

# Break through the speed barrier with the 'new interval training'

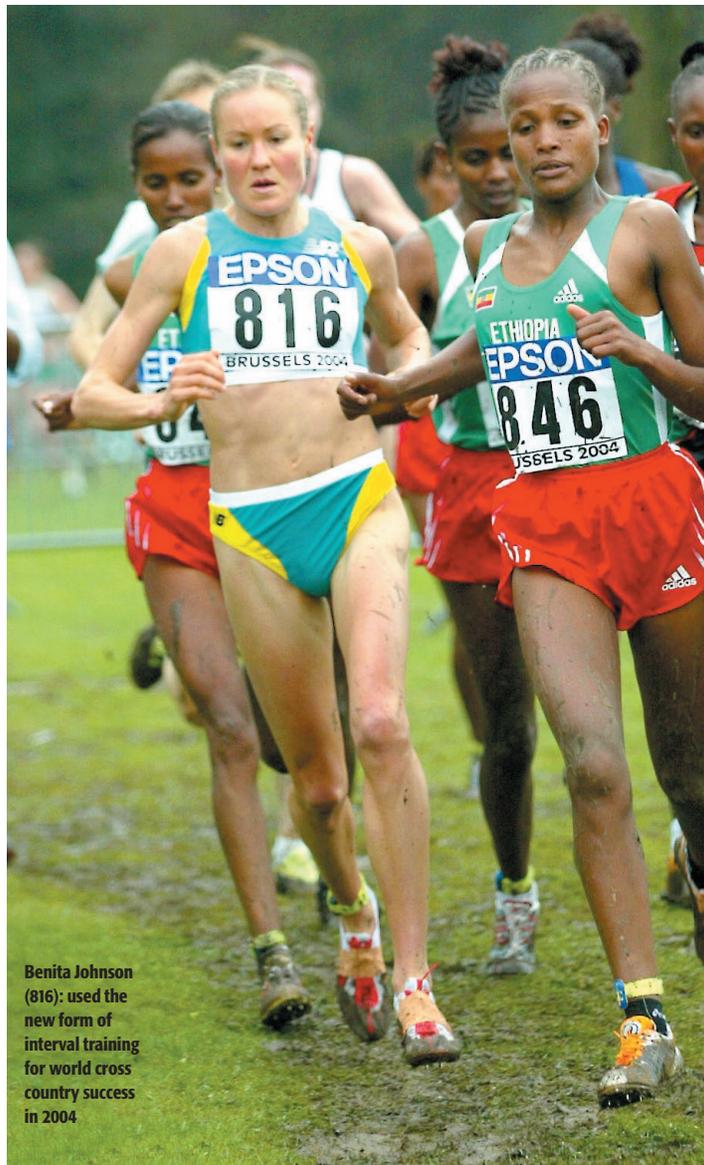


Using more active recoveries can result in better performances, says international coach PETER THOMPSON

**T**WO coaches were walking slowly towards the entry gate of their local track. "That Cadbury bar in your hand is chocolate," said one. "Yes, I know that," came the reply. "But not all chocolate is Cadbury." "Yes, I know that too. And, your point is?" "Well, you said that your athletes were doing an interval session tonight. Are they really doing an interval session? Or, are they actually doing a repetition session? Because, while in the same way that all Cadbury is chocolate but not all chocolate is Cadbury; all interval training is a form of repetition training but not all repetition training is interval training." "You know, you can be so annoying. And, just why is this point, that you feel you have to have to make, so important?"

Just why is this distinction between repetition training and interval training so important? Because, before we can look at the exciting prospects of the 'new interval training' we must know what the old interval training is and precisely why it is called interval training.

You are all aware that coaches and athletes frequently use repetition training by breaking distances down into parts, with the parts being repeated, such as 15 repetitions of 400m. This breaking down of training into smaller, more manageable bites has probably happened since the very first time that a man or woman put on clothing for a formal training session; and we start to find clear references to 'repetition training' by the early 1900s. To find the origins of the special form of repetition training known as 'interval training' we must also go back in history, almost 70 years to the late 1930s. At that time a German coach, Woldemar Gerschler, was a pioneer attempting to base his training methods on solid physiological and psychological principles. For the physiology, he teamed up with Dr Hans Reindell; and they applied Gerschler's understanding of the importance of cardiovascular conditioning in the search for a training method which would maximise the size, fitness and



**Benita Johnson (816): used the new form of interval training for world cross country success in 2004**

efficiency of the heart.

Gerschler and Reindell devised a form of repetition training where the athlete would run over a relatively short distance, such as 200m, at a relatively fast pace, a number of times. The name of the system, interval training, was because the rest or recovery period between the faster runs was considered the most important and vital part of the training. It is during the interval that the heart adapts, growing larger and stronger. In its original form, the next faster run would not start until the heart rate had returned, in the

interval, to 120 beats per minute. If this did not occur within 90 seconds of the end of the previous faster run, the workout was considered too difficult and had to be adjusted. Otherwise, the heart would be overworked, leading to fatigue and exhaustion, rather than to the desired training effect.

What was the impact of this interval training all those years ago? On July 15, 1939, Rudolf Harbig, having been coached by Gerschler using interval training, raced 800m in 1:46.6. This represented a massive 1.6-second improvement on the

world record and is still recognised as one of track's landmark performances. Less than a month after his 800m record, Harbig covered 400m in the world record time of 46.0. Harbig's 800m record endured an incredible 16 years until Roger Moens, again coached by Gerschler, ran 1:45.7 in 1955. More significantly, it raised the world's attention to a new method of training. Interval training became well and widely known, spreading from athletics to all other sports. It is still used by many coaches and athletes today in various guises but the essential thing is that the training effect takes place during the interval between the faster runs or efforts.

Move on now to the present day and our understanding of how the body produces energy has vastly changed and it is possible to identify a 'new interval training' where the training effect we're looking for happens, again, specifically in the intervals between faster runs.

As a coach or athlete you're probably aware that lactic acid can form when you're exercising, particularly when it's an intense activity. You may believe, or have been told, that it *only* forms when you 'run out of oxygen', that the burning sensation that comes, say, from a long, fast sprint is caused by this lactic acid. You may also believe that the soreness that comes the day after a hard training session is again caused by lactic acid and that massage will help to get rid of this waste product. From all this you may still believe that lactic acid in the body is very bad news.

The reality is very different. All the old beliefs of how bad lactic acid was are now known to be unfounded. It is not produced just when the body 'runs out of oxygen', it doesn't produce burning sensations and it doesn't produce muscle soreness. Far from being a troublesome waste product, lactic acid or part of it, can help us produce more energy, more quickly. We now know that lactic acid, as such, just does not exist in the body. As soon as it's formed it splits up into a 'lactate bit' and an 'acidic

bit'. The lactate bit is definitely not a 'bad guy' but is instead a positive and central player in our metabolism and in how we produce energy.

Understanding the role of lactate in the body makes it easy to understand why certain types of training we have done in the past have worked so well and how we can now apply this knowledge more precisely, including using the new interval training to really bring about major improvements in performance.

As you are sitting and reading this article you are producing lactate, and at the same time you are using it and moving it around the body but you are not building up high levels and so you are not aware of the process. Lactate production within your muscles occurs in healthy, well oxygenated individuals at all times. Coaches and athletes, however, are not so much concerned with rest as to what happens during exercise and in the recovery from exercise.

During exercise, an athlete's lactate level may be assessed by taking a small sample of blood and measuring the concentration of lactate. In the past, these lactate values have sometimes been incorrectly used to make projections on lactate production. Since lactate has the capacity to be both introduced and removed from the blood, the lactate level which we measure at any one time is actually a measure of accumulation in the blood, not production. In 1986 this dynamic movement of lactate around the body and its potential to actually produce more energy in the muscle was given the term 'Lactate Shuttle' by the American physiologist George Brooks. It took some time before the importance of Brooks' research was recognised by either other physiologists or coaches. The excitement when I encountered this research in the mid-Nineties was because it explained many of the things I had observed, both in my own coaching and from the fluctuating running rhythms of the East African athletes. In 1996 I introduced the term, 'Lactate Dynamics Training™' to specifically classify the training for the lactate shuttle, the clearance of lactate from one area and removal to another so that the lactate is optimally used.

Lactate Dynamics Training is any form of training where lactate production is deliberately increased by the intensity of exercise and then alternated with periods of less intense activity. In this way the muscle cells learn how to both clear and use the produced lactate during

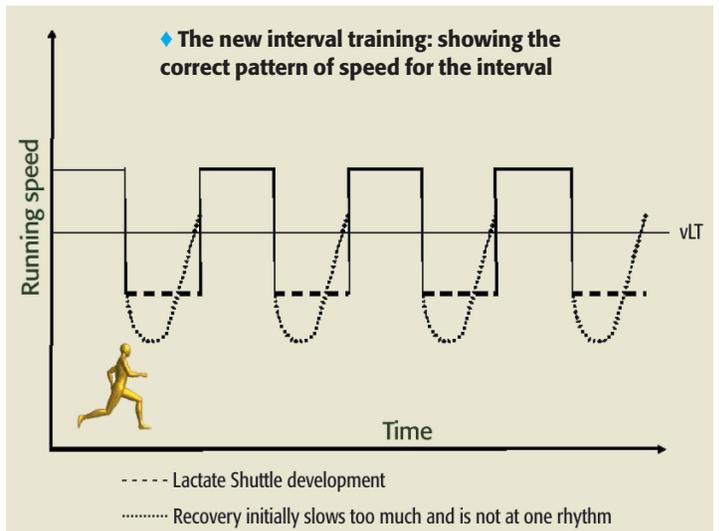
the less intense recoveries. With even more intense levels of exercise, the lactate may spill substantially into the blood, raising blood lactate levels. The alternating lower intensity periods then become a time when lactate clearance rates can really be accelerated, provided that these recoveries are not too slow. This alternating of pace produces a massive improvement to the lactate threshold, a very strong predictor of performance.

You're probably thinking already, "alternating periods of faster running with periods of slower running" – but that sounds very much like fartlek training. Well, you're right on the money. Properly done, fartlek training is a classic form of Lactate Dynamics Training and trains the lactate shuttle in an environment away from the track. The problem is that the fartlek done in clubs can be generalised as being too fast on the fast sections and too slow on the slower, recovery sections. This does not train the lactate shuttle very well. If the fast sections were not quite so fast, say about 5000m/10,000m pace for a four-mile fartlek, and the easier sections at 10,000m/ marathon pace, then the lactate shuttle would be better trained. The object is to accumulate some lactate and then in the easier, recovery sections to both use it as fuel and to clear it.

If we now take the concept of Lactate Dynamics Training to the track and apply it to our repetition training, we find the new interval training; where the training effect, as in the classic interval training, occurs specifically during the interval between the faster runs.

How might this look in practice? Well let's start by looking at our classic 15x400m repetition session and make this into a new interval training session. Each recovery now becomes a very active 'float' or 'roll-on' run. These roll-ons are not overly long and at a pace controlled by the athlete, so that they become more active as the athlete's lactate shuttle abilities develop. A recovery of 100m 'float' or 'roll-on' would be effective for this session, where the athlete goes from the pace of the 400m to an even, easier speed for the active 100m roll-on. The goal, whether it's an experienced or inexperienced athlete, would be not to slow down suddenly at the end of the 400m and then speed up as the next repetition approaches but to transition smoothly and quickly from the pace of the faster repetition to the pace of the recovery.

For a developing athlete, and a



lower number of 400m runs, the recovery 100m roll-on might naturally take 30-35sec; whereas a senior athlete may well cover this 100m in 20-25sec. I covertly time these recoveries and if the athlete starts to deteriorate significantly from the recovery time they had commenced the set with they take a longer, less active break of three to five minutes, before continuing with the set. To make the session even more powerful, the pace of the 400s would be varied so that the 100m roll-ons are dealing with clearing and using differing amounts of lactate. The new interval training session might eventually look like: three sets of 5x400m, with the 400s in each set run at 5000m pace, 3000m pace, 5000m pace, 1500m pace and 5000m pace. The 100m roll-on recoveries would be the interval between the 400s, with an active 800m roll-on between the sets.

Another example of the new interval training would be a goal of running 15x200m at 3000m pace with an active 200m roll-on. The rhythm goal might be 36sec for the 200s with a recovery of 200m in 54sec. If the athlete falls off either the 36sec or, particularly, the 54sec recovery, they take a three-minute active rest, resuming to achieve the total of 15x200m in 3000m pace. These are just a couple of examples and the range of sessions possible is limited only by your imagination, provided that the training effect is occurring in the interval between faster runs.

What is the evidence that this new interval training is effective? It is proved in the performances of many, many athletes such as Brendan Foster, Benita Johnson, Paula Radcliffe, Stefano Baldini and Hicham El Guerrouj, all of whom have used variations of this rhythmic approach with very active recoveries. Foster

used to run miles in training where he ran hard for 50m and floated for 50m, reportedly going under 4:20. In February, 2004, at the Australian national championships Benita Johnson caused a gasp as she set off in the 10,000m race to qualify for Athens with a 72sec lap. She then ran a lap of 82sec, causing another reaction from the spectators, and then proceeded to win the race running precise alternations of 72/82sec for the remainder of the distance. A classic lactate shuttle session. It was no accident then that a month later she won the IAAF World Cross Country.

Paula Radcliffe was seen just before the Helsinki World Championships carrying out a continuous and demanding interval session at Loughborough which included some 200s close to 30sec with recoveries of 200m in 40sec. The coach to El Guerrouj always emphasises that the work he does is rhythmical, not tied to rigid times, and with very active recoveries. And we could go on, emphasising, in particular, many of the successful non-East Africans.

Try the new interval training for yourself. Try making recoveries more dynamic, and the whole session more rhythmic, dictated by the perception of pace, rather than slavishly following a stopwatch. As you do, the ability to judge pace and run at various rhythms will improve but, most importantly, with this new interval training your competitive performances will really take off.

Back at the athletics track our two coaches had now reached the entrance. "Actually, it is an interval session tonight," said the second coach. "We're going to try this new type of interval training I read about in *Athletics Weekly* – it's supposed to be really effective. I suppose you want a piece of this chocolate?"