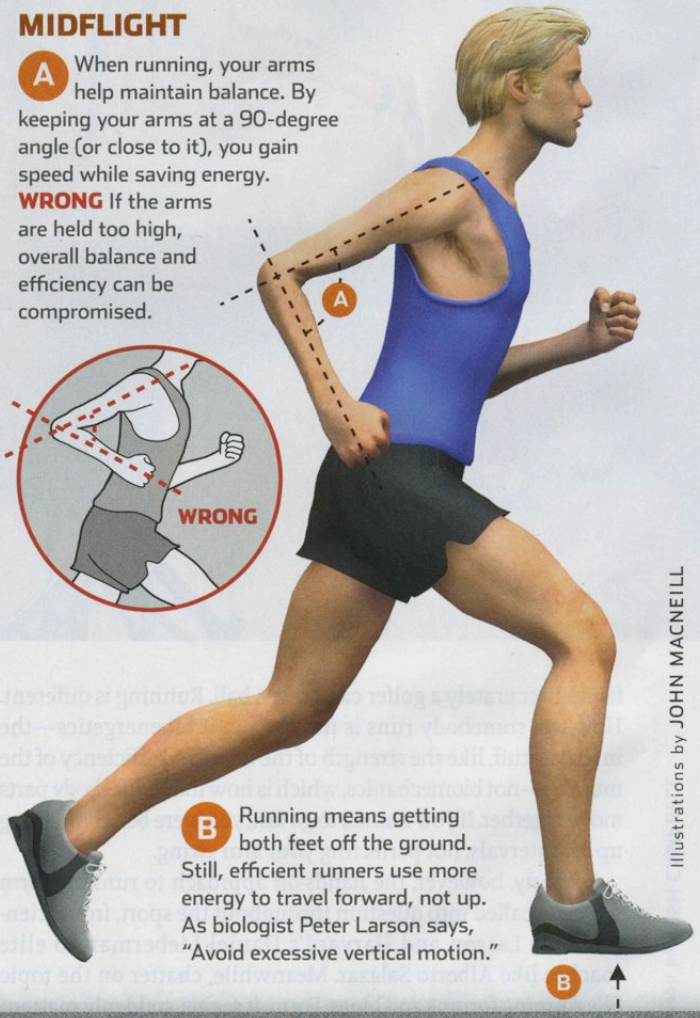
TOE OFF

A What constitutes ideal running form is often debated, but most experts agree that it starts by keeping your upper torso straight (with a slight forward lean) and arms bent at a 90-degree angle.
WRONG Avoid curving your back. Doing so can prevent your legs from extending from your hips.

B Although most runners toe off similarly, midfoot and forefoot strikers benefit from energy at toe off that has been stored in the calf and Achilles.

MIDFLIGHT

A When running, your arms help maintain balance. By keeping your arms at a 90-degree angle (or close to it), you gain speed while saving energy.
WRONG If the arms are held too high, overall balance and efficiency can be compromised.



B Running means getting both feet off the ground. Still, efficient runners use more energy to travel forward, not up. As biologist Peter Larson says, "Avoid excessive vertical motion."

Illustrations by JOHN MACNEILL

arm position, partly mimicking the running style of Ethiopia's world record holder and Olympic champion, Kenenisa Bekele. Salazar believed some of Ritzenhein's injury woes were related to his form, and the changes, he hoped, would reduce his injuries and make Ritzenhein faster. They received close media attention as Ritzenhein prepared to run the New York City Marathon last November, and gave a certain degree of legitimacy to the idea that changing form might not be reckless—if Alberto Salazar was willing to prescribe it, it couldn't be that crazy after all.

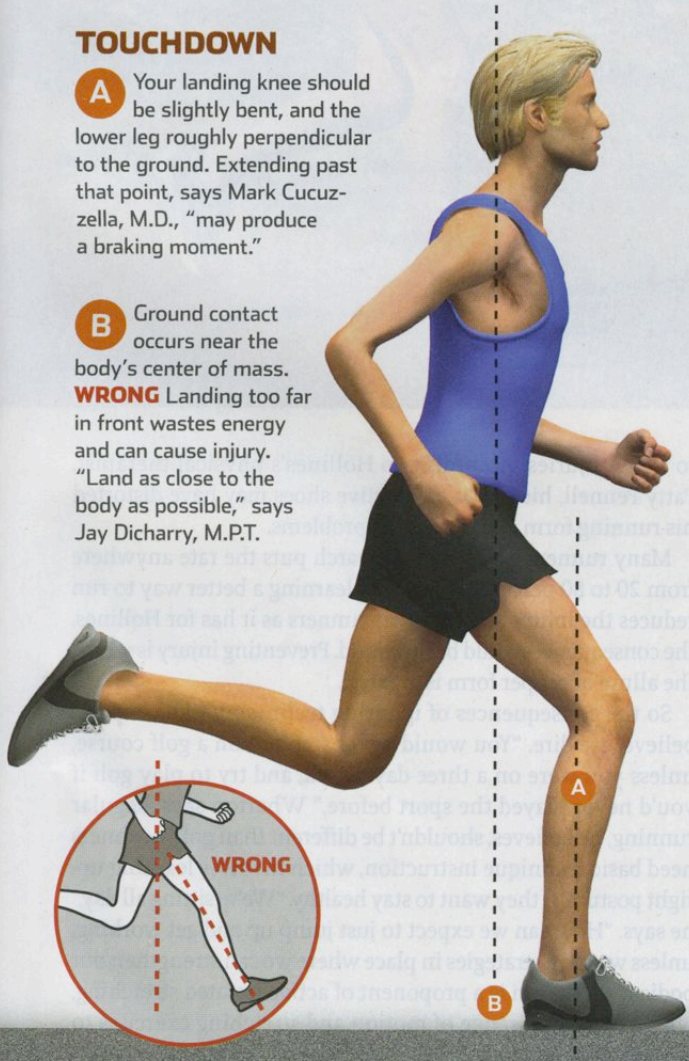
"Ours is one of the only sports where the technical aspect has been the skeleton in the closet," says Phil Wharton, a noted physical therapist who has worked with dozens of Olympians. "If you're not in the right form, and if you can't hold that form, you're going to stay in that injury cycle." If Wharton and Salazar are right, ignoring form may come at a price to both health and performance. But what if they are wrong? "For most people, I don't know if focusing on form is of great benefit," Pete Rea says. "It appeals to our need for the perfect pill or magic bullet, to figure out the secret. When really, there is no secret."

In April 2010, Hall went on to finish fourth, in 2:08:41, the fastest time ever by an American at Boston. Still, a Kenyan, Robert Kiprono Cheruiyot, won the race in 2:05:52, three minutes ahead of Hall in a new course record. And, like Hall, Cheruiyot has pretty good form. In which case, it seems fair to ask: Does Hall's form explain his success, or is it just a quirky footnote to it? And for the rest of us—if we have neglected form, and if we are now to think about changing ours, shouldn't we ask if it actually matters? Does it matter for everyone? Does it matter for you?

TOUCHDOWN

A Your landing knee should be slightly bent, and the lower leg roughly perpendicular to the ground. Extending past that point, says Mark Cucuzzella, M.D., "may produce a braking moment."

B Ground contact occurs near the body's center of mass. **WRONG** Landing too far in front wastes energy and can cause injury. "Land as close to the body as possible," says Jay Dicharry, M.P.T.



FRONTAL VIEW

A Other than your legs, look to minimize movement of body parts: arms swing upward from the hip, not out or in. **WRONG** Arms should not cross the center line of the body. "Avoid excessive side-to-side movement of the arms and legs," says Larson. Such action reduces efficiency.

B Knee lift reflects speed—an elite runner may barely lift his knee while jogging but will bring the upper leg parallel to the ground when sprinting. For runners trying to maximize their speed, a high knee lift is necessary.

TURNING THE PAIGE
A top distance runner, Paige Higgins rebuilt her form to get faster but ended up getting injured. She's now trying again, more cautiously, with Mike Sharkey.

Harry Hollines is a business development executive and a former Division I basketball player. In 2007, after a heart scare, he began running at the advice of his doctor. (The scare was a false alarm, but enough to get him training.) Hollines, then 37, found that running reignited his competitive instinct, and after six months he was logging 40 miles a week near his Denver home and thinking about a marathon. Three months later, however, he was injured: first with iliotibial-band syndrome, then with plantar fasciitis and Achilles tendinitis. "Eventually," said Hollines, "I couldn't run any more." His wife, Maria, recommended a physical therapist, but Hollines couldn't shake the problem. Then, in June 2009, he noticed that he felt better walking around his house without his shoes on. After some research, he tried running barefoot. "That's when I noticed the changes in my mechanics," he says. Significantly, his injuries dissipated.

Hollines's story is typical of the barefoot movement, which rejects the idea that feet need to be cushioned and supported in order to run without injury. Barefoot runners believe the opposite—that cushioned, supportive shoes may actually hinder the foot's natural ability to absorb shock and, paradoxically, lead to more injuries. According to Hollines's physical therapist, Patty Pennell, his heavy, supportive shoes may have distorted his running form and caused his problems.

Many runners get injured (research puts the rate anywhere from 20 to 80 percent per year). If learning a better way to run reduces the injury rate for other runners as it has for Hollines, the consequences could be profound. Preventing injury is where the allure of proper form is greatest.

So the consequences of ignoring technique, some experts believe, are dire. "You would never step out on a golf course, unless you were on a three-day drunk, and try to play golf if you'd never played the sport before," Wharton says. Regular running, he believes, shouldn't be different than golf—runners need basic technique instruction, which involves learning upright posture, if they want to stay healthy. "We're sitting all day," he says. "How can we expect to just jump up and get working, unless we have strategies in place where we can strengthen our bodies?" Wharton is a proponent of active isolated stretching, which combines range of motion and stretching exercises to correct misaligned posture and properly lengthen muscles. Hollines has taken that message to heart. He now spends up to

30 minutes per day stretching, working on core strength, and doing exercises to keep his feet and calves strong.

Other researchers believe that modern running shoes encourage poor form. Shoes with high, cushioned heels allow runners to have long strides and make heel-first landings that they would avoid if barefoot. That elongated stride, some researchers say, increases the risk of injury, possibly by raising the speed at which forces travel into the body at touchdown. "These shoes seriously disrupt the sensory input in the foot, and that sensory input is a major factor in regulating injuries," says Craig Richards, an Australian doctor who published a 2008 paper that found no link between running shoes and injury prevention. Humans have a natural ability to protect their bodies, Richards believes, and thick shoes interfere with it. "There is a significant concern that this neurological disruption might actually lead to a maladaptive gait pattern," he says.

Researchers have found evidence that heel-striking increases loading rates in the shins and knees, and other studies have linked higher loading rates—meaning how fast impact forces travel into the body—to injuries in the shins. A paper published in January by researchers at Delft University of Technology in the Netherlands found that loading rates are higher in runners who sustain certain stress fractures. Together, the studies hint at a link between heel-striking and injury, even if the connection has not yet been explicitly established.

In clinical practice, biomechanists and physical therapists are using form instruction to treat injured runners. Irene Davis, Ph.D., P.T., who is on the faculty at Harvard Medical School and directs the Spaulding National Running Center, a clinical and research center in Boston, has coauthored several papers on form and injury. In Davis's studies, runners who were told to land softly and quietly or to activate certain muscles were able to significantly lower impact forces to their lower legs and, in some cases, resolve chronic injury problems. "We're able to retrain gait patterns and significantly reduce people's pain," Davis says.

Last December, I met Hollines for a run on the High Line Canal Trail, a crushed-gravel path that winds through the southern suburbs of Denver. As we ran, I found it hard to imagine him as an injured, out-of-shape executive. He is trim, though well muscled. Over the course of an hour, my repeated impression was that he was remarkably composed: His upper body was steady, he took short strides, and he landed on his midfoot.

Hollines wore a pair of slipperlike shoes called the Terra Plana Evo, which offer a puncture-resistant outsole and a flexible upper; they are similar to Vibram FiveFingers, but without the toe sleeves. When Hollines was first experimenting with different shoes and barefoot running, he asked his coach, Maureen Roben, to evaluate his form on a treadmill. He started by wearing heavy, supportive shoes, then changed into racing flats. "Interestingly enough," Roben said, "the more minimalist his shoe became, the better his form became."

Hollines has become fascinated with the mechanics of running, and we talked about several recently published papers on footstrike and impact-loading rates. When he runs in traditional shoes, he says his stride feels unstable, like he is on the verge of injury and his feet have forgotten that he's running, slapping the ground recklessly. Hollines has even asked a cobbler to replace the soles of his work shoes with a flexible bottom made by Vibram.

Today, Hollines's running is better in every respect than it was two years ago. He has not been injured in more than 18 months, and now runs more and trains harder than he ever has. And he has become respectably fast. His first 5-K, which he ran in the Mizuno Renegade, a motion-control shoe, was in the 21-minute range. Last October, he finished second at a local 5-K in 18:24, a 44-second PR. "Most of the 5-Ks up in Colorado Springs and Denver are not only hilly, they're at altitude," he said. "If I could ever get a flat race at sea level—who knows?"

During his hall of fame career, Arnold Palmer won seven major golf championships, became the spokesperson for dozens of advertisers, earned millions of dollars, and enjoyed the affection of everyman golfers, even though—or perhaps because—he had an ugly swing that defied many rules of proper mechanics.

BARING HIS SOLES
When he started running barefoot, Hollines saw his form improve—and his injuries disappear.

Paige Higgins hasn't won the acclaim of Arnold Palmer, but she is an elite runner, and she shuffles. At top speed, Higgins has the look of a race walker, or maybe a thin, focused professional hurrying across a parking lot, and less that of a world-class athlete. She runs with an unusually low knee lift, such that her feet barely rise off the ground, and she shows no trace of Ryan Hall's flowing back kick. Her arms, by contrast, are busy. They swing decisively across her chest, then strike behind and to the side. Compared with her legs, Higgins's arms appear to be the primary drivers of her forward motion. Watching her run requires a certain quality of self-restraint: It is almost like seeing a frightening movie, except the impulse is to yell "Lift your knees!" instead of "He's in the kitchen with a steak knife!"

Yet Higgins is one of the better runners in the United States. Her fastest marathon, 2:33:06, placed her seventh at the 2008 Chicago Marathon and made her the eighth-quickest woman in the country that year. She has a shoe contract with Saucony, runs up to 140 miles per week, and has won a national title at 25-K. In 2009, she represented the United States in the marathon at the World Championships in Berlin.

Still, while Higgins is accomplished, her career has been up and down. Pro runners live precarious lives. Most get one or two shots at a big payday or Olympic berth; if they fall short, it becomes hard to stay in the sport. By early 2010, two years after quitting her job as an art teacher, moving from Colorado to Arizona, and joining a full-time training group, Higgins hadn't cracked the elite tier of American marathoners. With her coach, Greg McMillan, she was engaged in an increasingly desperate search for a breakthrough performance, and after a series of so-so marathons, she and McMillan decided that her form was partially to blame. So they decided to rebuild it from the ground up.

With his new form, Hollines has stayed injury-free and cut three minutes from his 5-K. "If I ever get a flat race, who knows?"

McMillan coaches 19 postcollegiate athletes, and only Higgins has undergone a form overhaul. By the time runners reach his group, they often have as many as 10 years of competitive running behind them, and like any repetitive activity, the mechanics of running eventually harden and don't easily change. McMillan sometimes cleans up his runners' form, adjusting an arm angle or encouraging better knee lift, but he has avoided altering the essential nature of a runner's stride.

Higgins's form, however, needed a good deal of attention. Though she ran upright, she was heel-striking and her stride rate was too high—even at an easy pace, she took more than 200 steps per minute, and McMillan believed that she would be better taking 180, which is widely considered ideal. McMillan thought that years of high-mileage training had turned Higgins into a runner who was efficient but lacked power—she could run forever, but her racing ability at short distances was relatively poor considering her marathon time. "We were running into a speed limitation, not an endurance limitation," McMillan said.

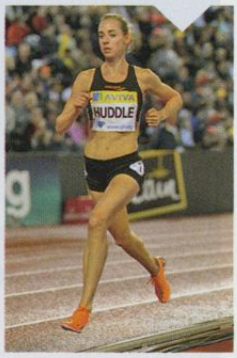
The scientific community believes that runners who heel-strike may waste energy. Runners who land on their midfoot don't brake their body weight as they hit the ground, conserving energy and slowing the rate at which impact forces travel up

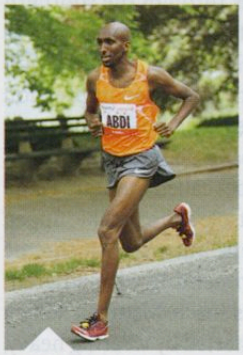
Victor Sailer/PhotoRun (6 race photos)

The Pros Strike a Pose

PRETTY PERFECT

BERNARD LAGAT is widely admired for his forefoot strike and smooth, graceful style. While a mild heel-striker, **SHALANE FLANAGAN** runs with no lateral motion, directing all of her energy forward. **MOLLY HUDDLE** used her forefoot-striking form to break Flanagan's U.S. 5000-meter record in 2010.





STRANGELY EFFECTIVE

ABDI ABDIRAHMAN has a heel-strike that is perhaps the most pronounced on the pro circuit. Though known for a conspicuous head bob, **PAULA RADCLIFFE'S** arm swing is also uneven. **DATHAN RITZENHEIN** spent a year learning to run with a midfoot strike, and is now waiting for the payoff.

the leg. "If you treat the leg like a spring, it catches the body and pops it back up in the air," says Peter Weyand, Ph.D., a professor of applied physiology and biomechanics at Southern Methodist University. In a midfoot strike, Weyand says, the muscle and tendon structure absorbs, stores, and releases energy without much waste. (For a sense of how that feels, try taking a few strides on your midfoot. You should feel your quads and calves working harder, which means that they—not your bones—are absorbing energy.) But when researchers graph the energy-return patterns of heel-strikers, they see something else. "The heel-strike is dissipated energy," Weyand says. In severe heel-strikers, impact forces are absorbed by the bone structure, which does not store energy well. Theoretically, the harder the heel-strike, the more energy is lost. Current technology is not sophisticated enough to capture what that might mean in a race, but Weyand believes it is modest, though not insignificant. "Two or three percent for these elites is huge," he says. For Higgins, three percent might mean almost a five-minute improvement—the difference between making the Olympics and going back to teaching art.

In Flagstaff, McMillan broke Higgins's form-changing process into three phases. First, he had her focus on a series of nonrunning movements—one involved standing in place and lifting her knees one at a time, which was meant to engage the full range of movement and the full power of her hip muscles. In the second phase, Higgins did drills—high knees and lunges—hoping to take advantage of her new range of movement with dynamic, rather than static, exercises. In stage three, McMillan had Higgins run with a midfoot strike, higher knee lift, and a slightly longer stride. "Greg kept saying, 'Get an inch,'" Higgins said. To practice a cadence closer to 180 steps per minute, she clipped a metronome to her sports bra during training runs.

Changing form required considerable effort from Higgins. At one point she calculated taking 210,000 steps per week.

"We were able to see changes," McMillan told me. "We were able to get a longer stride, a slower cadence, and improve her basic speed. We timed her in 100 meters, and she got faster by a second, which is pretty significant." From the perspective of technique, the experiment was essentially a success. By September, Higgins was running the way McMillan imagined.

But it required a great deal of effort, both physical, as her body adjusted to a new stride, and cognitive—Higgins was conscious of every step she took, and she calculated that she was taking around 210,000 steps per week. Even on easy distance runs she felt sluggish. "It was so awkward," she said. "I was exhausted."

Struggling with easy distance runs, never mind hard workouts, is enough to wear down even the toughest runner, and eventually Higgins's mood soured. McMillan stopped assigning the more aggressive exercises. Then, in October, as Higgins was preparing to race the New York City Marathon, she landed awkwardly on a rock. A week later, she was diagnosed with a stress reaction in her left foot. Higgins believes that midfoot striking had weakened her metatarsals, small bones in the foot. "It was a buildup, where it was getting weaker and weaker," she says. (When I asked McMillan, he said he wasn't sure how she injured her foot. "She was training for a marathon. It's impossible to know for sure.") The next day, Higgins flew home to Colorado, where she moved into a one-bedroom apartment with her cat, Boston, and asked her brother-in-law, Mike Sharkey, to help coach her. She continues to tinker with her form, doing variations on exercises she previously did with McMillan, albeit cautiously. "I'm still working on [my form]," she says. "But I learned the hard way that being too aggressive can lead to injury."

It is possible to change form, as Harry Hollines and Paige Higgins prove. But is it practical? The answers, as Hollines and Higgins also suggest, are mixed. Even changing stride rate and length, which is likely the simplest form change to make, has proved challenging. "For distance running, people naturally select the stride length most efficient for them," Iain Hunter, Ph.D., a biomechanist at Brigham Young University, says. Hunter has examined what happens to running economy—a measure of how quickly the body burns oxygen—when runners deviate from their natural stride length. Even when a change should make a runner faster, like asking Higgins to take 180 steps per minute, Hunter has found that economy worsens. "We realized that changes [to form] will happen with training, but you don't make the changes and have the training follow," he says.

Nor is it clear that runners need good form to race fast. Paula Radcliffe, the marathon world record holder, has a famously idiosyncratic style of running, most notable for an awkward head bob. Runners normally hold their heads stable, but Radcliffe's nods forward and to the side with each step, a trait that seems to worsen with fatigue. She also has an uneven arm carriage, with her left arm dropping lower during her back swing than her right. The effect is that her gait looks halting even when she is not, relatively speaking, in a state of duress. "With the head bob and everything," one coach mentioned to me, "you'd think she was going to fall over." Radcliffe never worried about it.

"We looked at it way back, and there was nothing wrong with it," she says. Neither she nor Andrew Jones, a physiologist who has consulted with Radcliffe since 1992, believed that fixing the nod was worth the effort. "Changes to form that take a massive amount of effort take away from the actual training, and that's a problem," she says. And there is good reason to think that our aesthetic idea of good form—the idea that Radcliffe is jerky, for example, or that Ryan Hall is *(continued on page 138)*

Videos illustrating the elements of running form described in this article, including slow-motion gait analysis of Ryan Hall, are available at **runnersworld.com/runningform.**

BECAUSE IT'S STEEP

Continued from page 84

sure I've ever experienced before. I squat low—as close to crawling as a 49-year-old man wishes to do—leveraging against the mountain like a lineman driving up against a blocking sled. I think I am running. I cross the line in 1:56 something. Someone gives me a silver Mylar cape, someone else a "Race to the Clouds" medal, and like a woozy pilgrim I follow a stream of bibbed men and women up the last few boulders to the actual summit, 6,288 feet above sea level.

I see the swarm of people crossing the sponsor-emblazoned finish line, the announcer trying to keep up with the litany of hometowns they represent, from Lewiston to Halifax to Milwaukee. Across the wide, 52-acre expanse of the summit dome, there is a mosh pit of humanity—friends and family all eagle-eyed and rummaging through hunched-over loved ones, looking to deliver attaboy backslaps to a conquering hero. Bluebird skies and warm, flowing sunshine play like music to the celebratory mood.

Unlike the reverse perspective from the base up, this long view is far more satisfying. If I'd merely turn around, I would see the observatory building and the visitors center with hundred-mile vistas in the direction of Vermont, New York, and Canada. Instead I clutch the summit sign for a photo op and scan back down the wavy contours of the road, until it is only a scratch in the lower engulfing forest. It doesn't look that steep or all that menacing from up here. The rush of having stopped is almost enough to forget having run up it. My legs are already returning to life. "How steep is it?" somebody could ask me right now. "Not that steep," I'd reply.

Later, Gus, one of TG's founders, would ask if he'd see me next year. I wouldn't fully commit, but I would think about what Dave Dunham had said the night before at the Eagle Mountain House during the 50th-running party. "What's the most memorable Mount Washington race?" he was asked.

"Tomorrow's," Dunham said. RW

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DOES FORM MATTER?

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smooth—does not match well with performance or injury. Jack Daniels, the legendary coach and physiologist, once videotaped 20 runners, and then sent the tapes to a group of coaches and physiologists and asked them to rank the runners in order of running economy. None could.

The changes that Dathan Ritzenhein made occupied the better part of a year, a period in which he did not race and was often injured. One reason Ritzenhein and Salazar had looked to form was to avoid injuries in the first place. "It's a hard thing to do," Ritzenhein says. "It takes a while, and it takes quite a bit of effort. Even on a nice normal run you have to think about what you're doing." By February, the changes were long complete, but Ritzenhein was injured again after a hard workout on an indoor track irritated his left Achilles tendon. In March, he underwent surgery and may miss the summer track season. I asked Ritzenhein whether he felt that changing his form was worthwhile. After all, he had broken the American record with his old stride, his first major race with the new form had gone poorly, and he still ended up injured. Ritzenhein took a deep breath and paused. "I'm not sure," he said. "I'm in a bit of a state of limbo. I feel like I've gotten used to the form, but I haven't had the race to say, 'Wow, it made a huge difference.'"

Still, it does seem reasonable to suggest that, for certain chronically injured runners, regardless of ability level, changing form might well be a cure. It is possible that many modern runners, in modern shoes, have learned a maladaptive style of running, one that causes them to run inefficiently and predisposes them to injury. And for runners who find themselves injured all the time—especially in the shins and knees—a change in form could very well provide an answer.

But most injuries, according to Blaise Dubois, a Canadian physical therapist, are the result of overtraining, not biomechanical flaws. Before you throw your stride away, you might check that you have the right training plan. Dathan Ritzenhein's priority was always proper training, even at the height of his stride transformation. "For a year, [form] was maybe in the top five," he said. "But we always ran 100, 120 miles a week. We lifted. We did intervals. We did long tempo runs. Those were the key things."

In addition, there is not a single controlled study in the scientific literature comparing injury rates or efficiency among shod and unshod runners, or midfoot-strikers and heel-strikers—in other words, nobody knows if good form is, in fact, good. The evidence that exists does not support any definitive statements about form, neither that it causes injuries nor that it prevents them, which is why changing form must be treated on a case-by-case basis. For a new runner with chronic shin pain, changing form could be a good idea. A veteran runner with no long-term injuries faces a different, riskier decision. As runners switch to a midfoot strike and store energy in the calf and Achilles, they also put more stress on those areas. That could be good, or bad. "If you get that bump in economy," Peter Weyand says, "you should be able to run faster. But you're probably running an increased risk of injury."

Put another way, changing form is like a medical intervention—to fix an ailment, you get a prescription, in this case to alter your stride. But just as in medicine, the question isn't always which intervention works, but how people apply it. It doesn't matter how good your medication is if you take it erratically. And it doesn't matter how great midfoot-striking is if you don't learn it properly.

Perhaps—and this, too, is speculative—the modern cushioned running shoe makes running easy for the modern runner. This seems like a good thing. Should millions of runners suddenly decide to change their form and then find that running is no longer a manageable activity, it would be a tragedy. The solution to an imperfect state of affairs ought not make things worse—it should not produce more injured, unhappy runners.

"The sensible advice is, if someone has a reason to change their footwear, or they're interested in changing their gait, they need to do it in an educated way," Craig Richards, the doctor from Australia, says. Richards's landmark 2008 paper on shoes and injuries ("Is Your Prescription of Distance Running Shoes Evidence Based?") was important because it found no evidence that running shoes prevent or cause injuries. But Richards is just as quick to note that the evidence doesn't support the barefoot style of running. "People need to be prepared to take the time to do it," he said. "And if they're not, they shouldn't go there. It's not for them."

In February, I reached Ryan Hall by e-mail. I wanted to know what he thought of all the attention his form has invited over the years.

"I get good and bad reports of my form all the time, from all sorts of different people, some of whom have no idea what they're talking about," he wrote. "I think we'll see what perfect form looks like in heaven." RW