# BMC News

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## British Milers' Club

Founded 1963

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| | |
|---|---|
| President | **Dr. Norman Poole**<br>23 Burnside, Hale Barns, Altrincham, WA15 0SG |
| Chairman | **Tim Brennan**<br>Cannon Platt, Moorlands Drive, Pinkneys Green, Maidenhead, Berks. SL6 6 QG<br>Tel 01628 415748<br>Email timbrennan@britishmilersclub.com |
| Vice Chairman | **Steve Mosley**<br>95 Beale Close, Danescourt, Cardiff, CF5 2RU<br>Tel 0292 030 6733<br>Email steve.mosley@lineone.net |
| Secretary | **David Reader**<br>18a Maidenstone Hill, Greenwich, London, SE10 8SX<br>Tel 07929 860389<br>Email davidreader@britishmilersclub.com |
| Treasurer & Adminstrator | **Pat Fitzgerald**<br>47 Station Road, Cowley, Uxbridge Middlesex, UB8 3AB<br>Tel 01895 811822<br>Email patfitzgerald@britishmilersclub.com |
| BMC News Editor | **Dave Sunderland**<br>Oakmore, Etching Hill Road, Rugeley, Staffs, WS15 2LW<br>Email david.sunderland2@ntlworld.com |
| Statistician & Webmaster | **Dr Tim Grose**<br>17 Old Claygate Lane, Claygate, Esher, Surrey, KT10 0ER<br>Email timgrose@britishmilersclub.com |

### Academy Contacts

| | |
|---|---|
| Academy Chairman | **David Lowes**<br>2 Eggleston Close, Newton Hall, Durham, DH1 5XR<br>Tel 07930 318651<br>Email coachlowes@aol.com |
| Courses | **Rod Lock**<br>Tel 0238 078 9041 \| Email coachlock@fsmail.net |

All official correspondence to the BMC should be addressed to the National Secretary at the above address. All matters so received will be addressed by the national committee at their next meeting. All other requests should be sent to the BMC Administrator Pat Fitzgerald and will be dealt with as soon as possible. Matters concerning specific areas of the club should be sent to the relevant person from the above list.

The BMC are always looking to expand its network of people and locations that host BMC races. If you feel that you can help or want to get involved then please contact the BMC Administrator Pat Fitzgerald.

# Chairman's Notes

**BY TIM BRENNAN BMC CHAIRMAN**

## The 2013 Season

The BMC 2013 summer season started and finished with two excellent results and had some fine highlights in between. On May 15th at a Gold Standard meeting in Watford, Jessica Judd ran 2mins 00.37secs which was a breakthrough run for her, a BMC record, and at the time led the world rankings. Not bad as she was fitting this race in during her A level studies. At the other end of the season on September the 4th and again at Watford, Charlene Thomas ran 4:03.74 for second on the British rankings and the fastest time in a BMC women's race.

In between we had some great age group results with many qualifications for the international championships. There were four European U23 qualifications, eighteen for the European U20s and twelve for the World Youth Games . Congratulations to our medallists in those championships, U20 Gold Medallists Jake Weightman, Emilia Gorecka, Zak Seddon and Bronze medallist Jonny Davies. World youth bronze medallist Kyle Langford. European U23 Silver medallists Charlie Grice, Tom Farrell and bronze medallists Laura Muir and Kate Avery.

One thing we have always tried to do in our races is provide the conditions for fast times in events for which otherwise opportunities would be limited. This is particularly true in the women's distance events. At the Sportcity Grand Prix there was a bit of innovation when he held a 3000m race inside a women's 5000m race to help some of the girls achieve qualification for the World Youth games. That 5000mrace produced a top of the UK rankings performance and at the end of the season 15 of the top 20 women's 5000m performances have come in BMC races. For next season we are looking at what endurance events we should stage and hope to extend our programme to include men's and women's 10000m races.

## 50 Years and running

2013 was the 50th season of BMC races, and we were very pleased to celebrate the anniversary at Oxford with a meeting of mile races and a sub 4 performance. Many loyal BMC comrades joined us after the races to reminisce about the early days of the club and the notable points in our history. In the last BMC news a lot of that early history was covered so to redress the balance slightly I would like to reflect on the last 20 years and how the club evolved under the chairmanship of my predecessors David Izatt, Glenn Grant and Norman Poole who's comments I include here.

Members only familiar with the BMC as it is to today would struggle to recognise the club as it was at the start of this period.

Davisd Izatt recollects 'The BMC of the nineties was very different to the competent, well organised and well financed organisation of today. In practice it worked as a confederation of regional Secretaries, like Mike Downs and Ian Chalk, with occasional national training days. The Annual Accounts showed an income of about £6000, much of which I always suspected came from Comrade Frank's pocket.

Norman Poole remembers 'During my early years the emphasis was on re-establishing the BMC at local level as a competition provider. We lowered the entry standards to appeal to a wider audience of athletes and develop our budget capability. We also encouraged more area secretaries to come on board. '

In the early 90s the competitions developed and rose in standard and events like breaking age group world records for the 4 X 1 Mile relay caught people's imagination; our membership grew. Building on the best of our regional successes such as the South West Grand Prix, the idea of a GP Series was born. Then with Nike coming on board as club sponsors it allowed us to take the standard of the GP's to a higher level.

Norman further commented that 'other major areas that we developed were the coaching conferences which were born out of the endurance conferences I established when I was the National Event Coach. We always tried to have speakers who were hands-on successful coaches who could speak about their coaching methods. This really seemed to appeal to coaches who attended in good numbers.

We knew in the early days of developing these ideas that we would not have success with BMC competitions and educational gatherings without having the National Federation on board. I know throughout my period involved with BMC committees that a lot of hard work went into making this relationship work with BAF/UKA and more recently England Athletics.'

In 2005 another significant change took place when the BMC academy was established. This was a recognition that the needs of young athletes needed to be addressed specifically by a dedicated organisation. The result was the extremely popular young athlete's courses and PB classic meetings.

It would be reasonable to describe this period as transformational with the scale of what we do today vastly exceeding what was done at the start of this period. None of this would have been possible without the hard work of the committee members and race organisers throughout that period. A huge amount of thanks is due to everyone who has helped. One constant throughout has been Pat Fitzgerald who is the organising force behind a large part of what we do, who as treasurer guards our purse, and who keeps peoples feet on the ground.

## 2014 and Beyond

As can be seen from this brief history one thing the club has never done is stand still, and I firmly believe if you do the danger is you start going backwards. The athletic environment is always evolving and we have to do so to remain as important to our members as we are today. The close season is when we reflect on where we are and what we need to do next. For sure we will bring some new ideas into force. Your opinions are always welcome and I would be very happy to hear any ideas that you have. I would be even happier to hear from people who are able to help and contribute to taking your club forward.

Best wishes

Tim Brennan

**Cover:** Charlene Thomas on her way to a decisive win in the Solihull 1500m

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Email: athleticsimages@aol.com

# Where Do You Stand?

**BY MATT LONG**

Matt Long encourages middle distance coaches to consider their spatial location and potential to make verbal intervention during competition.

Adjacent to p.215 within Sebastian Coe's autobiography *Running My Life,* is an iconic image of father and coach, Peter, kneeling at the side of a Zurich track. The date is 19th August 1981 and Seb is on his way to a new world mile record (3m48.53s) at the Weltklasse. Coe senior has hands cupped to mouth with his son recalling that he was, "cheered on by my father yelling out split times". The image of the bespectacled Peter Coe in trade mark red jacket encapsulates the significance of both spatial location of the coach and potential to make verbal intervention during competition.

## Concurrent feedback

Plenty has been written about good practice with regard to the way coaches offer 'terminal feedback' to athletes after training session or competition. Less has been researched in relation to 'concurrent feedback' (Galligan et al. 2000) which coaches can choose to give *during* competition itself. Davis et al (2000) term this 'exteroceptive feedback' because it is ordinarily underpinned by coaching observation. Jowett and Poczwardowski (2007) have stressed the importance of building an effective coach–athlete relationship and this article explores this dynamic in a middle distance competition context.

## Data collection

**Focussed interviews with a sample of 11 well established middle distances coaches and mentors were conducted to explore:**

1. Whether it is appropriate to make coach to athlete verbal intervention during middle distance competition.
2. Where coaches should position themselves in order to make this intervention.
3. The nature of the aforementioned verbal intervention.
4. The extent to which spatial positioning of coach facilitates effective terminal feedback to athlete.


*Diane Cummins (Canada) narrowly edges Chanelle Price (USA) and Shelayna Oskan-Clarke (98) in the Women's 800m at Oxford*

## Results

Some in the sample took a non-interventionist stance. BMC President Norman Poole, for instance, argued that athletes, "have to learn to handle situations themselves". This position was endorsed by Birchfield Harriers coach Phil Sargeant who argued athletes in the proverbial 'zone', "may not want to hear voices of their coaches", blocking them out as they would any other spectator. A strong advocate of planning prior to and debriefing after races, Poole likened his athletes to pugilists by using the boxing analogy of proverbially being "on your own in the ring" during the heat of competition. He was convinced that athletes who learn their "racing craft" through self-sufficiency can handle even world class competition at a young chronological age. The best practice example of Steve Cram was offered who took the 1983 world 1500m title aged just 22 years. BMC Academy Director David Lowes echoed these sentiments by stating that, "The need for 'encouragement' from the coach, although good, should not be expected. Athletes need to train to 'encourage' themselves inwardly without expecting outside cues" (See Lowes 2013)

In advocating the cautious use of intervention, Horwill scholarship winner Jamie French felt that "coach led feedback can raise awareness of external factors that the athlete was unaware of". With specific reference to 800m running, England Athletics (Midlands Area Endurance Coach Mentor) Geoff James said, "I position myself at the 600m point as it's *the* critical point in the race". He continued that, "I question the value of coaches locating themselves in the home straight. It's just too late to make a verbal intervention on the 2nd lap after athletes have begun to kick for home". Significantly James chooses to make 'paratelic' (process) based interventions rather than 'telic' (goal) based ones (Smith and Apter, 1975). With specific reference to his work with a BUCS medallist he continued, "I tend to give one command only. I may shout 'hands' to denote that she keeps placing her thumbs on her fingers as she begins to tire or 'head position' to try and avoid her shoulders tensing". An endorsement of this process based intervention philosophy was offered by Birchfield coach and team manager Dave Lawrence who stressed the important of coach 'knowledgeability' of the athlete. "You must observe what your athlete tends to do wrong in training and then make a decision about what one thing you are going to try and prevent them from doing at a critical point in the race". Lawrence pointed out that the coach simply cannot attend all of the athlete's races in the course of a season let alone their career and that an 'over-dependency' of athlete on the coach was unhealthy.

This above links to a wider debate about 'overcoaching' (Goldsmith, 2012), which was alluded to by Jenny Harris (National Coach Mentor Youth Endurance). She forewarned, "You can overcomplicate the mind of the young athlete by giving them information overload. I believe the athlete's body doesn't learn to respond when coaches overly intervene in the heat of battle in a race". Perceptively she noted that, "If you are going to intervene during a race there should be no set place. One needs to be athlete focused". Like James, she utilises command based words such as 'push' or 'pick your pace up' in order to avoid information overload. This point about overload was reiterated by National Coach Mentor Neville Taylor who commented that, "The trick is not to say too much. You should have dealt with the technical side of things in training". The man who coached Wendy Sly to a Los Angeles Olympic 3,000m silver in 1984 added that, "Never be critical with an athlete during a race. If I'm within earshot down the back straight and my athlete is stuck on the kerb, I may shout 'Get out now'". The point made by Harris about an athlete-centred approach was also emphasised by Shaftesbury Barnet coach Nadeem Shaikh, who spoke of "needing to know the individual as well as the athlete", reminding us that athletes are diverse and learn in different ways.

Former UKA National Trainer Jeremy Harries, who once guided the careers of John Nuttall and Helen Clitheroe confirmed that he always chose to locate himself between the 300m and 200m point whether it be an 800m or 1,500 involving his athlete(s). "I could view the race unfolding better from the vantage point of the back straight away from a crowded home straight". This was a deliberate strategy, "in order to give both my athlete and myself breathing space after the race. They have time to gather their thoughts and to reflect whilst walking over to the back straight and so do you". Significantly Harries indicated that he utilised both 'process' and 'goal' based interventions. An example of the latter may be the call to said athlete that "X is 15 metres behind and closing in on you winning this race".

'Goal' based interventions were referred to by City of Stoke AC coach Alan Morris, who has guided GB 800m athlete Emma Jackson to a 4th placing in the Delhi Commonwealth Games and a Daegu world championship semi final. In echoing the sentiments of David Lowes, Morris commented that, "It depends on the level of athlete you are dealing with. Experienced athletes tend not to need interventions". For teenage athletes Morris will adopt an entirely different approach compared to trackside interventions made with the aforementioned Jackson. "I tend to shout 'come on keep it up' in the middle of the race or 'finish it off' as they began their final sprint to the finish".

## Discussion

Poole and Sargeant's points about abstaining from intervention are paramount when one considers that many championship events from English schools upwards make effective verbal intervention in noisy environments almost impossible. In a similar vein comments made by Lowes remind us that the type of coaching intervention made may be dependent on the level of emotional maturation of the athlete. (See Long and French, 2013). James' point about coaches who locate themselves in the home straight raises the issue of whether by doing so they are performing the role of coach or have 'gone native' as spectator. Jenny Harris' point about information overload reminds us that middle distance athletes can't process intrinsic questions at the pace they are running and with that level of physical exertion. Jeremy Harries' comments indicate that athlete-centred coaching interventions can involve both process and goal thus attempting to effect a reversal between 'paratelic' and 'telic' psychological states. His point about both athlete and coach needing their proverbial and literal 'space' in the immediate aftermath of competition is pertinent if said athlete has underperformed. It gives the coach time for composure and rational thought. This is congruent with Deci et al's (1999) finding that positive performance feedback enhances future intrinsic motivation of the athlete. This famously didn't occur when a tearful Paula Radcliffe and husband and coach Gary Lough were involved in an altercation moments after she had stepped off the Edmonton track after missing out on a medal at the 2001 world championships.

Comments by Morris remind us we need to consider the developmental age of athletes in terms of their emotional, social and psychological maturation, as much as biological age and physiological development. His point about non intervention for the mature athlete along with Harris' concerns about the dangers of over-intervention, are important reminders that the coach should be attempting to responsibilise the athlete. This is supported by the notion of 'Autonomy Support' provided by Cognitive evaluation theorists in emphasising that athletes are, "individuals deserving self-determination, and not mere pawns that should be controlled to obtain a certain outcome" (Mageau and Vallerand, 2003). Shaikh offers us massive insight in that only some athletes will learn from verbal intervention. These aural learners will respond to hearing voices but taking into considering Fleming's (2005) VARK model, we know that other athletes learn best for instance through images or simply doing things.

What Neville Taylor gives us is a perspective on both the need for unconditional positive regard and the ability to make tactical interventions. Dave Lawrence's comments encourage coaches to think about developing an unconscious competence in transferring good practice from a training to a racing context.

## Conclusions

- Spatial positioning of coach is paramount should one wish to effect verbal intervention during competition.
- Spatial positioning should be athlete-focussed rather than pre-determined by coach set routine.
- Spatial positioning of coach during racing can facilitate both 'terminal' as well as 'concurrent' feedback.
- Coach to athlete verbal interventions are limited to between 2-4 instances within 800-1,500m races.
- These verbal interventions tend to be didactic ('telling') but can be both 'process' and 'goal' based in order to avoid 'information overload'.
- 'Process' based interventions may be both (a) technical and (b) tactical.
- The type of coaching intervention made may be dependent on the level of emotional maturation of the athlete.
- In retaining the principle of athlete-centeredness, non intervention of coach

may be an appropriate practice where appropriate.

## Coaches Involved in the Study:

Geoff James, Jenny Harris, Jeremy Harries, Alan Morris, Jamie French, Dave Lawrence, Phil Sargeant, Neville Taylor, David Lowes, Nadeem Shaikh and Norman Poole

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## About he author

Dr. Matt Long is a UKA Coach Education Tutor and volunteer coach at Birmingham University AC. This article is dedicated to the memory of the late Bob Ashwood.

Those wishing to donate to the Robert Ashwood Memorial Fund for young athletes can do so via branch sort code 40-35-09; account number 74019938.

BRITISH MILERS' CLUB

# BMC Awards

**BMC COACH OF THE YEAR**
**Philip Townsend**
*Also nominated George Gandy, Peter Mullervy, and James Thie.*

**BMC OUTSTANDING SERVICES TO COACHING LIFETIME AWARD**
**David Sunderland**
*Also nominated David Lowes and Gordon Surtees.*

**FRANK HORWILL AWARD FOR OUTSTANDING SERVICES TO THE BMC**
**Brendon Byrne**

**BMC/ HORWILL RESEARCH SCHOLARSHIP AWARD**
**Dr Matt Long and Jamie French**
*Examining the Potential Effects of High Intensity Warm Ups in a Middle Distance Context.*

**BMC ATHLETE OF THE YEAR**
**Mo Farah**
*Also nominated Charlene Thomas*

**BMC YOUNG ATHLETE OF THE YEAR**
**Jessica Judd**


*Mo Farah breaks Steve Cram's 1500m UK record when finishing behind Asbel Kiprop in Monaco*

# What does it take to be an Olympic champion?

**BY BRENDON BYRNE**

The New Zealand athlete Jack Lovelock set a world mile record of 4mins 7.6 secs in 1933. His finest moment came at the Olympic Games of 1936 in Berlin where he won the gold medal and set a world 1500m record of 3mins 47.8 secs. These performances are, of course, relatively modest by modern standards. But then again Lovelock`s training was incredibly light by modern standards too. When he set the world mile record he said "I was feeling absolutely on top form, as if running on air"

Running 100 miles a week was beyond the comprehension of athletes and coaches in the 1930s. In fact Lovelock usually trained 3-4 days a week and his weekly mileage was rarely more than 12! Almost all of his training was done on a track. He often had 30 races in a season and admitted that he was "burnt out" at the end of the season, probably because of his lack of endurance work.

Lovelock was a medical student at Oxford University where the ethos was very much that athletes are born and not made. Lovelock stated that "The cornerstone to success in middle distance running is a good running style that allows a complete economy of effort". In fact the Oxford/Cambridge way was one of "effortless superiority".

For Lovelock pace judgement was very important. He knew when he was on top form when he could complete a three quarter mile time trial in 3m 5 secs.

In the Olympic year of 1936 he began running after a five month break in an attempt to lose weight for a boxing match. Some of his sessions were as follows:-

Friday – jog and stride 2.5 miles
Saturday – swim 120 yards fast
Monday – jog and stride 2.5 miles
Tuesday – boxing
Wednesday – walk dieting and drying out
Thursday – boxing at LT and swim
Friday – boxing 2 rounds
Saturday – jog and stride 3 miles.

You would hardly think that this is the preparation for an Olympic champion.

Later in the season before the Olympics his sessions included:-

- 15th June – 3 miles in 14 mins 20 1/5 secs at the White City (London)
- 16th June – jog stride 2.5 miles and a walk
- 17th June – jog/stride 1 ¾ miles, fast 660 yards 1 min 22 2/5, jog stride 2 miles and 50 yard bursts for 2 miles
- 18th June – jog and stride 1.5 miles, 2 x 50 yard bursts
- 19th June – swim and sunbathing
- 20th June – Southern Counties 880 yards heat and final. Time 1 min 55 4/5 secs
- 21st June – walk 2 miles and swim
- 22nd June – 4.5 miles, jog 1 mile stride one mile, 220yards in 31 1/5 secs , jog 660 yards and then 220 yards in 31 4/5 secs jog 660 yards
- 23rd June – jog stride 3.5 miles, 660 yards in 1 min 22 secs, jog 1200 yards , 220 yards 30 4/5 secs, jog 880 yards.

Just before the Olympics he ran another ¾ mile time trial

On August 5th he qualified for the final in the slowest heat with a time of 4:00:6 seconds.

August 6th – Olympic final 1st 3 mins 47.8 secs. 2nd was Glenn Cunningham (USA) 3rd Luigi Becalli (Italy). Becalli was the Olympic champion in 1932 in Los Angeles. The great British runner Sydney Wooderson, who had earlier in the season beaten Lovelock, was unable to take part in the Olympics because of an ankle injury

Lovelock`s lap times were 61 1/2, 2:5:6., and 3:5:9. His last lap was 55.5 seconds.

He said "It was undoubtedly the most beautifully executed race of my career, a true climax of eight years of steady work, an artistic creation".

Every part of each session and race was meticulously recorded.

It is likely that Lovelock`s time would have placed him almost 140 metres behind Hicham El Guerrouj`s current world record of 3:26:0 set in 1998.

Lovelock was a doctor and he died after falling under a train in New York in 1949 aged just 39.

Clearly Lovelock was a wonderfully talented athlete who achieved his records and Olympic gold medal with the minimum training by modern standards. It would be interesting to know what he would have achieved in the modern era.

The photograph taken at the Olympic stadium in Berlin shows the list of Olympic champions from 1936. Note the few events that there were for women and no middle or long distance events at all.

# A life spent running

***Brenda Martinez** is one of the genuine 'break-out' middle-distance stars of 2013. The world 800m bronze medallist, after a "crazy" race in Moscow, talked exclusively to SPIKES about a life spent running, a life-changing coach and an assault on the US record books.*

If you wanted to create a textbook to give to parents about why their children should take up athletics, then pay attention to the story of Brenda Martinez.

From humble beginnings in the Californian city of Rancho Cucamonga, in San Bernadino County, Martinez was not born into a family of great wealth. At just five-years-old, her Mexican-born parents introduced her to the sport of track and field.

Since then, some 20 years ago, running has proved her guiding light, her rock and her inspiration. "Athletics saved my life," says Martinez.

"I know people I grew up with who didn't finish school," she says. "I'm not part of that because of my running," says Brenda, whose dad is a landscape gardener and mum a YMCA teacher.

"Athletics kept me distracted in a good way. It helped give me discipline, integrity, basically a good life."

And what a good life it has given her. Today Martinez, 25, is among the world elite in 800m and 1500m: ranked sixth in the former and seventh in the latter. She has just enjoyed the greatest season of her career, and the future looks rosy.

Martinez, who now lives at high altitude of around 2,060m at Big Bear Lake, California, with her husband Carlos, laughs at the memory of her first ever race, a 100m sprint aged five. "I was blown away," she says, and her coaches wisely re-directed her energies into middle-distance and cross country running.

She never over-trained as a youngster, she has always remained enthused by the sport. A good high school athlete, Martinez showed promise at college, finishing runner-up in the 1500m at the 2009 NCAA Championships.

After graduating from UC-Riverside in 2010, her career started to drift. Brenda Martinez wasn't ready to give up her running career after earning all-America honours three times at UC Riverside, but the running community seemed ready to give up on her.

The Rancho Cucamonga native struggled while seeking a training situation that would develop her potential. Rejected by two running groups, Martinez and her husband-turned-coach, Carlos Handler, didn't know where to go.

Struggling to find a coach, salvation came in the form of her husband's old college coach, who suggested Martinez chat to Joe Vigil, a sprightly octogenarian who guided Deena Kastor to Olympic marathon bronze in 2004.

So taken by Martinez's plight, Vigil decided to come out of retirement in March 2011 to coach her. It was to prove probably the singularly most significant moment of the Californian's career.

"I saw how intent she was on becoming a good runner," Vigil said, "so we started talking about what it takes and I asked her if she would be willing to commit the effort, because I've had medallists in the Olympic Games and world championships before and I know what it takes. And she seemed like she was very sincere in saying yes, I'll do what it takes."

Although Vigil and Martinez rarely work together and have communicated mainly by phone or email the past two years, she has kept her promise. The result has been a breakthrough season and a chance to make U.S. running history.

Since moving to Big Bear for altitude training — one of Vigil's requirements — Martinez, 25, has become a medal contender in the 800 at the world championships.

Not that Martinez, who receives most of her advice via telephone and email from the Arizona-based Vigil, found adapting to his training programme easy.

"When I first started with coach, I was really inconsistent and I couldn't hit the times," she says. "We had to adjust the work-outs for the first year and a half."

She once even misread a hand-scribbled note from her coach about one of the workouts, which led to confusion.

"I thought I had to run a 4x1 mile tempo run in repeats of 5:20," she says, "so I was taking breaks in between. Then when he said: the four miles should be run without stopping at that pace, it was like, 'Oh, I don't think I can do that'."

Gradually, her body became accustomed to Vigil's demands. In 2012 she qualified for her first major championships at the world indoors (she exited the heats of the 1500m) and smashed through the two-minute barrier for 800m, twice.

Martinez began to respond to her new training regimen last season with personal bests in the mile on the road (4:24.2) and on the track (4:26.76).

This season, besides her personal best in the 800 — which she nearly equalled with a 1:58.19 in a late-charging win last month on the Diamond League circuit — she set career marks of 4:00.94 in the 1,500 and 15:36.65 in the 5,000 and was part of a record-setting 3,200-meter relay at the

Penn Relays.

She's known for her strong finishing kick in the 800, but Vigil wants her to go out faster so she won't have to waste energy by running around rivals later.

"The training Coach Vigil gives me is definitely hard, but I'm improving. I believe in his training," she said. "It's just a matter of me being consistent and adapting. I feel that it finally paid off this year, whereas the year before, I was trying to race and adapt at the same time."

Not every athlete can thrive in a long-distance coaching relationship, but Martinez's single-mindedness makes it work. But her husband is the eyes and ears for both her and coach Vigil. Even though she has competed and trained in parts of Europe this summer, she has few souvenirs to show for it.

"This is a full-time job and I take it seriously. Coach, sometimes when he calls, he'll mention that he's not going to be here very long. He's 83 years old, so anything he tells me I try to implement in my training and I take it very seriously."

Vigil, who saw Martinez compete this season at Mount San Antonio College, Carlsbad and the U.S. championships, writes out her workouts in advance. Martinez or her husband sends him almost daily reports on how she's training, resting and feeling.

"Sometimes coaches have a big group of runners and they don't spend a lot of time with each one. But with her, whatever time I spend is quality time and we're able to communicate with each other just beautifully," he said. "And it's more important for her to be at altitude, training, than for her to be in Arizona with me watching her every day. So everything is working out just right."

Last autumn, all the pieces of the jigsaw started to fit together. Finally able to adapt to the sessions, she completed her most consistent training base. Now running the four-mile tempo run at an average mile pace of 5:05, she was all set to make some noise in the 2013 season.

It's not only about being a better athlete for Martinez, though. It has also been about becoming a better person as part of Vigil's holistic approach to running and life.

"He's more than a coach, he's an educator and he likes to teach," she says. "The one thing he wanted from me was to be a good person, to better myself as a person every day, and live a good life. He makes me feel like my mind is at ease and clear. He is one of my heroes."

For her part, Martinez now runs a running camp for girls.

In June, she shattered her 800m personal best by running 1:58.18 to finish second in Eugene Diamond League meeting, before repeating that placing at the US champs.

Buoyed by the confidence that gave her, she secured an eye-catching 800m victory at the London Diamond League, and obliterated her 1500m best by almost four seconds with a 4:00.94 time for third in Monaco.

Entering the Moscow 2013 World Championships, she was confident but also cautious.

"I tried not to put the pressure of winning a medal on me, and take it one round at a time. But once the final came around I said to myself: 'I belong here and know I can run with these girls'."

Adopting cautious tactics in the final, she wanted to go through 400m in 58 seconds, a pace Martinez knew she was comfortable with.

Refusing to get involved with the blistering pace set by her compatriot Alysia Montano, who hit 400m in 56.06, Martinez intelligently executed her pre-race plan.

She started to make a move with 250m remaining, entering the final bend in fourth and in medal contention. However, running in lane one she was briefly boxed in with 100m to go, her chances of winning a medal under grave threat.

"It was just a case of holding my position and if there was an opening: go for it. I still don't know how it happened [the gap opened up]… It was crazy. An odd race."

For the next two minutes she stared up at the giant screen replaying the race in the Luzhniki Stadium, before finally receiving the welcome news from a USATF official.

"There were two screens in the stadium, and many of the girls were looking up at the one which did have the results," she says. "I was all set to walk off the track. It was only when someone from our federation started screaming out my name and said I got third! I then started crying."

Since her success in Moscow, Martinez has not rested on her laurels. Taking just two weeks rest at the end of the season, coach Vigil already has a new plan in place.

"My coaches [her husband is the on-track facilitator of Vigil's training plan] don't care about the bronze medal right now," she says. "They say, 'we are not going to treat you like a bronze medallist. We will treat you like the same old Brenda with the same level of urgency to better yourself.' They are definitely tough on me."

In 2014, her aim is to get involved in some fast races and improve on her 800m and 1500m PBs. She also hopes to stretch her range and dip below 15 minutes for the 5000m – her current PB for the distance is 15:30.89.

Next year is the first of a three-year plan laid out by Coach Vigil, which he hopes could see her challenge the US 800m and 1500m records held by Jearl Miles-Clark at 1:56.40 and Mary Slaney 3:57.12.

"My coach is super-excited about the training, he has a three-year plan for me and we are looking at 3:55 [for the 1500m] and 1:55 [for the 800m]. He says it is actually a possibility that I can run that

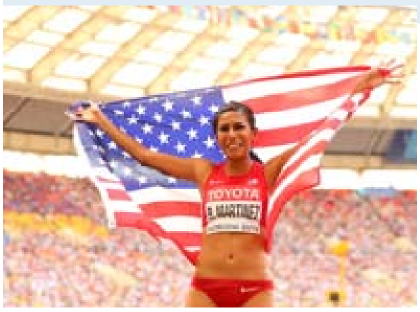
Martinez has an open mind on moving up from middle-distance to 10,000metres by 2016.

Her favourite work out is 6 x 1 mile repeats and place to run is the bike path along the lake of Big Bear California.

Favourite recovery fuel: Smoothies made with items such as fruit, vegetables, chia seeds and chlorophyll. Burt always includes lots of fruit, vegetables and greens.

## Brenda Martinez Fact file

**Born:** Rancho Cucamonga, California, on 8 September, 1987
**Height/weight:** 1.70 metres/52 kilogrammes
**Residence:** Big Bear Lake, California
**Coach:** Joe Virgil
Married to Carlos Holder
**Best marks:** 52.7 (400m); 1:57.91 (800m); 4:00.94 (1500m); 4:26.76 (mile); 9:39.52 (3000m, indoors); 9:51.91 (2 miles, indoors); 15:30.89 (5000m)
Road: 4:24.2 (mile); 15:44 (5km)
**Graduated:** University College, Riverside, California
**Progression:**
2007 - 2:04.22; 4:21.18
2008 - 2:02.84; 4:17.69
2009 - 2:00.85; 4:09.52
2010 - 2:04.76; 4:18.17
2011 - 2:01.07; 4:10.77
2012 - 1:59.14; 4:06.96 (4:09.96 indoors)
2013 - 1:57.91; 4:00.94



# Frank Horwill Scholarship winners 2013

## Matt Long and Jamie French

### About the 2013 winners:

Dr. Matt Long is a volunteer endurance coach with Birmingham University AC. Jamie French is Senior Lecturer in Physical Education and Sports Pedagogy at Leeds Metropolitan University. Both are British Athletics Coach Education Tutors.

### Why did you go for the scholarship?

**Dr. Matt Long:** Matt recalls that, "As a county level athlete, I remember reading Frank Horwill's *Obsession for Running* (1991) in the nineties. Since becoming a coach in 2002, I have often re-read this classic text and if ever my house was burning down it would be *the* one book from my athletics collection that I would try and save." He is keen to emphasise that Frank's reputation as a man of conviction who was not afraid to speak his mind impressed him, adding, "I never met Frank Horwill in person but from the oral testimony of others within and beyond the BMC it's obvious he had unshakeable self belief and confidence in his own ability. I admire that quality in people".

Matt is a member of the BMC who has applied for this scholarship on no less than three occasions. He believes that it is only through learning from his failed attempts to win, that he has enjoyed success this year. He continues, "I was fortunate enough to be shortlisted in 2011, was unsuccessful last year and was over the moon with emotion when I got the letter saying I had been successful in July". Before his passing in 2012 Frank went on record as saying he intended the award to, "encourage others to join the ranks of Astrand, Gerschler, Costill, Daniels and Noakes". Matt says this statement inspired him because these men are widely regarded as all-time great coaches or coach educators. "The award is a platform for me to try and better myself and make a lasting contribution to our great sport", he adds. The man who lives in the brewery town of Burton-on-Trent, is keen to encourage those of you thinking of applying next year to do so because, "I learned so much from my two failed attempts. David Reader, David Dix and Pat Fitzgerald gave me such positive interviews and were willing to facilitate constructive feedback. Whether you are successful or not is immaterial in some ways. Whether they can fund you or not, these people are genuinely interested in your work and will help you better yourself as a researcher and/ or a coach".

**Jamie French:** Jamie has written previously for BMC News and BMC Academy Director David Lowes has kindly invited both he and Matt to the forthcoming training weekend at Spinkhill in October to talk about their work. He is actually a former long jumper who was ranked in the top 10 in the UK several years ago. He coaches at Leeds Met University and in his role as a Regional Trainer with British Athletics has produced coach education material on both middle distance and endurance running. In speaking of his collaboration with Matt his says, "Matt and I met whilst working for British Athletics last year and have written numerous articles together for a range of national magazines and websites including 'Athletics Weekly'. When Matt mentioned the scholarship to me as a potential joint enterprise I jumped at the opportunity". Like Matt he is both honoured and excited by the scholarship. He continues, "Our research is an eclectic mixture of sports science, psychology and ethnography. I think to be named as winners in the 50th year of the BMC is extra special- it's a real honour".

### Can you give us an outline of your research project?

Jamie is keen to stress that the propensity for coaches to work with athletes to effect increasingly dynamic warms ups is not new. It is commonly accepted, for instance, that double Olympic champion Hicham el Guerrouj used to warm up by running 300m at his race pace before he ran a metric mile. He adds that, "This being said, critically we suggest that the effectiveness and scientific underpinnings of these practices are only recently being understood".

As an academic interested in sports science and performance Jamie aims to critically appraise some experimental research conducted earlier this year by Stephen Ingram, Barry Fudge and Jamie Pringle from the English Institute of Sport and Andrew Jones of Exeter University. Jamie explains the methodology in more detail. "In a warm up context, 'potentiation' basically means increasing the intensity of event specific activity to facilitate subsequent improvements in performance". Using an experimental research design he and Matt will compare groups of performance athletes who will undertake middle distance time trials after they have completed either a 'traditional active warm up' (e.g. jog; mobility drills; strides) on the one hand or a 'high intensity warm up' (e.g. jog, mobility drills; strides; 200m effort at race pace) on the other. Jamie points out that, "As well as looking at whether athletes run their time trials faster using a higher intensity warm up compared to a traditional warm up we will be testing blood lactate levels of athletes at different points."

As a coach Matt recognises that cognition is a massive factor in athletic performance and explains why he will be working with Jamie to administer a short psycho-social inventory to athletes after their respective warms ups and conducting qualitative interviews with them after the completion of their time trials. Both wish to find out if high intensity warm ups produce greater psychological as well as physiological stimulation compared with a traditional warm up.

Matt enthuses, "Whilst I am a criminologist by trade, I have a first degree in Sociology and believe passionately in exploring a coaching ethnography of warm ups. I met Mo Farah's physiologist Dr. Barry Fudge in Loughborough last year and he told me, 'Don't forget that coaches are the real innovators and then it's the sports science which catches up with what they are doing in practice later'. The way in which say Norman Poole may effect a high intensity warm up in Manchester with Michael Rimmer may for instance be totally different to the way in which Bud Baldaro does it with Hannah England in Birmingham". Matt plans to both interview and observe some high profile coaches to look at how, in retaining the principle of athlete-centredness, they may do things in diverse ways.

### Why might your findings be valuable to coaches and athletes?

Matt and Jamie are keen to talk about different levels of intervention which coaches can make to try and improve the performance of their athletes. They point out that a so-called 'long term intervention' may be something like making a radical change to the way in which athletes periodise their work. A 'medium term intervention' may involve, for example, progressing the intensity of a short microcycle of training. They conclude by stating that, "Coaches and athletes working together to change the way in which they warm up is very much what we would call a 'short term intervention'. It doesn't take years or even months to effect. It is something which you can explore and change relatively quickly if you see fit. That's what's so exciting for us and for you!"

**All interested in making a contribution to the research process should contact matt@mattlong.wanadoo.co.uk or j.french@leedsmet.ac.uk**

# Research Study: Frank Horwill Scholarship 2012

For all the joys of running, athletes know that there are inevitable occasions when running hurts. The anticipation of pain can be daunting. Some athletes are afraid of handling pain over long distances and some athletes cannot stop thinking about how much running hurts. Conversely, there are athletes who accept pain and find ways to control their thoughts. Either way, all runners experience pain and if they want to compete, all runners must find ways to cope. For some, coping involves dropping out; others can push through pain. As sport and exercise psychologists, we were interested in painful thoughts and a particular type of attention (mindfulness) that might help athletes manage pain.

In 2012, The BMC awarded us the Frank Horwill Scholarship to investigate the relationship between pain catastrophizing, mindfulness, and performance. Pain catastrophizing affects how athletes experience pain. People who catastrophize tend to do three things, they ruminate about their pain ("I can´t stop thinking about how much it hurts"), they magnify their pain (e.g., "I´m afraid that something serious might happen"), and they feel helpless to manage their pain ("There is nothing I can do to reduce the intensity of my pain"). Mindfulness is a non-judgmental focus of attention on the present experience. In the case of pain, mindfulness would manifest as an acceptance of pain; pain is not good, it is not bad, it is just something that happens. People who are mindful of pain would stay in the present; they would not think about previous pain or hypothesize on the consequences of pain.

In order to examine pain and mindfulness we recruited 190 male and female 800m and 1500m athletes and asked them about their pain, mindfulness, and personal best times. The sample consisted of 19 Elite BMC members, 22 Gold BMC members, 18 under 20s BMC members, and 3 senior BMC members. The remainder of our sample did not achieve BMC membership qualifying times. We found that when participants rated themselves higher in mindfulness their levels of catastrophizing decreased. In males, more mindful and less catastrophic athletes recorded quicker times; this was not the case in females. We also found that on average males were more mindful and less catastrophic than females. Finally, we found that on average, BMC members were more mindful and less catastrophic than non-members were.

Although the results of the current study cannot infer causality, it appears higher levels of mindfulness could be related to reductions in pain catastrophizing for both male and female athletes, and quicker personal best times in male athletes. From a coaching perspective, current results suggest that mindfulness training may be a tool for male athletes to consider. By accepting training pain, male athletes may be able to reduce catastrophic thinking and continue to push through pain. Female athletes may also benefit from higher mindfulness and lower catastrophizing; however, coaches need more research, with large samples of elite female runners, to substantiate this tentative conclusion

**Martin I. Jones**
**BSc MSc PhD PGCHE CPsychol CSci AFBPsS FHEA**
Senior Lecturer in Sport and Exercise Psychology, University of Gloucestershire

Martin is a senior lecturer in sport and exercise psychology at the University of Gloucestershire. Martin gained an MSc and PhD in sport psychology from Loughborough University and completed a post-doctoral research fellowship in sport psychology at the University of Alberta Canada. Martin has published peer reviewed journal articles and book chapters on various topics in sport psychology including positive youth development, mental toughness, and sports coaching. Martin teaches sport and exercise psychology to undergraduate and postgraduate students and has received several student led teaching awards and a University of Gloucestershire teaching fellowship. Martin is a British Association of Sport and Exercise Sciences Accredited Sport and Exercise Scientist, a Chartered Psychologist, and an Associate Fellow of the British Psychological Society, a Science Council Chartered Scientist, a Fellow of the Higher Education Academy, and a Health and Care Professions Council Registered Sport and Exercise Psychologist.

*John K. Parker*
**BSc MSc PhD PGCHE CPsychol CSci AFBPsS FHEA**
Senior Lecturer in Sport and Exercise Psychology, University of Gloucestershire

John is the course leader for the BSc sport and exercise sciences degree program at the University of Gloucestershire and a senior lecturer in sport and exercise psychology. John gained an MSc from Oxford Brookes University in cognitive neuropsychology and a PhD from the University of Gloucestershire in psychology. John has published research in imagery, youth sport, mental toughness, sports coaching, and exercise and cognition. John is a Chartered Psychologist and an Associate Fellow of the British Psychological Society, a Science Council Chartered Scientist, a Fellow of the Higher Education Academy, and a Health and Care Professions Council Registered Sport and Exercise Psychologist. John has coaching qualifications with the Professional Golfers Association and is an AA Class registered and a Fellow of the Professional Golfers Association.

# “Why not try the chase then?”

**BY DAVE SUNDERLAND**

The recent season saw a promising upsurge in middle-distance standards at both Junior and Under 18 level, particularly on the male side with some tremendous performances at their respective global Championships. In the Junior Men’s 1500metre for example we had the greatest depth for years and the greatest number of qualifiers ever for the European Junior Championships in Rieti with ten. However, we can only take three representatives to a championships so what of the ones who did not make it? They can either, re-double their efforts and resolve for the forthcoming season depending on their stage of development and progression. They can become dispirited and disillusioned and fail to make it into the senior ranks. Or they can change direction and with their talents the logical move would be to the Steeplechase. It is an event that lends itself to a 1500 metre runner and one which is wide open and where success can come relatively quickly. We had no qualifiers for either the men’s or women’s Under 23 steeplechases, and only one A Female, and one B Male achieved the world championship standard for Moscow. Indeed it is a worrying situation with only Zac Seddon European Junior Steeplechase champion a possible glimmer of hope on the horizon.

So come on then grab the nettle or are you afraid of the event? Many athletes who have not competed in the event before are quite understandably wary of the barriers and particularly the water jump. However, it has been shown that a good endurance runner can have significant success with the most rudimentary of techniques as illustrated by Dave Bedford (Former UK Record Holder), Helen Clitheroe (Former UK Record Holder) and Eilish McColgan (British Champion). Then it is a question if coming to the event late, improving, refining and polishing the athlete’s rudimentary technique. This is where the time is gained for as it has been alluded to with this cohort of athlete’s they are competent runners, but could have been significantly better Steeplechasers with a more efficient technique. Therefore any time lost over the barriers or in the air is wasted time.

Another major problem for any 1500metre runner or any runner thinking of taking up the event is the paucity of coaches able to coach the steeplechase. Many coaches inadvertently hold potential steeplechase athletes back through their own lack of knowledge of the event and embarrassment of not being able to assist their athlete in this direction. Therefore, they avoid the event and keep the athlete in the events which they are comfortable coaching and are not willing to learn the steeplechase or ask for assistance. In this respect they are doing a great disservice to the athletes and the sport by holding potential steeplechasers back from the event.

What therefore apart from hurdling technique does a good steeplechaser require vis-à-vis a good 1500mtere runner? As can the chart below illustrates there are a great many similarities in the two events:-

## Requirements for each of the endurance events

| Event | 800m | 1500m | 5k/10k | Steeple-chase |
|---|---|---|---|---|
| Mobility | • | • | • | • |
| Endurance (02) | • | • | • | • |
| Speed (Alactate) | • | • | • | • |
| Speed Endurance (La02) | • | • | • | • |
| Strength | • | • | • | • |
| Strength Endurance | • | • | • | • |
| Power | • | • | | • |
| Technique | • | • | • | • |
| Tactics | • | • | • | • |

## Overview

800m - All aspects
1500m - All aspects but % difference to 800m
5k/10k - No power & little strength and lactate
Steeplechase - All aspects + extra technique

The main problems therefore for any young athlete aspiring to the Steeplechase are as follows:-

1. Coaching expertise
2. Fear of the Event
3. Opportunity to train over barriers and the water jump
4. Poor first impressions
5. Race opportunities
6. Training for the event

So let’s look at how these major concerns can be addressed.

With the abundance of coaching information that is out there on websites, literature, video, other coaches’ knowledge etc. It is quite easy for the coach to get the relevant information quite quickly. Then they implement it and grow with their athlete fitting the training plan to suit the athlete’s needs and working on both their strengths and weaknesses. They can use their own video footage to analyze and gain instance feedback. Then they can use this information to make any modifications and refinements over a period of time.

Both the coach as illustrated and initially the athlete may have a fear or certain trepidation towards the event particularly when you have 35 barriers to negotiate in a 3000metres event. The coach through gaining knowledge must give the athlete both the confidence and training structure that will alleviate these fears. They must ensure that they train for the event in training and throughout the year. A common problem with our Steeplechasers is that they only do technical work starting in the pre-competition period and not throughout the year. If you constantly practice technique it becomes engrained and it gives the athlete the confidence when it comes to the race situation. That is why repetition training should include hurdles or barriers – if a foot on/off approach is adapted – to constantly simulate race conditions. Because of the problems of filling a water-jump for training the water jump should be simulated by using the barrier at the end a horizontal jump run way into the sand pit driving forward for distance or onto the infield on to mats. This constantly using technical work in training both gets over the athlete's awkwardness and uncertainty with regard to the barriers, but also ensures that they become confident and competent exponents over the barriers, and can take that confidence and competency into the race situation.

Most young athletes have a poor first experience of the event because they are asked to do it by the club to gain points in league fixtures. This first experience can completely disillusion the young athlete and put them off the Steeplechase forever. Both the athletes coach and club have a duty of care towards the athlete and should not allow them to tackle the event until they want to and are capable of doing so with some competence. The Steeplechase is the most demanding of events – particularly the last kilometer of a three thousand metre steeplechase – and therefore should not be under taken lightly as could lead to injury. It should only be attempted after the athlete at worst has done some rudimentary technical training and at best when the athlete is competent enough to tackle the event with confidence and be well conditioned enough to keep this competency going throughout the race.

Once the athlete has gained this competence and confidence through a structured technical training programme they can then devise their competition programme along with their coach. Initially this will involve league, county (club/schools) as well as Area competition but should soon be looking for National Standard competition, paced BMC races and higher standard competitions. This is the dilemma for the true, pure steeplechaser finding enough events at the steeplechase and above all finding the right number of quality events. Perhaps if a number of the pre-mentioned ten 1500 metre runners took up the event this would ensure that the quality in the races will rise accordingly.

These therefore are some of the teething troubles which the young aspiring steeplechasers will encounter. But they are easily surmountable for any athlete with desire who wants to succeed in the event and the sport. What they need to ensure is that they devise the correct training programme which not only progresses and develops during their career but also encompasses all the ingredients shown in the table above.

A prospective steeplechaser male or female should have a good range over


*James Wilkinson winning the World Steeplechase Trial from Luke Gunn in Birmingham*

both 1500 metres and 5000 metres (3000 metres in the younger age groups). It is imperative they are constantly using technique work in training and that their training programme is progressive from an early age. The programme should include mobility, coordination, conditioning and rhythm training. They should also if they want to be successful become specialist steeplechasers, and to become a specialist steeplechaser requires a great deal of mental toughness and patience because it takes years to both master the steeplechase and to be mature enough be an accomplished.

There should always be an emphasis on hurdling drills, with the hurdles raised progressively to give the athlete confidence. As previously mentioned hurdles should be included in normal track sessions, using a hurdle/barrier for every 200 metres in the session. (Eg: 600 metres = 3 hurdles). Where possible and if required video footage should be taken of training sessions and feedback given.

Training sessions should be constructed to simulate race conditions. All the time the coach and athlete should be working on a solid technical model, fluency, efficiency, economy of effort and relaxation. They should in training working at race pace over the hurdles/barriers, when fatigued, in a group, hurdling on a bend, ensure they hurdle off either leg and place barriers in different positions to simulate inside and outside water jumps.

Types of steeplechase training should include differential or split intervals including hurdles; pace injectors including hurdles; pace increases including hurdles; tired surges plus hurdles; repetition training plus hurdles; hurdling stressed after Oregon circuits or skipping or step running to simulate fatigue in the race situation. The athlete should also have a robust physical preparation programme. There should also be an element of power in the training schedule so that the athlete is strong enough to absorb the constantly changing rhythms of the event driving off and over hurdles/barriers and landing. Each of the hurdle/barrier in a race have to be attacked, with a minimum amount of time spent in the air, and upon landing they should be instantly driving off into their running action. Training should always be exhilarating not exhausting. It should be training not straining.

So the opportunities to be a specialist successful steeplechaser are there in abundance at every level of our sport. So have you the desire to be successful, have you mental toughness to be successful because you have the attributes it is just about maximizing them. Then you will fill the void that is out there and gain international recognition and success that would not be yours if you stayed in your present event. Accept the challenge of the chase now before it is too late to turn to it.

# World Championships Reflections
## Moscow

**BY DAVE SUNDERLAND**

Disappointingly the British team were only able to fill a third of the places available. Of the athletes who participated only six were backing up in a post-Olympic championship. This meant that sixteen athlete's did not manage back to back Championships for a variety of reasons.

But as the following statistics show perhaps the Africans and other countries haven't been as dominant as we have been led to believe. Brenda Martinez claimed the first ever USA medal in the women's 800m as did Hellen Obiri (Kenya) in the 1500m both taking bronze. Milcah Chemos was the first ever Kenyan winner in the Steeplechase and the Russians failed to win a medal in this event for the first ever time.

Mohammed Aman (Ethiopia) at 19 was the youngest ever 800metre winner in an event that the Kenyans failed to have a finalist and Aylanleh Souleiman claimed Djiboutis first ever track medal. Asbel Kiprop (Kenya) joined Noureddine Morecelli (Algeria) and Hicham El Guerrouj (Morocco) as a three time winner of the 1500metres. Conseslus Kipruto (Kenya) became the youngest ever medallist in the steeplechase at 18 and Stephen Kiprotich (Uganda) did a rare Olympic and World Championship marathon double.

The highlight of the Championships both from an athletic and UK perspective was the double by Mo Farah following on from his London double. Surprisingly, it was in the 10,000metres where he had to pull out all the stops to gain a narrow victory by much less than a second from Ibrahaim Jeila (Ethiopia) and Paul Tanui (Kenya) not the 5000metres. The 5000metres was where having seen his 10000metres run and after running a heat to qualify you would have expected the fresh Africans to have made this a hard sustained true run race. However, they once again failed to show any fortitude and allowed him to dominate the later stages of the race. Running negative splits Farah covered the second half of the race 43 seconds faster than the first and therefore was able to cover the final 1500metres in 3:41.82secs to come home in a pedestrian 13:26.98 seconds by world standards. Running as a team and showing any character to take the race by the scruff of the neck seems to be a thing of the past for the current generation of Africans.

*World Championship 4th placer Hannah England in action in Moscow*

In the 800metres Andrew Osagie after his disrupted season did very well to make the final and finish a creditable 5th . This was a first rate achievement. Michael Rimmer also after a disrupted season did well to make the semi-finals, and with an injury free season will be back to his best. Similarly, in his first major championships Chris O'Hare did very well to make the final of the 1500metres where unfortunately the two previous rounds and his long American season seemed to take their toll as he trailed in last. But I am sure he will learn greatly from this experience – as others could have done – and he will come back much stronger next year. In the 3000metres steeplechase James Wilkinson was found wanting in a slow run heat, not having the confidence to take it on to have a realistic chance of qualifying for the final. I am sure that he will have learned from his first major games experience and come back a better athlete.

On the women's side in the 800 metres both Marilyn Okoro and Laura Muir made the semi-finals whereas Jess Judd's promising season ground to a halt exiting in the heat, I'm sure she will be back. Laura Muir in probably not her best event ran her two fastest ever 800metres and can be suitably pleased with her performance. Whereas Marilyn Okoro having looked good coming into the event and in her heat (UK lead/Seasons best) ran a very lack lustre semi-final to finish 7th . This event heralded a new star in Eunice Sum (Kenya) who ran splits of 27.58s, 29.58s (57.16s), 30.44s (87.60s) to finish in 29.28s (1:57.38s) with the prodigious USA Junior Ajee Wilson 6th in 1:58.21s.

The 1500metres saw a welcome return to the top level of Hannah England. After such a great run it seems pedantic to quibble about her tactics, but perhaps with a little more self -belief and commitment to get on the pace in the future more medals are possible. Unfortunately Laura Weightman following her fall in the Trials was not at her best and the question has


*Laura Muir in her world championship semi-final*

to be asked should she have put herself through this ordeal.

Elish McColgan did well to reach the steeplechase final finishing 10th . If she added some technical proficiency to her running prowess she could really do well in this event. In the marathon run in the heat of the day with high humidity both Britons ran exceedingly well with Susan Partridge 10th and Sonia Samuels 16th with no Africans in front of them!!

Other highlights included Aman's dominance and Nick Symmonds (USA) getting a deserved medal in the 800metres. Asbel Kiprop's imperious performance in the 1500m, where there was another medal through Centrowitz for the USA. Ezekeil Kemboi gaining his third World title to add to his two Olympic titles. He is now challenging his coach the great Moses Kiptanui – three world titles, world record holder, Olympic champion and first man under 8 minutes – as the greatest ever steeplechaser. Finally in the men's events there was the performance of Stephen Kiprotich managing to win back to back championship marathon titles.

On the women's side the highlights were the emergence of Sum (Kenya) and Wilson (USA) in the 800metres, and Milcah Chemos (Kenya) in the steeplechase, were revelations. Abeba Aregawi winning her first major 1500 metre title and the continuing dominance of Meseret Defar (Ethiopia) and Tirunesh Dibaba (Ethiopia) in the


*World Championship finalist Andrew Osagie*

5000metre and 10000metres respectively were the other stand out highlights.

Perhaps with a change in personnel in the UKA endurance roles there will be a strategic long term development plan put in place so that in future we can ensure where possible we have a full complement of endurance runners across all disciplines. With athletes remaining healthy enough to contest back to back championships.

# The Secrets of Mo Farah's Success?

**BY DR. JESSICA LEITCH**


Photo © Getty Images

**Dr. Jessica Leitch founder of Run 3D based at Oxford University and her colleagues have under taken a biomechanical analysis of Olympic Champion Mo Farah. They have deduced that he has nine key elements to his running technique that have assisted him to become so successful. The following article examines how his technique has helped him to his recent triumphs.**

Mo Farah after a successful two years is broadening his horizons to attack world records and attempt a marathon. But what has brought about this transformation from a runner on the periphery of world class, to being the dominant force?

His running technique appears to have changed radically, since Alberto Salazar took over his coaching in 2010, from the athlete who failed to get through the heats of the Beijing 5000 metres. Farah has admitted that before he went to work with Salazar his technique was all over the place.

At the World Championships in Moscow this year, for example he averaged more than 13 miles an hour in the 10,000 metres, winning the gold medal.

In an attempt to understand this transformation, biomechanics experts at Run 3D, a spin out company from the University of Oxford, have analysed footage of Farah's new running style to see what elements may be contributing to his success.

Dr Jessica Leitch, founder of Run 3D and a visiting fellow at the department of engineering science at the University of Oxford, identified nine key elements of his gait that are fundamental to Farah's success.

## Foot strike

Many long distance runners are known as heel strikers, because as the term implies they strike the ground first with their heels. This type of foot plant causes a large impact force to run up their leg to their knees and hips, and can cause injury problems.

Farah, however, strikes the ground with the ball of his foot, known as mid-foot striking. He then lowers his heel before going back up onto the ball of his foot and then pushing away with his toes. He essentially becomes lighter on his feet.

Dr Leitch said: "By adopting a mid-foot strike running style, the impact on the ground is reduced and the forces acting at the hip and knee joints are lower, which decreases the chances of Mo developing an injury at these joints.

"It also helps him optimise where his foot strikes the ground and the rate of his stride."

## Foot position

Importantly Farah's foot lands only slightly in front of his centre of gravity, his knee is bent and his lower leg is almost vertical. This position where Farah's feet strike the ground in relation to his body is highly efficient.

According to Dr. Leitch "Many distance

Photo © Getty Images

Photo © Getty Images

runners over stride, which means that they plant their feet well ahead of their centres of gravity and land with an extended knee,"

"This can cause an inefficient up and down motion as well as longer energy absorption or braking phase as the body has to travel over the foot in order to be ready to push off."

Therefore, by keeping his centre of gravity over his feet, the force of Farah's feet pushing off the ground is transferred up through his leg into the upper body to propel him forward. This minimises any up and down movements.

## Air time

When undertaking a gait analysis assessment the amount of time the foot is in contact with the ground is known as stance time. In the study of Farah this was very short – just fractions of seconds, meaning he spends more time in the air than on the ground.

Dr Leitch said: "This means that less of the ground reaction force is absorbed by the flex of the foot. Adopting this strategy means the lower limb becomes stiffer and there is less energy lost in damping."

## Wriggle and Twist

The body can move in three planes – forward and backwards, up and down and side to side.

When running most of the movement is obviously forward and any excessive movements in the other planes can use up energy and reduce efficiency.

It can be seen Farah keeps his hips and shoulders level while his legs move straight forward, meaning there is no unnecessary side to side movement or twisting.

Dr Leitch said: "Although it is difficult to measure, if Mo were to have his biomechanics tested using 3D gait analysis, it is likely that he would demonstrate an optimal range of motion.

"Even at the end of a race, Mo's pelvis is level and there is no sign of his hip and knee collapsing inwards as we so often see in fatigued and injury prone runners."

## Relaxed gait

Relaxation is a key component for a long distance runner to ensure they maximise their running efficiency and economy. Many runners grimace, clench their fists and lock their jaws with their efforts, Farah runs with a very relaxed gait, giving the illusion that he is gliding around the track.

His hands are open, his jaw is relaxed and his shoulders are not hunched.

Dr Leitch said: "By running in this way and focusing on reducing the tension though

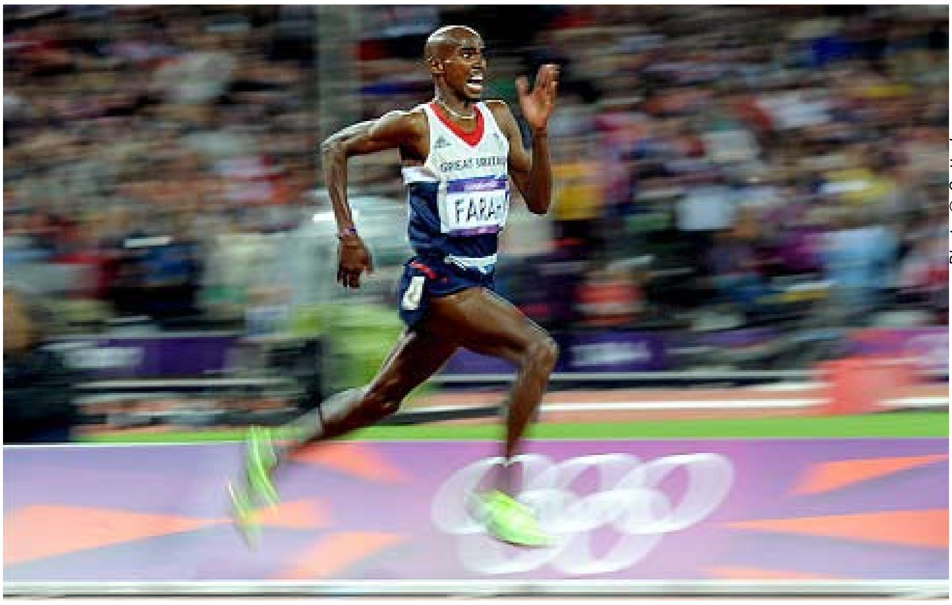



*Photo © Getty Images*


*Photo © Getty Images*

out his body, Mo wastes less energy and is able to run more efficiently."

## Trailing leg

According to Dr. Leitch this is perhaps one of the most interesting elements of Farah's technique. After his foot leaves the ground, he quickly kicks his heels upwards towards his bottom rather than leaving it trailing behind him.

"This is a technique that is employed by sprinters in order to reduce the distance that the swing leg has to travel before it is ready for the next stride," said Dr Leitch. "By doing this, Mo can increase his cadence, which leads to faster running."

## Cadence

This is the rate at which the feet hit the ground, or stride rate. To run faster, the stride rate and stride length need to increase.

"There are many aspects of Mo's running style that enable him to run with a high cadence, thereby increasing speed and optimising performance."

## Arm position

Analysis of Farah's running shows that he holds his arms relatively high and with a very bent elbow compared to most other competitors. This generates a more powerful drive from the backwards pump of the upper arm, known as elbow drive.

## Forward propulsion

Farah's technique also means he does not bounce up and down much as he runs. This allows him to use the bulk of the force from his legs and feet to drive his body forward, therefore allowing him to cover more ground quickly.

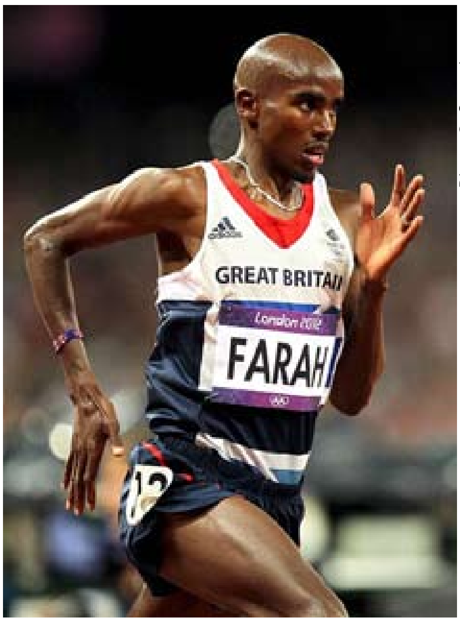




*Photo © Getty Images*

## In Addition

However, his technique, is not the whole story and copying his technique is unlikely to turn others into world class athletes.

Dr Leitch added: "There is no right way to run, neither is there a one size fits all solution for optimal running gait. What works for Mo might not work for everyone and may even lead to injury."

Farah and his family are now based in Portland Oregon, with his coach Alberto Salazar at the Nike Oregon Project. He also does high altitude training to improve the way his body uses oxygen.

Here he now trains for up to eight hours a day, has a specialised diet and access to state of the art cutting edge best equipment available. Which includes an innovative underwater treadmill that allows him to run for longer without risk of injury?

Christian Poole, who used to work with Farah when he was based at St Mary's University College in Twickenham said: "He has been doing a lot of strength work, so that will make a huge difference in his ability to run and with a few technique changes that has helped him quite a lot."

# UK-wide study into the mental health of runners and the general public calls for respondents

A large-scale study into the link between running, eating disorders and depressive symptoms, conducted by the Psychology department at the University of Central Lancashire (UCLan), is appealing for respondents.

The study, which can be found at www.survey.stuartholliday.com, invites responses from runners of all levels from complete beginners to professional athletes and also non-running members of the public in order to examine the link between the prevalence of depressive and eating disorder symptoms. The results will form a scientific basis for the identification, treatment and prevention of such disorders in athletes of all levels

Distance running (counted as 800 metres up to ultra marathon distance) is the largest participatory sport in the UK with over 250, 000 runners participating in over 50,000 races per year [i]. Scientific evidence [ii] has highlighted depression as the most commonly diagnosed co-existing disorder in individuals with eating disorders in the general population. With distance runners facing pressure to maintain a low body weight to improve performance or qualifying times, the potential trigger for disordered eating, compared to those who do not exercise to the same level, is higher than average with 13.6% of athletes having clinical or subclinical Eating Disorders compared to 4.6% of controls. [iii]

The majority of previous research has focused mainly on small groups of elite female athletes. This study differs in that it will compare a large sample of both male and female endurance athletes of all abilities against a control group of non-athletes. Whilst clinical research [iv] has shown depression is the most commonly co-existing mental illness with eating disorders in both men and women, other research [v] has shown that running can have a positive effect on depression.

It is the stated aim of the research team to identify specific subgroups that are at increased risk, in order to provide specifically tailored education programmes and interventions aimed at helping people in the future.

Individuals who participate in the study will be asked to complete an online survey and be given the opportunity for support if required. Anonymity is ensured and express consent will be required. Although individuals are required to complete their name at the beginning of the survey, the data provided will not be identifiable to them. Those who do take part are free to withdraw from the study at any time up until the questionnaires have been returned (after which they can not withdraw) and no reason is required.

Full details and eligibility criteria for runners and non-runners can be found at http://www.survey.stuartholliday.com. The survey will run from September to January 2014 and should take between 10 and 15 minutes to complete. Support will be provided if required and the research team is happy to consult with those assessing their suitability to take part. Results will be provided to participants on request but individual or identifiable information will not be provided.

For further information contact Stuart Holliday on +44 (0)1772 893875 or email SHolliday3@uclan.ac.uk. Written enquiries should be sent to Stuart Holliday at the Department of Psychology, Darwin Building, Preston, Lancashire, PR1 2HE.


*Lauren Deadman leads Gemma Kersey in the Women's 3000 metres at Oxford*

[i] http://www.runbritainrankings.com/rankings/ladderlist.aspx?agegroup=ALL&sex=0)

[ii] Fletcher, B., & Kupshik, G. (2008). Eating disorders and concurrent psychopathology: a reconceptualisation of clinical need through Rasch analysis. Eating Disorders, 198, 191 - 198.

[iii] Sundgot-Borgen, J., & Torstveit, M. K. (2004). Prevalence of eating disorders in elite athletes is higher than in the general population. Clinical Journal of Sport Medicine, 14(1), 25–32.

[iv] Geller, J., Johnston, C., Madsen, K., Goldner, E.M., Remick, R.A., & Birmingham, C.L. (1998). Shape- and weight based self-esteem and the eating disorders. *International Journal of Eating Disorders, 24*(3), 285–298.

[v] Lane, A. M., & Terry, P. (2000). The nature of mood: Development of a conceptual model with a focus on depression. *Journal of Applied Sport Psychology*, (12), 16–33.

# BMC Races 1964 – 1975

**(MANY OF THESE WERE COMPILED BY RAY WILLIAMS)**

**BMC Mile, South Shields, 27 June 1964**
1, Neill Duggan 4:06.5; 2, Derek Graham 4:06.5
(Note: 1/3 of the field did not turn up, triggering a disciplinary ruling by the BMC Committee regarding race invitations)
**BMC Mile, Paddington, 6 August 1966**
1, Malcolm Browne 4:03.0; 2, John Thresher 4:03.3; 3, David Gibson 4:03.7; 4, Nick Barton 4:08.5; 5, J McLatchie 4:10.0; 6, Geoff Pymm 4:10.0; 7, B Goodyear 4:10.0
**BMC Mile, Northampton, 27 August 1966**
1, John Whetton 4:04.1; 2, Malcolm Browne 4:04.9; 3, Chris Stewart 4:05.1; 4, Derek Ibbotson 4:09.4
**BMC Mile, Hartlepool, 17 June 1967**
1, Alan Simpson 3:58.4 (first 'sub 4' in a BMC organised event); 2, John Rix (U-20/Junior) 4:02.8; 3, Mike Billington 4:05.5; 4, Hugh Barrow (BMC member number 1) 4:06.8; 5, David Hogg 4:07.8; 6, Brooks Mileson 4:08.6; 7, A Grant 4:08.6
**BMC Mile, Paddington, 5 August 1967**
1, David Gibson 4:07.8; 2, John Thresher 4:08.5; 3, Geoff Biscoe 4:08.9
**BMC Mile, Guildford, 2 September 1967**
Winner: Fred Bell 4:05.0
**BMC Mile, Thurrock, 23 September 1967**
Winner: Andy Green 4:09.4

**BMC Mile, Bideford (Westward Ho) 14 September 1968**
1, Chris Stewart 4:10.3; 2, Mike Geraghty 4:11.8

**BMC City Mile, Motspur Park, 23 July 1969**
1, John Kirkbride 3:58.0 (3:42.0 at 1500m); 2, Jim Douglas 3:58.5 (3:42.3 at 1500m); 3, John Boulter 3:59.2; 4, Rayfel Roseman 3:59.8; 5, Mike Beevor 4:01.6; 6, Andy Green 4:02. 8; 7, David Bedford 4:02. 9; 8, ***Phil Banning 4:02.9 (U-20; UK Junior Record)***

**BMC Boys 1500m, Crystal Palace, 16 December 1970**
1, **Steve Ovett** 4:10.7; 2, Paul Williams 4:11.4; 3, Glenn Pritchard 4:19.4; 4, Steve Skinner 4:21.1; 5, Wayne Tarquini 4:22.4; 6, J Williams 4:27.4; 7, S Tamplin 4:27.4

**BMC Youths/Boys 800m, Hendon (Copthall), 3 June 1972**
1, Graham Cooper 1:56.5; 2, Paul Williams 1:56.8; 3, Wayne Tarquini 1:59.5; 4, Peter Gronland 1:59.5; 5, ***Sebastian Coe*** 1:59.9; 6, Garry Jarvis 2:00.1; 7, Steve Jacob 2:02.1; 8, Peter Fitzsimmons 2:05.8
**BMC Mile, Ipswich, 16 October 1972**
1, Maurice Wands 4:19.3; 2, J Watts 4:19.3; 3, A Warburton 4:21.3
BMC Women's Mile: 1, Margaret Hepworth 5:02.5; 2, Penny Yule 5:05.7; 3, G Pannell 5:06.4
**BMC 1000m, Crystal Palace, 23 November 1972**
1, Mike Fromant 2:31.2; 2, David Glasspool 2:31.6; 3, Paul Williams (Junior) 2:32.1; 4, S Elliot 2:32.5; 5, Graham Cooper (Junior) 2:34.4
BMC Youths/Boys 1000m: 1, Wayne Tarquini 2:36.3; 2, S Randall 2:38.3; 3, C Moreton 2:39.1
BMC Women's 1000m: 1, Christine Curthoys 2:56.1; 2, S Davidson 3:01.6; 3, Shiree Hines 3:03.2; 4, Gillian Adams 3:03.2 'B' Race: 1, Ruth Chettleburgh 3:05.6; 2, L Martin 3:05.8; 3, C Ledger 3:05.8

**FA Cup Final races, Wembley Stadium, 5 May 1973 (grass)**
BMC 800m
1, Rob Herron 1:55.8; 2, Pete Browne 1:55.9; 3, Dave Cropper 1:56.4; 4, John Davies 1:56.7; 5, A Gibson 1:57.6
BMC 3000m
1, Emile Puttemans (BEL) 8:10.6; 2, Dave Bedford 8:14.6; 3, Ian Stewart 8:17.4; 4, Tony Simmons 8:18.2; 5, Walter Wilkinson 8:35.6; 6, John Cadman 8:35.6
**BMC Brigg Mile, Broomfield Park, 18 July 1973**
***1, Dick Quax (NZL) 3:57.0 (Ground Record);*** 2, Tony Polhill (NZL) 3:57.4; 3, Chris Stewart 4:03.6
**BMC City Mile, Motspur Park 25 July, 1973**
1, Nick Rose 3:58.4 (3:42.3 at 1500m); 2, ***Steve Ovett 4:00.0 (UK Junior record; 3:44.8 at 1500m);*** 3, Phil Banning 4:00.2 (3:43.6 at 1500m)

**BMC City of London Road Mile, 6 January 1974**
1, Ken Rasmussen 4:10.4; 2, Jeff Willshire 4:11.5; 3, D Wright 4:13.5; 4, John Cadman 4:16.6; 5, R Harris 4:16.8; 6, Ray Smedley 4:18.2....10, David Purcell (Junior) 4:25.4
**BMC 1500m, Crystal Palace, 17 April 1974**
1, Jeff Willshire 3:53.8; 2, J Aldridge 3:54.1; 3, Kevin Steere 3:54.5
BMC Junior 1500m: 1, Paul Williams 4:00.4; 2, Steve Jacob 4:04.1; 3, Trevor Marsden 4:05.5
**BMC 800m, Crystal Palace, 28 April 1974**
1, John Greatrex 1:51.2; 2, Chris Van Rees 1:52.5
B Race: 1, Mark Winzenreid (USA) 1:51.2; 2, Gary Cook 1:53.8
BMC Junior 800: 1, Paul Jerrum 1:55.7; 2, Billy Bellew 1:56.1
BMC Women's 800: 1, Penny Yule 2:12.4; 2, M Townsend 2:16.1
BMC Intermediate Girls 800: 1, Lesley Pamment 2:13.2; 2, Kerry Fielon 2:15.1; 3, Sally Noble 2:16.4; 4, Christine Brace 2:16.5
FA Cup Final 3000m, Wembley Stadium, 4 May 1974 (grass)
1, Brendan Foster 8:05.0; 2, Juhaa Vaatainen (FIN) 8:13.0; 3, Tony Simmons 8:13.6
**BMC Women's 600m, Crystal Palace, 12 May 1974**
1, Jane Colebrook 1:32.2; 2, Lesley Pamment 1:32.9; 3, Marion Barrett 1:34.5
**BMC Women's 800m, Bracknell, 13 May 1974**
1, Katrina Colebrook 2:10.3; 2, Penny Yule 2:10.8; 3, C McLoughlin 2:11.2
**BMC Mile, Ilford, 21 May 1974**
1, Ken Rasmussen 4:06.8; 2, David Nicholl 4:08.3
BMC Junior 1500m, Cambridge, 25 May 1974
1, Graham Jackson 4:04.3; 2, David Purcell 4:04.6
**BMC 1500m, Loughborough, 6 June 1974**
1, Chris Barber 3:48.3; 2, Martin Knowles 3:48.5; 3, D Wright 3:48.7
BMC Women's 800m: 1, Jane Colebrook 2:09.0; 2, Christine Tranter 2:09.7; 3, Janet Lawrence 2:12.0
**BMC Mile, Coatbridge (Scotland), 8 June 1974**
1, Ray Smedley 4:12.6; 2, Ron MacDonald 4:12.8; 3, Dave Gibbon 4:14.9
**BMC 1500, Hampden Games, Glasgow, 13 June 1974 (grass)**

1, David McMeekin 3:51.7; 2, Martin Knowles 3:52.6;
3, David Lowes 3:53.6
BMC 3000m Kennington Oval, 6 July 1974 (grass)
1, Chris Stewart 8:14.8; 2, Clive Thomas 8:15.3;
3, Keith Penny 8:17.0
**BMC Women's 1000m, Crystal Palace 10 July 1974**
1, Margaret Coomber 2:47.3; 2, Margaret Beecham 2:49.6;
3, Rita Ridley 2:51.3
**BMC Brigg Mile, Haringey, 17 July 1974**
1, Steve Ovett 3:59.4 (European Junior Record);
2, Chris Barber 4:02.0; 3, Chris Stewart 4:02.2
**BMC City Mile, Motspur Park, 24 July 1974**
1, Chris Barber 4:00.9; 2, Chris Stewart 4:01.0;
3, Clive Thomas 4:01.7; 4, David Nicholl 4:02.3

**BMC Upjohn Mile, Crawley, 4 August 1974**
1, Tony Staynings 4:05.0; 2, Jim Douglas 4:05.7;
3, Terry Colton 4:05.7
**BMC City of London Road Races, 2 January 1975**
BMC Mile: 1, Chris Barber 4:06.7; 2, W Fulford 4:07.5;
3, Kevin Steere 4:09.5; 4, Tony Simmons 4:10.3
BMC Junior/Youths Mile: 1, Paul Williams 4:14.0;
2, M Harper 4:15.6; 3, Gary Jarvis 4:17.2; 4, P Lee 4:18.1
BMC Women's Mile: 1, Joyce Smith 4:42.6; 2, Margaret Beecham 4:50.2; 3, Glynis Penny 4:52.5; 4, Christine Tranter 4:56.7;
5, Annette Roberts 4:57.6
**BMC Women's 600m, Crystal Palace, 12 February 1975**
1, Margaret Coomber 1:33.6; 2, Gloria Dourass 1:34.3; 3, Helen Page 1:35.1; 4, Betty Price 1:35.9
**BMC Women's Races, West London Stadium, 21 February 1975**
BMC 800m: 1, Marion Barrett 2:13.5; 2, Annette Roberts 2:13.5;
3, Betty Price 2:14.0 'B' Race: Lesley Ledger 2:19.7
BMC 3000m: 1, Christine Tranter 9:29.8; 2, Margaret Beecham 9:45.8; 3, C Gould 9:49.2; 4, Thelwyn Bateman 9:50.0;
5, Angela Mason (aged 15) 9:55.8
**BMC 1000m, Crystal Palace, 12 March 1975**
1, Barry Smith 2:27.3; 2, John Greatrex 2:28.6; 3, M Bissell 2:29.0; 4, Glen Grant 2:29.0 'B' Race: 1, S Verley 2:30.1;
2, I Davidson 2:32.4; 3, T Walsh 2:35.4
**BMC Harry Wilson Mile, Crystal Palace, 14 May 1975**
1, Glen Grant 4:05.2; 2, Jim Douglas 4:09.4;
3, Philip Lewis 4:12.6
**BMC Bannister Mile, Oxford, 12 June 1975**
1, Barry Smith 4:06.0; 2, Julian Goater 4:06.0;
3, Mike Downes 4:09.4
**BMC Brigg Mile, Woodford Green, 9 July 1975**
1, Jim Douglas 4:00.6; 2, Glen Grant 4:01.2; 3, Dick Quax (NZL) 4:01.7. 'B' Race: 1, Kevin Steere 4:04.7; 2, Charlie Spedding 4:06.5
**BMC City Mile, West London Stadium, 16 July 1975**
1, Nick Rose 4:00.0; 2, Erwin Hartel 4:01.3;
3, David McMeekin 4:01.6
**BMC Osman Mile, Hayes, 23 August 1975**
1, Kevin Steere 4:09.2; 2, John Cadman 4:09.3
**BMC 1500m, Stretford, 25 August 1975**
1, Alan Mottershead 3:46.5; 2, Martin Knowles 3:46.6
3, Mike Downes 3:48.8
**BMC Sporting Club Mile, Derby, 4 September 1975**
1, David McMeekin 4:01.0; 2, John Cadman 4:04.5;
3, Walter Wilkinson 4:05.0
**BMC 3000m, Kennington Oval, 13 September 1975 (grass)**
1, Glen Grant 8:15.8; 2, Keith Penny 8:18.6;
3, Mervyn Brameld 8:26.8
**BMC Races, West London Stadium, 22 October 1975**
BMC 1,000m: 1, Chris Van Rees 2:32.7; 2, Mike Harmer 2:33.9
BMC 2000m: 1, Paul Williams 5:28.2; 2, Graham Jackson 5:30.0
BMC Women's Races, West London Stadium, 5 November 1975
BMC 600m: 1, Sally Sales 1:34.7; 2, Helen Page 1:35.7;
3, Joyce Dunt 1:35.7 'B' Race: 1, Tracey Walsh 1:39.5;
2, Nadine Eisenberg 1:40.8
BMC 3000m: 1, Annette Roberts 9:34.6; 2, Lynne Harvey 9:34.8;
3, Betty Price 9:51.2; 4, Christine Stenhouse 9:59.6;
4 Margaret Morgan 10:05.4
**BMC 1200m, Crystal Palace, 12 November 1975**
1, Graham Jackson 3:05.6; 2, Chris Van Rees 3:07.0;
3, Mike Harmer 3:09.0 'B' Race: 1, John Bristow 3:13.7;
2, J Corbett 3:15.3
**BMC 2000m, Crystal Palace, 10 December 1975**
1, Graham Jackson 5:25.6; 2, Jerry Odlin 5:26.0;
3, P Grindley 5:26.6

# England Athletic Coach Mentors

Whilst there are no current UKA performance coaches there have been additions and changes to the England Athletics Coach Mentor structure. The following list gives the names and contact information of the England Endurance Mentors plus their additional responsibilities to their mentoring roles.

- Martin Rush – National Endurance Team Lead, National Coach Mentor Long Distance and Walks. mrush@britishathletics.org.uk 07803671969

- Dave Sunderland – Mentor for Middle Distance and Steeplechase (800-5k), Coach Education and Schools. dsunderland@englandathletics.org 07968143520

- Jenny Harris – National Coach Mentor for Youth Endurance and Schools. jharris@englandathletics.org 07540703537

- Bud Baldaro – National Coach Mentor for Long Distance and Roads, and Universities. bbaldero@englandathletics.org 07841504303

- Neville Taylor – National Coach Mentor in South and Competitions ntaylor@englandathletics.org 07841 504498

- Andi Drake – National Coach Mentor in the North and Walks adrake@englandathletics.org 07824482624

# Asserting the Rural and The Truth about Wilson

**BY JOHN BALE**

*'The development of the Wizard, Hotspur, etc. against the earlier boy's papers, boils down to this: better technique, more scientific interest, more bloodshed, more leader-worship. But, after all, it is the lack of development that is the really striking thing'.*(George Orwell, 1940)

*'Wilson persists as an ideal of what an athlete ought to be'.* (Alan Bennett, 2013)

The representation of sporting practice has assumed many forms and media, ranging from music and art and from television to literature. One form of popular culture has been the boys' weekly (or comic)[1] which while occupying a niche market can nevertheless be decoded. In a group of George Orwell's essays in which popular culture was taken seriously, he reminded us that while boys' weeklies may not be 'literature' the written word can, nevertheless, sway our minds.[2] In this essay I explore the place of a fictional character featured in a boys' weekly from the early 1940s to the 1980s, a character that *could* sway the minds of British boys of between 15 to 18. His name was William Wilson.

In the inter-war years boys' books and annuals featured sporting yarns as major foci with Football and Cricket featuring prominently in popular writing, aimed at the teenage market. These papers or books were often prefaced by colourful covers depicting sporting scenes. George Orwell noted that sports were a central feature of boys' weeklies such as *The Gem* and the *Magnet* and it was schools like St Jim's (in the *Gem*) and Greyfriars (in the *Magnet*) which were the sites where sporting action took place, on lavish greenswards and boys in white flannels and school caps. It was tacitly expected that sport was a 'good thing' – a mirror of the 'play up and play the game' mentality of Tom Brownism.[3]

By 1940 the circulation of the *Gem* and *Magnet* was declining and during the War and post-war years boys' weeklies became dominated by the Dundee based D. C. Thomson group that included *The Hotspur*, *Rover* and *Wizard*. The street rather than the school became the milieu in which sporting action was written and many of the comics' heroes came from working class homes. Fictional footballers of the era included 'Limp along Leslie', 'Baldy Hogan' and the most famous, 'Roy of the Rovers'. Public school types became figures of fun and it was the soccer scorer rather than the cavalier cricketer who became boys' heroes. Although football may have been the most popular sport found in these weeklies, other sports *were* represented, one being athletics , and Jeffry Hill has shown in his studies of Alf Tupper a fictional character in the *Rover* who is a focus on social class and how Tupper ('The Tough of the Track') exemplified aspects of post-war sport, amateurism and social class.[4]

Appearing first in *The Rover* in 1949, Tupper was represented as a stereotype of the working class runner, living off fish and chips and often lacking a good night's sleep [5] Tupper lived and worked in the inner city with his workplace being situated under the railway arches implying noise and smoke. Such an environment is explicitly shown in some of the illustrations from *The Rover* in which he appeared weekly. Tupper represents the urban and, arguably the 'North', being depicted as a grim environment of grime, grease and pouring rain. The English long-distance runner and Mancunian, Ron Hill, had Tupper as his hero and was an avid reader of the diet of yarns supplied to him each Friday.[6] Tupper's world of the rural settings implied in the public schools is limited and he mocks the Oxbridge toffs and snobs. He is proud to be a working man who can also be a true amateur athlete.

To a degree the present paper complements Hill's but my focus is more geographical and environmental than historical and sociological. And while Hill's work has been textual, mine is contextual. I explore another boys' comic and another athlete, William Wilson, like Tupper, a runner from the Thomson stable.[7] He preceded Tupper, first appearing in *The Wizard* in 1943[8] but it is difficult to establish whether Tupper or Wilson became the most popular. It is worth noting, however, that *The Truth About Wilson* was published as a book in 1962[9] whereas Tupper was never published in book form, being consigned to the conventional weeklies though there are reprints of some of the yarns of the fictive runners, Tupper and Wilson, in Brendan Gallagher's anthology of *Sporting Supermen.*[10] Neither Tupper nor Wilson were schoolboys and whereas *The Gem* and *The Magnet* were written about boys and for boys. Tupper and Wilson were about men read by boys, young men such as apprentices as well as six-formers. Girls and sex hardly ever appeared in these weeklies, hence carrying on a Victorian tradition.

## Representing the Rural

My focus of this paper is an exploration and excavation of Wilson of the *Wizard*.[11] While Tupper may have represented the urban and the industrial, Wilson, I suggest, can be read as a representation of 'the rural'. Both runners can be seen as transgressive but in different environmental contexts. In a period of post-war industrial decline, but at the same time a concern with the 'preservation' of rural England', it is Wilson, I suggest, who represents an earlier way of life, away from the grime and poverty of Tupper's world, amplified in post-war austerity Britain. Before proceeding to examine 'the rural' and the relations between the writing of Wilson and of mid-century rural Britain (including aspects of preservationist England) I examine some 'rural' representations of Wilson in *The Truth about Wilson* and material from the *Wizard*.

The narrator of *The Truth* is a sports journalist, W. S. K. Webb (also the book's author') who works as an athletics and boxing reporter for *The London Clarion*.[12] The story is set immediately before the Second World War when Webb first encounters Wilson in the 1939 'Summer Championships' at the Stamford Bridge Stadium in London which, at the time, was a popular venue for track and field meets. In the mile event twelve runners went to the starting line, keenly watched by well known and well-informed journalists. But unknown to them a thirteenth runner jumped over the barrier and joined the race. He was obviously out of place, wearing an old black Victorian running costume with half-length sleeves, the legs coming below the knee, and he ran in bare feet. It was Wilson. Despite his antediluvian running costume 'there was rhythm about his running which told of the complete co-ordination of mind and body', flashing past the spectators 'with the grace of a greyhound'. Webb recognised that he had adopted an even pace but one unbelievably


*Figure 2. Wilson.*

fast – 57 seconds for each lap. This resulted in him shattering the world record with a time of 3 minutes 48 seconds (a time which not matched until 1981).[13] Immediately, after the race there was neither a lap of honour nor an interview with the press. Wilson immediately disappeared, returning to his home and ignoring any post-race celebrations.

After the astonishing breaking of the mile record by an unknown 'outsider', Webb seeks to find who he is and how he had developed such athleticism. He travels to the north of England and discovers that Wilson was born in Stayling in Yorkshire in 1795, the son of a wealthy farmer who left him with £5,000.[14] He was able to study in various universities, determined to find the elixir of life. It appears, however, that he spent most of his life at Amberside (close enough to be Ambleside in the Lake District). The prefix 'Amber' suggests longevity or fossilisation, reflected in Wilson's life. Webb also records that the mile event was far from being his only feat. Whereas Tupper was a runner, Wilson was a sporting polymath, excelling in various athletic events and varied sports. .For example, he was a weight-lifter and a cyclist, encountering unsavoury characters along the road. He could throw the javelin 260 feet and long jumped 26 feet, he was a boxer and rock climber, and broke the world record in the high jump, anticipating the 'Fosbury Flop'. He climbed Mount Everest, barefoot and without oxygen, and with a man on his back. Shooting, fencing and cricket were also part of his stupendous repertoire.[15]

Wilson's exploits were extraordinarily absurd (compared with the more realist performances of Tupper). Yet the statistics given by Webb in the late 1940s were remarkably prescient and most of Wilson's have been beaten though his fictional record of 9.00 seconds for the 100 metres was ridiculously ambitious. Here the author melds fact with fiction, using plausible results and with real places (for example, Stamford Bridge). Another example of 'realism' appears towards the end of *The Truth About Wilson*, when Webb is given by Wilson a manuscript which explains the truth about him.

## The Rural in the truth about Wilson

Webb's writing of Wilson clearly paints an image of 'the rural'. Amberside Moor is 'a tract of wild and lonely country […] ten miles to the west of the Great North Road'.[16] His clothes were a 'jacket and trousers which were made of a thick, homespun yarn and a pair of clumsy, thick soled shoes', hardly those of a city gentleman.[17] He is described as having 'brown hair, sparse and without parting'. He had a short fringe coming down straight flat over his forehead. From deep sockets stared eyes that were small and piercing. Over the prominent cheek bones the skin was stretched tight, suggesting an ascetic lifestyle. The image of 'the other' is confirmed by comments about him such as 'a queer sort of chap', 'a queer fish'.[18] His role as an outsider was confirmed by his refusal to attend post-meet banquets following athletics events. A villager informs Webb that Wilson often moves away for weeks. He 'never sleeps under a roof […] he's for the fresh air' and sleeps out in the bracken.[19] On one occasion Webb finds him 'on the high bleak moorlands' […] asleep with no covering than a waist-cloth – lying in the heather, fast asleep'.[20] To reinforce the rurality of Wilson's environment, Webb notes that: 'The autumn air was keen in the lonely Rune Valley among the bare Cumberland hills' while a horse looked out of a stable: 'A file of ducks waddled solemnly from the muddy pond in front of us. A hen with less steady nerves flew squawking into the barn upon noticing a sheep dog that was trotting behind a shepherd's heels'.[21] It is difficult to find a more rural image than that painted above. It is the idyll, Arcadia, where he retreats after track races in the urban metropolis. There are no post-race banquets for him who, instead of the wining and dining at post-race banquets, lived off nuts and berries.

Webb finds Wilson's note book in which faded ink and the worn, leather cover suggested it was several hundred years old. In it there were lists of herbs and other botanical [….]. These were recorded as jottings which listed all the herbs he had ever seen. For example, 'Witch-hazel, Hamamelif Virginia, XIII, and V, Atropia bella donnar XV; Saxifraga, herba, XC and X11; Thymnf VII […]'. All these, and others included in the list, are actual plants which can be found in any basic botany text book and are edible. The inscription in the book was 'W. Wilfon, Amberfide Moor'. There are hints here of 'doping' – at least stimulants or pain-killers. Not surprisingly he is a vegetarian, his diet explaining both his longevity and his athletic performances.

Here was the polar opposite of Alf Tupper, the classic distinction between the country and the city and it is possible, I believe, to meld the ideology of preservation with that of anti-sport sentiments from the mid-nineteenth onwards. While the countryside was to be preserved, so too should the 'landscape' of sport.

## Preservationism

The nostalgia for a rural past in the presence of post-war industrialisation is transcended in the Wilson stories by the fact that he was born on November 1st, 1795. He had not aged with time and his longevity connected the pre-modern with the modern. In the 1930s and especially post-war period the nostalgia to the rural in the face of new urban and regional planning legislation and design was heralded by those who derided the concretisation of the rural scene. As early as 1914 a cartoon in *Punch* showed a crisis in the English landscape as the 'ordinary' man left behind him a 'village world with church and fields and birds' to be replaced in 1919 by 'a town of wires and roads and mess'.[22] In 1926 the Council for the Preservation of Rural England was set up but concern about the erosion of the rural had started much earlier – the National Trust was campaigning since 1895, the Commons Preservation Society since 1865 and the Society for Checking Advertising since 1893.[23] The effect on the rural by urban housing, the erosion of 'the rural' and arterial roads and subsequently the motorway saw 'nature expelled' – the nature from which William Wilson came.

'Preservationist discourse', observes David Matless, 'becomes locked into dichotomy, with a diagnosis of disorder and a will to order feeding off one another'. But the planners were there to plan and the country lane gave way to the arterial road and the boom in post-war spending on motor cars. Whereas Tupper was brought up in grime and grease, working under the railway arches, training along the towpath and through poorly lit streets, Wilson has nature, the rural with its unconstrained freedom. The tension of rural/urban in the post-war period came from cries the likes of John Betjeman and Nicklaus Pevsner, the former yearning for a rural idyll and the latter tending towards a functional England of straight lines, concrete and Le Corbusier. This is, of course, a crude dualisms, noted by Raymond Williams in his brilliant *The Country and the City*: 'county life has many meanings'.[24] But it is difficult to deny Betjeman, who noted (not necessarily with tongue in cheek): 'All fields we'll turn to sports grounds, lit at night / From concrete standards by fluorescent light'.[25] Betjeman praises the meadow in which Wilson runs free in nature while Tupper is constrained in the concrete jungle of artificial light where the urban planners were devouring the rural.

The immediate pre- and post-war of a changing English landscape was mimicked by changes in the sporting and recreational landscapes in several ways. Planning was one feature of both sport and architecture. Speed was a dominant feature of the post-war reconstruction and the widening roads and the arrival of motorways signalled a modern Britain – its straight highways replacing the winding lanes. Betjeman recorded that it was Bournemouth, with its 'broad *winding* roads', was preferred to the faster, straight alternative.[26] The running track can be read as analogous to the motorway. Track racing was becoming formalised from the mid-nineteen century on but it was not until 1880 that a bureaucracy, the Amateur Athletics Association (AAA) was formed to administer the sport. In the mid-1860s therefore, there were considerable variations in the sites and sights of running and racing. There were also debates between those who favoured cinder tracks over grass fields and other basic considerations, namely the shape and size of the tracks on which the athletes performed their work-like tasks. Montague Shearman took these 'problems' seriously, partly because the geometry of the track determined the speed and hence the result of each athlete.[27] Shearman favoured a track of three laps to the mile with four straight stretches. A track of 440 yards (making four laps to the mile) with gradual curves of 100 yards at each end was not favoured unless a very long straight could be accommodated at one side. The emphasis was clearly placed on straightness and Shearman was adamant that 'in every path there should be as much straight and as little corner as possible' and that the 'path should be quadrangular with rounded corners, and not an oval with the two sides flattened'.[28] The significance of the straight track was that speed could be maintained whereas 'running in a curve must necessarily shorten the stride'. [29] Additionally, it was stressed that an essential characteristic of the 'fair' running track was that it should be level. The Cambridge University track, for example, was not level and as a result many of the fast times made by sprinters at the Fenner's ground were regarded as untrustworthy.[30]

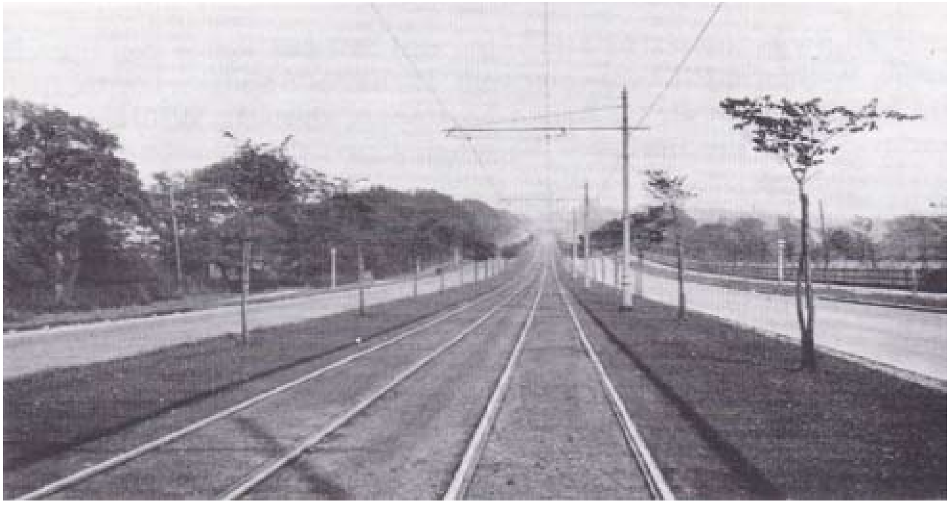
Running tracks are sites for *races*, the outcome of which is a *result* and/or a *record*. Racing implies speed and competition whereas running is simply moving faster than walking. 'There can be no question about the public fondness for a "record"', observed Shearman, adding that athletics had 'simply gone mad' upon times and records. In the case of several sports, records needed to be measured and the more serious sports became the more accurate the measurements needed to be. Again, Shearman expressed concern about the possibility of 'accurate' recording in sprint races especially, noting that some timekeepers started the stopwatch with the flash of the pistol, others the report and others the first motion of the runners. As a result of such variations in timing 'there is every possibility of a mistake *being* made to the extent of a fifth of a second, or even rather more, in the timing of races'.[31] Concerning the fetish of speed and the record Shearman stated that the sooner 'athletes learn that time is a test of speed but of nothing else, the better for the sport' and what was required, he suggested, was a public which saw racing as a 'competition of equally matched antagonists', not an event in which athletes who, with the help of a pacemaker and no serious opponents, break records.[32] Shearman saw such record-breaking as nothing less than a stunt or a 'show'. 'It is magnificent - but it is not sport'.[33]

Likewise, in nineteenth century running tracks there was often no defining line which separated the spectators from the contestants. Consider the case of the English quarter-mile championship of 1866. The favourite, E. J. Colbeck was easily winning when a wandering sheep found its way on to the course. Colbeck cannoned against the sheep, broke its leg, and went on to win in a record time.[34] Here was a case more suited to Wonderland than to serious sport but it illustrated to the bureaucrats who organised the event that rational sport-space should be segmented and that the sheep (nature) should have been separated from humans (cultured) . Rationalisation was required.

By 1939 running tracks were more standardised than the varied forms and perimeters of Victorian times. While many races were still held on grass tracks it was widely accepted that cinder surfaces were more durable and 'produced' faster times. Stop watches had become more sophisticated as had the spiked running shoes. Stamford Bridge and the White City were the most well-known tracks in the south which the north boasted Belle Vue in Manchester and Ibrox Park in Scotland. The 'fastest' track in Britain was regarded at the London University track at Motspur Park in south-west London where the world record for the mile had been set in 1937 by Sydney Wooderson with a time of 4 minutes 6.4 seconds. (and broken by Wilson).

## Improving on Nature

By the 1950s the attempts to improve running tracks had resulted in the synthetic surface. These tracks were reckoned to provide better traction, they did not turn to mud, and lead to faster times. By the mid-sixties the synthetic track became *de rigueur* – and had clearly improved on nature. The transformation of the running track was paralleled by the transformation of the road, the arterial road being 'developed' to become the faster motorway network – improving on nature. Motorways, like the synthetic track, signified speed, or 'speeding up'. They also signified a technological



*Figure, 1. Straight, synthetic surfaces (Road, rail and running track?)*

landscape. The synthetic track has been matched by the synthetic turf and the interiorisation sports, present already in the 1930s.[35] F.A.M. Webster, probably the most significant athletic coach at the time, argued for athletes from the shot putt to the mile, to undertake indoor training. Webster noted that indoors 'there is an admirable uniformity of running conditions. The footing is consistent, board tracks lend spring to the runner's stride and accord him a feeling of liveliness, that lessens fatigue'.[36] Again, nature was being replaced. Through all these changes Wilson continued to wear his black running suit, unshod and living as a vegetarian in a northern cave. He was symbolic of the days before regimentation, bureaucracy, and artifice.

Speed was manifest in both the urban and sporting landscape. Indeed, they are uncannily shown in a photograph from Peach and Carrington's *The Face of the Land*, published in 1930 (see figure 1). It shows a 'new road, conceived with real vision'.[37] Looking at the parallel lines reaching out to the horizon its form could be either a running track or a motorway. Just as John Betjeman preferred the meadow to the concrete he also liked winding roads to straight lines:

*Let's say goodbye to hedges*
*And roads with grassy edges*
*And winding country lanes;*
*Let all things travel faster*
*Where motor car is master*
*Till only Speed remains.*[38]

And by the mid-1950s it *was* a case of 'only speed' that mattered, demonstrated by the object of breaking records and the growing use of pacemakers.

The nineteenth century view that order was replacing chaos in sports, mirrors later views in the 1930s that the winding lanes of old England were being replaced by high-speed motorways. Consider the following observations, first from England in the late nineteenth century and the second from Germany in the 1930s, both nostalgically affirming nature over culture:

*Instead of casually walking into a cricket-field, you now pass a policeman, and show a season ticket, or pay for entrance, into a ground furnished with a path of cinders, and fenced in with grim barriers, in order to look at athletes who have been training systematically, instead of runners who take off their coats, and go on with glorious certainty as to who's going to win what. Many look back with a sort of regret to the more primitive athletic times – the days of grass, when cinder paths were not yet dreamed of, when a stop-watch was talked of but not seen'.*[39]

Thirty years later an uncanny similarity was found in the anti-urban and anti-modern rhetoric emerging from 1930s Nazi Germany, seeking to return to the 'natural':

*Gradually, then, the symbols of our asphalt culture which have penetrated physical culture will disappear: the cement stadium, the cinder track, the measuring tape, well-tended lawns, and running shoes which have served to intensify the pursuit of 'sheer performance'. In their place will be the simple meadow, untrammelled nature.*[40]

The nature (Wilson – preservationist) and the nurture (Tupper – progressive) is, perhaps, too crude a dualism but I sense that it makes the point that Wilson represented the rural while Tupper the city. Or, Wilson was ultra-conservative while Tupper was rather more progressive, at least willing to explore new training methods such as indoor running, new technologies such as the tread mill, enhancement of oxygen supply, and various other collaborations with 'boffins' to improve the limits of human endurance.[41]

## Back to Wilson

Could Wilson have contributed to the waves of nostalgia flooding over Britain from the 1930s onward? Here was a countryman, humble but strong, born out nature and nurtured on simple – but effective – foods. Indeed, Wilson could be read as a model of the Spartan male. After all, C.E.M. Joad had alluded to the 'culture of the body' – provided by nature: 'The feeling of the air upon the skin, of the sun upon the face; the tautening of the muscles as we climb.'[42] The open air, the muscularity, was of course, complemented by Baden-Powellism. He recommended sports for boys too but for him the countryside was the focus of his activities claiming that the best possible developer of nerve and muscle and endurance' is rock climbing' –a 'ripping good sport'.[43] Joad's communion with the earth and the sensuousness of sun and wind was precisely the way Wilson was represented.

As for Tupper he had the same motives but lacked the grass under feet, though when he had the time he enjoyed country lanes and cross-country running. It is unlikely that *he* felt what people were 'beginning to reap the substantial benefit by living, working, eating and playing more *in the open air*'.[44] Tupper had to put up with the cobbles, belching fumes from the furnaces, pungent odours of factories, and the 'acids of modernity'.[45]

Other preservationists not only saw the erosion of the countryside but also the emasculation of the landscape by the rapid inter-war growth of suburbs, sites of 'emasculation, a domestic realm constraining the English *man*',[46] spawning such organisations as the Anti-Plan Society.[47] In the preservationists' intellectual territory were ideas of health as well as landscapes, advocating vegetarianism, the simple life, brown bread and nudism. Matless alludes to the geographer, Vaughan Cornish, who noted 'the tactile sensation'' of the rural landscape, with the caveat that 'The Spartan not the Sybarite is the epicure of scenery'.[48] Associated with the 'back to nature' movements was the British nudist movement, inspired by the ideas of the German, Hans Surén' whose book, *Man and Sunlight* was published in England in 1927, just as British naturism was formalising itself.[49] Surén considered that civilization had become synonymous with the urban and promoted a moral geography of landscape, the city being unsuitable for humans and 'as soon as humans become strangers to sunlight and nature, both health and strength of character vanished'.[50] This rhetoric could readily be applied to Wilson's physical environment and his 'simple life', a life which was seen as 'subsidiary' in terms of culture and tradition but possessing a 'silent physicality'.[51] Such physicality could be illustrated in the rural Wilson, bursting out of 'the pulsing life of the earth'[52] to, for example, finding himself in Stamford Bridge where he could contest his power against a mechanical civilisation 'in a land of greed' and Mammon.[53]

## The War Effort

In a well-known book on planning titled *Britain and the Beast*, Lord Howard of Penrith (Peter Howard) quoted some German laws on nature: 'It was not only the *transformation of the German ma*n which created the preliminary condition necessary for an effective system of protection of Natural Beauty'. Hence, suggests Matless, 'Nazi ethos' could be reworked'.[54] Indeed, it was 'extreme right politics that dominated physical culture magazines in the 1930s, the editor of *Superman*, T.W. Standwell, urging his acolytes towards 'Supermanity'.[55]

The Wilson stories were first published in 1943, in the inter-War period with the yarns continuing into the war years and after. Wartime sports were limited but various forms of popular culture were concocted by the government to sustain morale. While not promoted by the government, what a better role model in sustaining morale would be the Wilson stories? For Gilbert Lawford Dalton and the publishers of the *Wizard*, the hostilities provided a chance to bring Wilson into the War where he became Squadron leader Wilson, DSO, DFC and bar. His skills were valued by the Royal Air. Force but by the end of the War it was assumed that he had been shot down though he was officially listed as 'missing', giving the publishers to resurrect him as, indeed, they did.

For teenage boys, the image of Wilson, striding out from his hideaway at Amberside to perform astounding feats, could be seen as a boost to morale. He was their comic-book hero, a Superman whose physical appearance denoted character, a semi-nude Englishman, running through the countryside, supple, lean, muscular with a striking stride, who took part in the British sports of athletics and cricket – and more (Figure 2, page 23).[56] His emphasis on the rural also fitted the *Zeitgeist* of England's 'green and pleasant land' and the movement for its preservation and, being introduced during half way through the War, Wilson demonstrated aesthetic appeal, but, at the same time he was 'hard'. Surely, these were also the qualities of the German SS, 'ready to do battle by all means at hand'.[57]

As has been recently noted, there was 'little difference in looks' between Mussolini's 'new man', the German Aryan, and the 'clean-cut Englishman'.[58] So, while Wilson could be said to demonstrate chivalry, health resulting from the country life, and 'fair play', he also revealed the 'possibilities inherent in modern masculinity when stripped down' to militaristic use in the R.A.F – or worse.[59]

## Concluding Thoughts

George Orwell concluded his essay on boys' weeklies by stating that with the arrival of post-Greyfriars weeklies such as the *Wizard* and *Rover*, and the shift of Tom Merry and Billy Bunter to Wilson and Tupper, little had fundamentally changed in the world of the weeklies. By this he meant that there was 'no political development whatever'.[60] It is clear that Wilson was conservative. Tupper was working class but he was happy to accept the laws and regulation of modern sport, organised by the upper class and in the case of athletics, invariably from the ancient universities whose athletes he detested. Wilson's conservatism, his rural life, his emphasis on fitness, his health and rural sensitivities combining to produce a sportsman, who unquestionably acknowledged that modern sport is nothing but a 'good thing'. The paradox is that he was able to retain the rural while participating in the modern, surviving 'the vertigo and whirl our frenzied [sporting] life'.[61]

Orwell asked, why 'is there no such thing as a left-wing boys' paper?'[62] An attempt to answer that question in the context of sport is to suggest a re-evaluation of the word 'sport' and replace it with 'body-culture'. Drawing on Henning Eichberg's notion of a 'trialectic', three configurations of body-culture can be identified: (a) achievement, serious and competitive 'sport'; (b) Physical Education; and (c) 'play' or 'frolic'.[63] Tupper and Wilson can ultimately be read as athletes working to the extreme, excess, and dedicated to victory. Moderation is unknown to them, with Wilson represented as a hero of ridiculous and unlikely longevity. Tupper seems to more realistic but nevertheless seeks victory and achievement. Alternative configurations of body culture were available from the 1850s onward, i.e. gymnastics (i.e. health) and frolic (play), the former basing itself on non-competitiveness and German and Nordic aesthetics, and the latter the romantic, quasi-nudist or 'back to nature' ideals.[64] But both had to give way to achievement sport, part and parcel of the twentieth century cult of speed which Wilson *and* Tupper encouraged. To return to Orwell, his 'political-sociological' essay could be applied to the sports-oriented boys' weeklies of the 1940s onwards with their right wing values (including Tupper and Wilson) which were not so far from the *Gem* and *Magnet* as one might think.

John Bale is an Emeritus Professor at the School of Public Policy and Professional Practice at Keele University, U.K. and an Honorary Professor at the school of Human Movement Studies, Queensland University, Australia. He has written numerous books and articles on various aspects of sports, his most recent book being *Anti-Sport Sentiments in Literature* (Routledge, 2007).

## Notes

1. The term 'comic' refers to the 'comic strip' which is mainly made up of visual images. 'Boys' Weeklies', on the other hand, are dominated by the written text.
2. George Orwell, 'Boys' Weeklies', Horizon, 3, March, 1940.
3. J. P. O'Flinn, 'Orwell on Literature and Society', College English, 31, 6, 1970, pp. 603-612;
   Robert H. MacDonald, 'Reproducing the Middle-Class Boy: From Purity to Patriotism in the Boys' Magazines, 1892-1914', Journal of Contemporary History, 24, 3, 1989, p. 522; D. P. Leinster Mackay, 'Some Etonian Thoughts and Contrary Imagination: Thing (1994) and Orwell (1984)', British Journal of Educational Studies, 31, 1, 1985, p. 75.
4. Jeffrey Hill, '"I'll run Him": Alf Tupper, Social Class and British Amateurism', Sport in History, 26, 2006, pp. 502-519; Jeffrey Hill, '"I like to have a go at the swanks"': Alf Tupper and English Society, 1945-1990', in Philip Dine and Séan Crosson (eds.) Sport, Representation and Evolving Identities in Europe, Oxford: Peter Lang, 2010, pp. 79-100. Jeffrey Hill, 'Alf Tupper: The Tough of the Track and the class struggle in British Athletics', in Dave Day (ed.), Sporting Lives, Crewe, Institute for Performance Research, MMU, 2011, pp. 30-39.
5. www.toughofthetrack.net/indexa.htm (accessed 24 May, 2010).
6. Ron Hill, The Long Hard Road, (vol.1), Hyde, Ron Hill Sports, 1981, pp.64.
7. Hill, '"I'll run Him"; Hill, '"I like to have a go at the swanks"'; Hill, 'Alf Tupper: The Tough of the Track'.
8. http://hubpages.com/hub/Wilson-of-the-Wizard (accessed 24 May, 2010).
9. W. S. K. Webb (William Dalton), The Truth about Wilson, London: D. C. Thomson, 1962.
10. Brendan Gallagher, Sporting Supermen, London: D. C. Thomson, 2006.
11. This could be called 'Deconstruction' which looks for what is deemphasized, overlooked, or suppressed in a particular way of thinking. Jack Balkin, 'Deconstruction', 1995-96, http:www.yale.edn/edu/lawweb/balkin/deconstruction (accessed 9.1,2013).
12. Webb is a non-de-plume, the author, in fact, being the prolific Gilbert Lawford Dalton (1904-1963), who authored both the Wilson and Tupper stories plus numerous others for Thomson comics. Before working with Thomson he had been a sports reporter specialising in football, cricket and athletics.
13. This was achieved by Sebastian Coe.
14. 'Stayling' seems to be an anonymous place-name.
15. Webb *The Truth about Wilson*.
16. Ibid, p. 24.
17. Ibid, p. 19.
18. Ibid.
19. Ibid, p. 25.
20. Ibid, p. 26.
21. Ibid, p. 49.
22. David Matless, Landscape and Englishness, London, Reaktion Books, 1998, p. 25.
23. Ibid.
24. Raymond Williams, The Country and the City, London: Hogarth Press, 1985, p. 3.
25. ohn Betjeman, 'The Town Clerk's Views', in John Betjeman's Collected Poems, London: John Murray, 1958, p. 169.
26. John Betjeman, 'Bournemouth', in Trains and Buttered Toast (ed. S. Games), London, John Murray, 2006 [1937], P. 73 (italics added).
27. Shearman, Athletics and Football.
28. Ibid, p. 185.
29. Ibid.
30. Ibid.
31. Ibid, p. 208.
32. Ibid, p. 213.
33. Ibid, p. 212.
34. Shearman, Athletics and Football, p. 87.
35. .A.M. Webster, Indoor Athletics and Winter Training, London, Harrap, 1938, p. 44.
36. bid.
37. Matless, Landscape and Englishness, p. 56.
38. John Betjeman, 'Inexpensive Progress', in K. Gardner (ed.), Faith and Doubt of John Betjeman, London, Continuum, 2010, pp. 175-76.
39. Published in Baily's, a prominent sports magazine and quoted in Haley, The Healthy Body and Victorian Culture. p. 123. Italics added.
40. Quoted in John Bale, Landscapes of Modern Sport, London, Leicester University Press, 1994, p.42
41. Gallagher, Sporting Supermen, p. 64.
42. Matless, Landscape and Englishness, p. 87.
43. Ibid.
44. Ibid, p. 92, italics added.
45. W.G. Hoskins, quoted in Matless, Landscape and Englishness, p. 274.
46. 46 Matless, Landscape and Englishness, p. 35. Italics added.
47. Ibid, p. 194.
48. Ibid, p. 95.
49. Nina Morris, 'Naked in Nature: naturism, nature and the senses of the 20th century', Cultural Geographies, 2009, 16, pp. 283-308.
50. Ibid.
51. Ibid, p.252.
52. Ibid.
53. Williams, The Country and the City, p. 248.
54. Matless, Landscapes and Englishness, pp, 94-95.
55. Ina Zweiniger-Bargielowska, Managing Health and Fitness in Britain, 1880-1939, Oxford, OUP, 2010.
56. George Mosse, The Image of Man, New York, Oxford University Press, 1996, p. 115. Mosse adds that 'Nazi male symbols were often [...] pictured in a natural setting', p. 173.
57. Ibid.
58. Zweiniger-Bargielowska, Managing Health and Fitness.
59. Mosse, The Image of Man, p. 180.
60. Orwell, 'Boys' Weeklies'.
61. Max Nordau, quoted in Stephen Arata, Fictions of Loss in the Victorian Fin de Siecle, Cambridge, Cambridge University Press, Cambridge University Press, 1996, p. 28.
62. Interest in Wilson continues to the present decade as shown by the interest in him by author and play writer, Alan Bennett, 'Diary', London Review of Books , 3 January, 2013, p.33-35. (I am grateful to Jeffry Hill for this reference and for helpful comments on a draft of this paper).
63. Henning Eichberg, Body Cultures (eds. J. Bale and C. Philo), London, Routledge, 1998, pp. 123-125.This is not to say that alternatives have not been suggested to reduce the emphasis on specialisation in high achievement sports. See, for example, Sigmund Loland, Fair Play in Sport, London, Routledge, 2001.

# Understanding Athletic Movement

**BY DAVE ROWLAND**

## Introduction

The objective of this piece is to provide a general appreciation of the critical factors that underpin athletic movement. We all understand that athletic movement requires certain degrees of strength, speed, endurance, and technical proficiency. However, what are less obvious, are the various biological processes that provide the basic underpinnings of athletic movement, the processes that must be trained to enhance strength, speed, and endurance performance.

The benefits of an understanding of how such underpinning processes work is that this knowledge can help to enhance coaching insight, which in turn may lead to more accurate targeting of physical training. In many respects the brain may be considered the master controller of human movement, and so we will begin with an overview of how the brain initiates, and controls, athletic movement.

Communication within the brain: From intention to activation

As with all other tissues in the human body the fundamental building block of the brain is the cell. In the brain the vast majority of cells are referred to as neurons. Neurons differ from other bodily cells (such as those found in muscle, skin, or your internal organs), as neurons are specifically designed to transfer information. This information is transmitted using electrical and chemical signals, and it is these changes in electrical and chemical states that provide the basis of all human thought, emotion, and movement. A consequence of all this furious, but unseen, activity is that the brain uses up a disproportionate amount of the total energy available to the body. Although the brain accounts for only 2% of the overall weight of the body it is estimated that it consumes somewhere in the region of 20-40% of all available energy stores. To illustrate the complexity of the brain consider that the average human brain is composed of roughly 100 billion cells, with each individual cell having several thousand connections to other neurons. This comes up to a grand total of 500-1000 trillion connections within the brain. No computer on earth has as many connections, or such a massively complex system of organisation. At any rate, the often cited 'brain-is-like-a-computer' analogy is hopelessly inadequate. Unlike a computer, the brain is a living thing; it can grow or shrink, connections can be made stronger or can deteriorate. In fact one of the revolutions in neuroscience (the study of the brain) over the last 15 years has been the realization that our brains are very much shaped by our life experiences. In other words, everything we do, everything we experience, causes physical and chemical changes within the brain. The consequences of these experiences can have positive or negative effects on both the physical structure, and on the chemistry of the brain.

*Steve Mitchell contests the lead from the eventual winner Charlie Grice in the men's 1500m at Solihull*

While it is obvious that regular exercise causes physical changes to the body - you can see if someone loses weight or gains muscle - exercise also results in many hidden training adaptations within the brain of the exercising athlete. As a result regular physical training has a number of positive effects on the developing brain of a child, on the fully grown adult brain, and on the aging brain. And although we commonly assume that improvements to athletic performance result primarily from adaptations to the body, we should also be aware that the brain constantly adapts in response to training, and that these changes are just as fundamental to athletic performance as the more obvious physical adaptations.

## How neurons communicate

Individual neurons don't actually touch each other and are separated by microscopic gaps (called synapses). An individual neuron communicates with its neighbours by releasing chemicals -tiny micro-balloons of chemicals (referred to as neuro-transmitters)- which float across the synapses and adhere to adjacent neurons. Currently there are over 100 different types of neuro-transmitters that have been identified, with more regularly being discovered. Some of these chemicals are well-known and are frequently mentioned in conversations and articles relating to both general health and athletic training – for example; adrenaline (epinephrine), nor-adrenaline (nor-epinephrine), serotonin, dopamine, and cortisol.

When a tiny balloon of neuro-transmitter is released it floats across the synaptic gap and fits into the relevant receptor on one of its neighbouring neurons. If one balloon of neuro-transmitter hits one receptor, then nothing happens. The signal is too weak, and hence does not get transmitted any further than this second neuron. That neuron absorbs the neuro-transmitter, breaks it down into its component parts, and uses the raw materials to replenish its own chemical stores. However, if the receptor is hit repeatedly within a short enough time-span by that particular type of neurotransmitter, then the receiving neuron will respond by releasing more neuro-transmitter, which then hits its adjoining neurons, and so the signal spreads through networks of neurons. A characteristic of this neuro-transmitter release is that the signal becomes amplified as it spreads. So, in essence, just as converging streams of water gather momentum as they run downhill, so the signal spreads like a wave that rapidly rises, surges through the various brain regions, and then just as quickly subsides. And this is how signals in the brain are transmitted, as flurries of electrical and chemical activity which briefly flash through networks of neurons.

### Practical relevance

One of the positive adaptations which occur as a result of regular training is that the ease with which appropriate neurotransmitters are released improves. Hence, more efficient and faster neuro-transmitter release, for less effort and energy. Furthermore, the sensitivity of the surrounding neurons to that particular neuro-transmitter is also enhanced. So essentially, the transmitting neuron becomes better at sending the signal, and the receiving neuron become more sensitive to the message being transmitted. The end result is that signals are transmitted more efficiently (more precisely and requiring less energy) between neurons. Interestingly, one of the factors that typically accompanies 'training stress syndromes' -such as Overtraining, burnout, or staleness- is the depletion of certain neurotransmitters within certain areas of the brain. And this makes sense when you consider that repeated activity, without sufficient rest and recuperation, gradually depletes the brain of chemical stores, just as it depletes the body of energy stores. Hence, even though the athlete may sleep well, even though there may be no apparent muscular fatigue, performance levels can still be compromised. Why? Because training and/or life-stress have combined to deplete stockpiles of various messenger chemicals, hence disrupting the delicate balance essential for optimal functioning.

Just as with the body, training-induced changes to the brain are both physical and chemical in nature. As examples; one of the consequences of regular physical skill-practice is that the brain becomes more effective at accurately activating the various muscles required to execute a specific movement pattern. In effect what this means is that the firing of the networks of neurons which control specific regions of muscles becomes more precise. As these neurons are repeatedly activated during practice, their activation thresholds become more sensitive and easier to switch-on. This phenomenon is the basis for the maxim, 'neurons that fire together, wire together' – meaning that the more frequently a particular combination of neurons fire in a synchronized pattern, the stronger the connections between these neurons becomes. In real-terms what this means is that with repeated practice, the energy required to activate muscles to perform particular movements decreases. Furthermore, again with practice, the signaling between the brain and the musculature becomes more precise. More precise signaling means that firstly, only the appropriate amount of muscle is activated to produce the required movement power, and secondly that this activation occurs at exactly the right time. From an athletic perspective this means that; (i) movement is more efficient, and so energy is conserved, and (ii) improved signaling enables a more complete activation of the working muscles, hence enabling the generation of larger movement forces.

## Communication between Brain and Body

There are many differently designed neurons, each adapted to perform specific tasks related to human function. Of specific interest in relation to athletic movement are the motor neurons. A Motor neuron is actually a single cell. Although we commonly think of cells as extremely small, motor neurons can be very long - for example stretching down from the spinal cord to the big toe.

The motor neuron consists of 3 distinct parts; the cell body, the dendrites, and the axon. The cell body is connected to hundreds, sometimes thousands, of other cell bodies by means of the microscopically thin dendrites. These dendrites enable the neuron to share information with all the other cells within its immediate surroundings.

When a decision to move is taken within the brain, it is translated into a series of electro-chemical signals. The dendrites detect these environmental changes and relay these signals back to the cell body. The cell body then sends an impulse down through its one, and only, axon. This single axon then joins the millions of other axons leading from the brain, down through the spinal cord, and out into the musculature. The axons merge with others that are heading for the same area of the body, and are bound together in a coating of fatty material (termed the myelin sheath). These individual bundles then merge with others and exit the spinal cord as 'nerve trunks'. As these nerve trunks travel through the muscles individual bundles branch off from the trajectory of the main trunk and

head into different areas of the muscle. Similarly, as these bundles travel deeper into the muscle, smaller and smaller collections of nerve fibres separate, until finally each microscopically thin axon is once again travelling alone towards its specific destination. The destinations of the individual axons are specific sites within the muscle – more on these shortly.

One of the differences between young growing athletes and mature adults is that the fatty myelin sheath that protects the nerve bundles gradually becomes thicker as we grow. This fatty layer acts to both provide insulation for, and to increase the speed of transmission of, the motor signal. In effect his means that the speed at which signals from the brain are transmitted down the spinal cord, to the working muscle, increases during the growth years as the protective sheaths thicken during maturation. This thickening of myelin sheaths is positively influenced by regular physical activity, healthy diets, and athletic exercise.

## Structure of the brain

A useful fact that may help in understanding the structure of the brain is that the bottom-most areas of your brain, in other words those closest to the top of the spine, were the first to evolve. As millions of years passed, and evolution progressed, later extensions and modifications to the brain were gradually layered on top of these more ancient foundations. So for example, the brain stem -which is situated on top of the spine at the junction between spine and brain-, was the earliest brain structure to evolve. Consequently, we share this brain region with our most ancient of ancestors, which also turns out to be the far distant ancestor of modern lizards, hence it is often referred to as 'the reptilian brain'. Accordingly, as you would expect, the brain stem is capable of managing only the most basic and automatic of life's essential processes - such as the regulation of breathing, heart rate, and blood pressure – all common aspects of living that we share with these long-separated and very distant relations.

As we travel up through the layers of the brain we next encounter the area referred to as the mammalian brain (as we share this brain structure with all other mammals). This region is the seat of the limbic system (frequently referred to as the emotional brain). It is within this area that we find the brain structures associated with the well-known ‘fight, flight, or freeze’ instinctive responses to sudden emergencies. Also housed within the mammalian brain are the regions dedicated to controlling movement. These regions coordinate with each other to collate and interpret all incoming sensory information - vision, hearing, current limb positioning, and balance- all critical to movement control. Those unfortunate enough to have damage to these areas of the brain - for example consequent to a stroke - commonly display deficits in motor control, such as an inability to appropriately activate various muscles, errors in timing of limb movements, slowness and awkwardness of movement, &/or uncontrollable involuntary tics.

In a sense, the function of the mammalian brain centres is essentially to act as negotiators between the higher brain (which we will deal with next) and the brain stem. Like all good negotiators their job is to listen to both sides, interpret the demands of both sides, and find an optimal means of resolving these demands in a manner that satisfies both the higher brains desire to move from X to Y, and the brain stems desire to conserve valuable energy stores while avoiding discomfort, pain, and injury.

Finally, we come to the uppermost of the brain areas, the cerebral cortex – also termed the neo-cortex (‘neo’ simply meaning new). The cerebral cortex is, evolutionarily speaking, our most recent brain addition, and its size is disproportionately large when compared with that of all other mammals. This is the area of the brain that singles humans out as unique in our ability to reason, think rationally, make conscious decisions, and our unparalled ability to master a wide diversity of physical skills. It is the expanded areas within this giant cortex that enables us to think and move in such an incredible diversity of ways; to run, hop, bound, throw, juggle, play the violin, and perform a wide diversity of other complex movement skills.

## Communication from Body to Brain

At the same time as the movement centres within the limbic system are receiving orders from the higher brain, they are simultaneously seeking information from the body. This information is generated by sensory receptors residing throughout the bodily tissues; in the skin, muscles, joints, tendons, ligaments, fascia and within the hollow organs of the body (the heart, liver, kidneys etc). These receptors take various forms; for example, mechanoreceptors detect changes in length and tension, thermoreceptors changes in temperature, nocioreceptors detect pain signals and relay these signals back to the central nervous system, chemo-receptors are sensitive to changes in acidity, and so on.

The receptors most frequently mentioned in relation to athletic movement are; muscles spindles, golgi tendon organs, and joint receptors. Muscle spindles normally consist of 2 to 12 miniature muscle fibres enclosed in fibrous capsules, which are attached and encased within the muscle. The muscle spindles themselves do not actually contribute much to the force produced by the muscle, acting instead to detect both the speed and magnitude of changes to the muscles length. The golgi tendon organs are not actually situated within the tendon, with most residing at the border between muscle and tendon. The primary function of these sensors is to provide feedback on the forces being transmitted through the tendon. Joint receptors are sensitive to mechanical stress and are thought to reside in various locations, such as joint capsules, ligaments, and other connective tissue sites. So, for example, ‘articular’ receptors reside within the joint capsule and are particularly well-suited to detecting potentially damaging conditions, such as high tension levels across a joint, &/or joint inflammation. Finally, there are sensors situated close to the body surfaces. These are sensitive to external mechanical events – for example stretching of the surface of the skin, acceleration of body surfaces, movement of the hair, and so on. In other words, sensors detecting cues that relate to how our bodies are reacting to, and moving through, the external environment.

And so; all the information relating to the current status of every aspect of bodily function is sent from these receptors back, via the spinal cord, and onto the brain. At various relay stations along the route this information is combined, filtered, deciphered, and then only relevant messages are forwarded up the communication chain. The obvious analogy is with the communications network of very large organisations. The key decision-maker will not have the capacity to handle all information and make all decisions, as they would quickly become overloaded and ultimately performance would deteriorate and progress grind to a halt. Hence, managers are required to collate information

| | | |
|---|---|---|
| | Higher Brain Command | |
| External Environment | (Mid-Brain) | Internal Environment |
| | Movement Solution | |

*James McMurray a convincing winner of the men’s B 1500m at Solihull* and make decisions at a local level within their departments, while referring only crucial information up through the decision-making chain of command to the executive decision-maker (the cerebral cortex). In turn, these managers will have sub-managers that perform a similar role for them, and so on until we reach the level of the individual neuron whose sole purpose is to carry individual units of information.

An important example of how important movement decisions may be taken without any involvement from the brain, are the spinal reflexes. Perhaps the most obvious example is that of the jerk reflex initiated by sudden pain. You place your hand on a hot oven ring, the resulting pain signal flashes to the spinal cord, and instantly – without referral to the higher brain – a decision is taken at the spinal level to jerk the hand away from the source of heat. This is obviously an extreme example, and one that everybody has probably experienced at some time. However, it is important to be aware that reflexive processes are constantly working away in the background when we move. The objectives of these reflexes are, yet again, primarily two-fold; avoid pain and conserve energy. Think of running as an illustration. When you run you usually do not have to concentrate to maintain balance. You unexpectedly step on something slippery and your body automatically corrects the resulting imbalance before you are even aware there is a problem. But reflexes are also incorporated into athletic movements to reduce the workload of both the brain and body. As examples; we typically do not have to concentrate on stabilization, or balance, or what we should do with our arms, when we run because these functions are all taken care of automatically through reflex action. Similarly, when we impact with the ground during run or jump activities, a large portion of the energy produced by ground contact is stored in the structures of the lower leg, and re-utilised to help power the next stride through the action of the 'stretch-shortening reflexes' (more on these later).

Initiating Movement; A Summary

Within the brain the process of events that precede movement are; within the cortex a command is issued, for example, run from here to there. Within the mid-brain information is gathered from the body via the spinal cord, brain stem, and from areas of the mid-brain associated with vision, hearing, and balance. The centres of the mid-brain involved in various aspects of controlling movement then liaise with one another in assimilating and interpreting all this information. Finally, based on all of the collated information (from both the body and the environment) the mid-brain then sends a series of signals down through the brain stem, through the spinal cord, and out into the musculature of the body.

## From muscles to movement

*Muscular activation*

When the axon – having travelled down from the brain, through the spinal cord, through the nerve bundles and trunks – finally arrives at its designated patch of muscle, it joins to the surface muscle at its own specific anchoring site, known as a Motor End Plate. The Motor end plate marks the outer border at which the axon makes contact with the muscle surface. At the other side of this border a number of individual muscle fibres are attached to the motor end plate (at sites called Neuro-muscular junctions). And so the structural design is; a single nerve axon binds to a single motor end plate on the surface of the muscle. At the other side of this border the motor end plate is connected to a number of neuro-muscular junctions, and each junction is in turn connected to a single muscle fibre.

Effectively what this means is that a single nerve axon sends a signal to a single motor end plate. A single motor end plate is connected to a number of neuro-muscular junctions, each of which is in turn connected to a single muscle fibre. The implication of this design is that if an activation signal is sent down the axon to the motor end plate, then all the muscle fibres that are adhered to the motor end plate, via their respective neuro-muscular junctions, are activated. These individual components – the axon, its motor end plate, its neuro-muscular junctions, and the individual muscle fibres attached to those junctions –collectively form a single 'Motor Unit'.

An implication of the design of the motor unit is that once the command signal reaches the motor end plate then all the muscle fibres attached to that plate are activated. This observation is the foundation of the commonly cited 'All or none' principle of motor unit activation. The number of fibres within a single motor unit (i.e. attached to the motor end plate) is primarily dependent on the size of the muscle in question, for example; a motor unit located within a small muscle controlling say, movement of the eye, or movement of the larynx, may contain less than 10 muscle fibres. Whereas within a large leg muscle, a single motor unit, may cause the activation of hundreds or thousands of individual fibres.

However, although all the muscle fibres within a single motor unit may be activated during a specific movement, this does not mean that all the fibres within a given muscle are active. Activating an entire muscle is not the same as flicking a light switch. Muscles are rarely, if ever, either totally 'on' or totally 'off'. Instead, at any time only a portion of the total number of motor units within any given muscle will be active. In fact, the only demonstrated way to simultaneously activate all the fibres of a muscle is by directly applying an electrical signal to the muscle, hence by-passing the brain and spinal cord, and thus causing the muscle fibres to be artificially stimulated. And so; although all the fibres within a single motor unit are always activated simultaneously, conversely the fibres within an entire muscle are unlikely to ever be all simultaneously activated at any one time.

## How is the muscle activated?

As is the case with communications within the brain, communications within the muscle are also transmitted using a combination of chemical and electrical signals. These signals travel in waves along networks of channels that run throughout the muscle. When an individual muscle fibre is activated, it contracts - meaning that the ends of the fibre are pulled closer together. So, when a muscle is activated, it shortens, hence pulling on the bones to which it is attached (via the tendons). Accordingly, individual muscles, acting in isolation, can't 'push', they can only 'pull'. Through this shortening action the muscle pulls on the tendon, which is attached to the bone, the ends of which articulate with the joint, hence causing a movement force around the joint.

Whether or not movement occurs as a result of muscular force is dependent on the sum of other forces that may be acting on the joint at that instant in time. For example, if you are pushing against a wall, or trying to pull a truck, it is unlikely that there will be much movement. Muscles may generate high forces, but the external resistance will be far greater. So, if the external resistance is greater than, or equal to the applied force, then no movement will occur. When muscles generate force, but do not change length, this is referred to as an isometric muscle contraction. It is possible to generate high forces and tensions during isometric contractions, and so isometrics can sometimes be used to develop strength, and to initiate positive muscular changes, while minimising the risk of injury. Getting back to our example; if there is no external resistance (no wall, no truck), but there is an equal and opposite internal resistance, then again, no movement will occur around that particular joint.

So consider the example of a contracting bicep of the upper arm. If the bicep is contracted, it will shorten and pull on the tendons attached to the lower arm, hence causing rotation around the elbow joint. However, if the opposing muscle group, in this case the triceps, are simultaneously being activated to generate an equal, but opposing muscular force, then no movement will occur. Therefore, in order to flex the elbow -moving the wrist and hand toward the shoulder- either the force being produced by the bicep must be increased, or the force being produced by the tricep must be decreased.

Staying with this simple example, consider this question: If you now wanted to contract the bicep -moving the hand and wrist towards the shoulder- either more powerfully for few contractions, or with better endurance for multiple contractions, how could you go about accomplishing these goals? There are a couple of obvious answers. Most obviously, you could train the bicep to be bigger and stronger, hence increasing the force generated during muscular contraction. And you could endurance train the bicep over many repetitions causing endurance-related adaptations within the muscle. However, there is another route following on from our previous discussion. If you can reduce the activation signal to the tricep – in other words relax the tricep - as the bicep is contracting, then internal muscular resistance to bicep flexion will be reduced. The end result is a quicker, a more forceful, and a more energy efficient movement.

A further point of note relevant to this simplistic example; if you were to perform this simple arm movement as powerfully as possible or as many times as possible, you would notice that it is not just the biceps and triceps that are involved. Indeed, these muscles cannot work alone. There must be some degree of activation of the musculature of the forearms to contribute to controlling the movement of the elbow joint. Similarly the musculature surrounding the shoulder joint must also be activated to fix and stabilize the position of the shoulder.

Finally, if you were to extend the example and perform this rudimentary movement, either powerfully or continuously, while standing on one leg, or with chronic low back pain, it would quickly become apparent that even when performing such an evidently rudimentary movement around a single joint, that many other muscles throughout the body are required to provide the stable platform necessary for movement to occur. If this platform is too rigid, or too unstable, then again energy will be wasted and sub-optimal movement efficiency will result. And so, even in the performance of such a simple movement it becomes apparent that there are a number of skill factors (activation and relaxation patterns) required. The repeated cycles of activation and relaxation of opposing muscle groups must be finely synchronised, elbow and shoulder joints must be appropriately stabilised, postural and leg muscles must constantly modulate force output to maintain the skeleton in a balanced, stabilised stance while simultaneously absorbing the movement disturbances of the moving arm.

And so it is worthy of note that movement power and movement endurance are not solely dependent on the force and speed capacities of the contracting muscle groups, but are also critically dependent on movement skill and coordination.

## What are the key factors that contribute to muscular strength?

The amount of force that can be generated in any given movement is a product of a number of core factors, which can be broadly categorised as skill or muscular factors.

As has just been noted, there is a 'skill' in generating force. Movement power will be enhanced by the precise activation of the working muscles, coupled with a more complete de-activation of opposing muscle groups. Hence, sometimes athletes can become stronger just by becoming more skilled in performing a specific movement, without necessitating any changes to the musculature. Hence, athletes commonly experience rapid gains in the amount of weight that they can lift in the first weeks and months of beginning weight training. These rapid gains are not necessarily the result of muscles becoming stronger, but because they have learned, practiced, and refined the 'skill', the coordination pattern, of the particular lifts.

There are 3 key structural aspects of muscle design that impact directly on the amount of force a muscle can produce.

*i. Muscle cross-sectional area*

As a general rule; the more muscle fibres that are arranged side-by-side, in other words the thicker the muscle, then the more force that the muscle can generate. And this makes sense; the greater the number of individual fibres that can pull together, the greater the overall force generation. Hence, for example, the thickest muscles in the body -the gluteal muscles of the butt- are capable of generating the largest forces.

There are two potential available mechanisms for increasing muscle cross-sectional area; firstly, and most obviously, by increasing the size of the individual muscle fibres. This is a common occurrence when athletes participate in properly structured strength training programmes, but may also occur consequent to any form of training that requires high muscular force production. For example, sprint or jump-based training can often result in increases in muscle size, especially in younger athletes. The second potential route to increasing muscle size is through increasing the number of fibres within the muscle. Whether or not this can actually occur following normal training programmes remains unclear, despite much research and debate.

*ii. Muscle architecture*

Also of significance in relation to force production is the design of the muscle. In particular, the angle between the line of pull of the muscle fibres and the direction of the desired force production. As a general rule; the greater the angle formed between the direction of the muscle fibres and the direction of the desired force, the greater the resulting movement power generated by that muscle. Muscle architecture is modified each time a muscle increases or decreases cross-sectional area, and obviously architecture is also changed during the childhood and adolescent growth years.

*iii. Fibre-type composition.*

As is well known, the total population of muscle fibres within any given muscle is composed of different varieties of fibre. These fibres are traditionally categorised as either 'Slow' or 'Fast'-twitch. However, it is important to note that within these two broad categories that fibres exist along a continuum. In other words, slow twitch fibres can be conditioned to behave more like Fast twitch fibres, and Fast twitch fibres can be conditioned to behave more like Slow twitch. However, the balance of evidence suggests that it is not possible (at least under normal training circumstances) to totally transform one type of fibre to the other.

One other relevant piece of background information is that when called upon to contract, muscle fibres are recruited primarily on a 'size' basis. In effect, smaller diameter fibres, as they have the

| | |
|---|---|
| **Type I** **Type IIa** | **Type IIx** |
| **Low Force**<br>**High Fatigue Resistance** | **High Force**<br>**Low Fatigue Resistance** |

*Force/fatigue continuum*

lowest activation thresholds, are the first to be activated, followed in sequence by progressively larger fibres. This phenomenon is called the ‘size principle’, and although perhaps not 100% accurate in all cases, is a good general principle to help in understanding patterns of muscle recruitment.

Slow twitch fibres are also commonly referred to as Type I fibres. These fibres are distinguished by a number of key features; primarily their reddish colour (due to the perfusion of oxygenated blood-bearing capillaries), and the narrow, thin cross-sectional area of each individual fibre. Type I’s are also the smallest diameter fibres and are hence easily activated, and – thanks to their plentiful oxygen supply and oxidative enzymes- are ideally suited to endurance-type activities.

From a practical perspective; the implications of these design characteristics are that Type I fibres are very economical, capable of producing force at a modest level, but for a sustained period, and critically (for endurance performance), at a low energy cost. Accordingly, regular endurance training can drive fibres to become more fatigue resistant, but at a cost of becoming less adept at generating high forces. Slow twitch fibres also play a critical role in activities that must be performed consistently throughout the day. So for instance, muscle groups that are heavily involved in maintaining posture, balance, and stability typically contain high proportions of slow twitch muscle fibres. For example, the soleus muscle of the calf, and the deep muscles of the core which must be habitually activated to maintain upright posture of the trunk.

In contrast, Fast twitch (also termed Type II) fibres can develop force quickly, shorten at a high velocity, and relax rapidly after contraction. Fast twitch fibres are larger, are capable of generating

more force, at higher shortening velocities, but with poorer fatigue-resistance than their Type I counterparts.

Depending on the training status of the individual, fast twitch fibres may be conditioned to behave ‘more like’ Type I’s – having low force generation, but good fatigue resistance capabilities – or demonstrate high force generation ability, but fatigue very quickly. Hence, the various fibre types can be thought of as existing along a force/fatigue continuum.

Fast twitch Type IIa’s are larger than Type I’s, and accordingly are harder to activate. As a consequence of training Fast twitch Type IIa’s can be described as effective multi-purpose fibres, having both good endurance and good force generation capacities. With appropriate strength/power training Type IIa’s can become enlarged, and hence capable of developing higher forces. While with appropriate endurance training Type IIa’s are capable of exhibiting fatigue-resistance qualities resembling the more endurance-specialized Type I’s.

Fast twitch Type IIx fibres have the largest cross-sectional area, and are capable of producing the greatest forces when activated. However, such fibres fatigue very easily and quickly, and recover slowly. Type IIx’s are peculiar in the sense that regular activation of these fibres through physical activity, causes them to move down the force/fatigue continuum – hence becoming less powerful, but having better endurance capabilities. Accordingly, Type IIx’s are often referred to as the ‘couch potato’ fibres. Although they are capable of high and fast force generation, they respond to training by becoming slightly slower and capable of producing slightly less force. One of the implications of this is that regular training of ANY KIND will cause Type IIx fibres to move down the force/fatigue continuum. Essentially this means that it is not possible to increase the number of Type IIx’s in a muscle purely through training means. In fact, people with the highest number of Type IIx fibres tend to be those who have suffered a spinal cord injury, and hence do not have the ability to activate their leg musculature. Similarly, those who have been confined to long periods of bed rest typically increase their percentage of Type IIx’s during these periods of inactivity.

## Development of skill and co-ordination

How does the brain ‘know’ how to precisely regulate and control all the various aspects and components of movement that have already been discussed? It seems like a highly complex task; activate all the necessary muscles to generate movement


*The Womens Mile, Oxford, with eventual winner Alison Leonard in 6th position* power, minimize the tension in the opposing muscle groups, contract all the muscles necessary for stabilizing joints, maintaining balance, and controlling posture. Given the massive exchanges of two-way instructions, information, and feedback that are necessary between the brain and the body, how is it possible that we can learn and perform movements that seem so natural, sometimes effortless, even under conditions of extreme pressure?

How the brain accomplishes such a complex task is interesting, but also of practical relevance, because if we can adequately understand the underlying mechanisms then perhaps we can better understand and target training that can positively affect movement skill and efficiency. In order to gain insight into the mechanisms underpinning skill development and co-ordination it may be useful to briefly examine how our models for understanding and explaining these phenomena have evolved over the course of the past 40 years or so.

The first sensible observation to make is that practice improves your ability to perform movements successfully. When you perform a movement repeatedly, you become better at it. It does not necessarily matter if it's an infant taking its first faltering steps, learning to use a knife and fork, or learning to juggle. Improvement occurs consequent to repeated trial and error, until such time as the movements become more controlled, more accurate, and more reliably repeatable. Accordingly, it seems obvious that through some or other mechanism we remember previous attempts, and that through repeat practice we refine these previously employed movement strategies so that they become more efficient.

At this juncture it may be useful to specify what is meant by the term 'efficient' in the context of movement control. In a nutshell, when the brain decides to perform some physical task there are a number of important criteria that must be satisfied. Most obviously the body must perform the task successfully. In other words, the movement objective is accomplished; the fork goes in your mouth rather than your eye, the discus lands within its arc rather than on the motorway, and so on. However, from the brains (and in particular the lower brains) perspective, there are a number of other criteria that must also be met. For instance, the movement must be performed in a manner that causes the least pain. The movement should be performed in a manner that wastes the least amount of the brains and bodies valuable energy stores, that minimizes fatigue and muscle damage, and that presents the least risk of danger or injury.

*Chris O'Hare wins the 1500m Trial race at Birmingham from James Brewer and Lee Emanuel*

So how are previous movement patterns remembered, how are they stored, and how do we learn to modify and refine movement skills over time? When researchers first began to apply brain power and resources to investigating such questions, they made what seems a very logical initial assumption. Basically, that the brain functions as a very complicated computer. In essence, that the brain performs multiple calculations regarding timing, distance, and speed, and then 'tells' the body exactly what muscles to activate to perform the desired movement. Therefore, movement is controlled in a pre-planned, 'top-down' process, in other words, the brain first calculates, assembles, and then issues a set of instructions, which the body executes accordingly.

Movement pattern instructions are then remembered in the same way as a computer remembers a specific programme; it is filed away until the same movement must be performed in the future. During the 1960's the term 'Motor Program' was first used to describe these pre-planned movement instructions. Again, drawing heavily on the analogy of the brain as a computer, devising and storing movement plans to be accessed and re-used in the future. Hence skill development was understood as the process of gradual refinement of the motor programs, gradually eliminating variation until the movement was perfect, and perfectly repeatable.

However, it wasn't long before challenges arose that were not readily explainable through the logic of this basic theory. Take for example the relatively straight forward and natural activity of running. When I want to run, there is a quick search and retrieval of the appropriate motor program, I 'plug-in & play' this program and off I go. Let's suppose I start off in a jog and then accelerate into a run, and finally accelerate into a sprint. Is a jog a different motor program than either a run or a sprint? When I am accelerating is that a different motor program? If I run in a straight line is that a different program to running at an angle?

No matter how refined the computer, the instantaneous search, retrieval, running and seamless integration of so many different programs seems a very cumbersome and unlikely solution to the movement control problem. Furthermore, even accepting that the brain is a highly efficient and intricate filing system, how can it be possible that distinct motor programs for every movement we ever encounter over the course of our lives can all be stored within an unchanging space?

By the mid-1970's, in direct response to this and other challenges, the conception of the motor program was broadened to that of a Generalised Motor Program (GMP). A GMP was seen as containing a much broader set of instructions than the traditional motor program. Where the traditional motor program was a specific and detailed plan, the GMP was a general blueprint. Where the motor program specified exactly what to do under exact circumstances, the GMP set only the general parameters. So, to continue the running example; rather than constantly switching programs every time you accelerated, stepped off a kerb, or changed surface from road to grass to sand, all that was required was one run-related GMP. Once this general set of instructions was accessed, then more specific detail could be filled in by the senses as you were moving along. So, for example, you see that you need to change stride to avoid some obstacle, your brain does some high-speed calculations, and this revised information is fed into the 'running-GMP'.

This expansion of motor control theory solved quite a few theoretical problems. Most obviously it provided a rational solution to the 'storage problem' by suggesting a mechanism whereby only critical movement information is retained, with the remainder being filled-in through on-going feedback from the outside World. This theory also offered an explanation as to how people can execute movements that they have not previously encountered. So for example, if you know how to run, then you can run up a sand dune without ever having previously done so before, and without having to spend time 'learning the specific skill'. In other words, without having to fumble about as you develop a unique motor program for that activity. The concept of GMP's also offered a solution to one very important, frequently observed, peculiarity of motor learning that directly contradicted the logic of the traditional perspective. In fact, not only did this peculiarity contradict traditional motor program theory, but also flew in the face of what we might consider common sense.

One of the predictions of the traditional motor learning approach was that in order to perfect movement technique the skill should be practiced in the same way, for as many identical trials as possible. In other words, that consistent practice of the same movement, performed in the same way, optimally facilitates the refinement of the movement skill. The more frequently you get it exactly right, the stronger the motor program becomes, and the more likely you are to be able to get it right in the future. Again, seems sensible. The only problem was that when researchers attempted to illustrate this in experiments, the results consistently demonstrated that actually the opposite occurred. It did not matter if it was learning simple finger-tapping routines, or refining

already well-developed complex skills such as serving in tennis or taking penalties; When the task was repeatedly practiced in the same way, then skill performance within that training session improved – i.e. short-term performance improved - but long-term performance showed very little, if any, benefit. Alternatively, when the execution of the skill was continuously varied, performance on the day was erratic, as might be expected, but interestingly short-term performance improved. More surprisingly, performance continued to improve even after actual practice of the skill was stopped for periods of time. This prolonged improvement did not occur in the groups who performed 'blocks' of the same skill, executed in the same manner with little, or no, variation. In the vast majority of cases the long-term differences in skill performance between the groups was actually quite substantial, leading to the conclusion that in spite of what had been conventional wisdom, that in the long term, 'random practice' beats 'block practice' in relation to skill training.

This effect is sometimes referred to as the 'Paradox of practice variability'. In essence, if you manipulate skill training so that the performer is consistently having to make subtle changes to their key movement patterns, then there will be more frequent errors in both accuracy and reliability of execution of these skills*, in that training session*, but future movement accuracy and reliability in will be enhanced. If alternatively, you consistently practice the same skill, the same way, then skill performance on that day will improve, but this improvement is fleeting and will not necessarily carry forward to future efforts. This paradox is often summarized as; Low practice variability leads to few errors in training, but many in competition. High practice variability leads to many errors in training, but few in competition.

Now, there are a couple of qualifiers to be added to this general guideline. If you are a novice, in terms of your skill development, then any form of skill practice, regardless of how it is organized, will lead to improvement. If your event requires the repeated execution of a cyclical movement pattern, such as running or walking, then it is not feasible to be constantly chopping and changing how the movement is executed. However, from a skill development and refinement perspective, an awareness of the facts suggests that it would be of benefit to cater for randomized movement variation within the overall context of the training programme. (Some suggestions and examples for accomplishing this will be returned to elsewhere).

## From muscles to movement

*Which muscles do what?*

So far we have discussed the sequence of events that precede movement. The brain decides to move, information is sought from every outpost of the body, and the brain and spinal cord consistently adjust the movement plan take into account of all this critical data. Electrical and chemical signals are issued to the muscles, which contract, pull on tendons and bones, and cause movement around the joints. All simple and straightforward. However, where the picture becomes a bit murkier is when we try to unravel the roles of the individual muscles involved in any complex athletic movement. Let's consider running; a movement that is considered a very natural and universal skill. Our brain instinctively knows how to do it, if a child who has never been shown how to run is scared by a lion, that child will automatically run (the other possible outcome is that they will freeze due to the sudden contraction of all muscles rendering movement impossible).

Admittedly they probably won't run with world class technique, but you can be sure their sub-conscious brain will organise the movement of the limbs in a fast and energy efficient manner without the intervention of the conscious brain. So the brain doesn't have to decide which muscles to activate and which to de-activate. However, from a conditioning perspective it would seem like essential information to know which muscles are being activated, and what actions they are being asked to perform. In other words, which muscles make the most contribution to movement power and at what stages of the running cycle?

Perhaps surprisingly the answers to such questions are not very clear. Surprising because much of the focus of athletic preparation is devoted to training the musculature, and yet how sure are we that we are focusing this effort in the right areas?

We have already noted that the thickest -and consequently the largest force producing- muscles in the human body are those of the gluteal muscles surrounding the hips. These large butt muscles are unique to humans and are not shared with our distant cousins the great apes. The gluteals seem to have evolved specifically to power run and jump activities – they are not normally activated to a great extent in other daily activities. Hence it would appear that these muscles make the largest contribution of force to forward run and jump propulsion. Obviously, this is not to say that other muscles to not contribute significantly. The muscles of the trunk must resist the momentum to pitch forward as we run, and must work to maintain an optimal posture during movement. The large muscles of the quadriceps (front of thigh) and hamstring (rear of thigh) must work together to transfer the forces travelling between the hips and the knee, and to appropriately stabilize the knee and lower leg to counteract the impact forces caused by ground contact. The muscles surrounding the chest, upper back, and shoulders must similarly work to stabilize movement around both the neck and shoulders, and to manage the forces generated by the swinging arms. Finally, the small muscles of the foot and ankle, and the muscles and tendons of the lower leg, must co-operate to appropriately handle the shock loading associated with contact with the ground, and re-positioning the foot for upcoming foot-strikes. And although this is a very general overview of the various roles played by the differing muscle groups, the practical implications are clear. Athletic movement requires that many of the muscles of the body are required to play multiple roles in contributing to healthy athletic movement. Hence, efficient, effective, and safe conditioning for athletic events requires appropriate conditioning of the whole-body.

## Where does the energy for athletic movement come from?

Within the muscle cell energy is stock-piled as a compound called adenosine triphosphate, commonly referred to as ATP. ATP is one of the end-products of the long chain of events that starts with the ingestion of food and fluids, and progresses through multiple steps; is separated, processed, and appropriately diverted to be excreted, to be used as raw material for building and repair projects, or to fuel the energy demands of the body. The various molecules of ATP are held together by chemical bonds (simply small forces of attraction). When the central nervous system relays a movement command to the muscle cells, tiny electrical signals cause minute chemical reactions to occur, which in turn cause the chemical bonds within the ATP molecule to break. As the ATP bonds pop apart, a miniscule packet of physical energy is released. And when a sufficient number of these bonds erupt simultaneously, they provide the power necessary for muscular contraction, and hence movement.

The raw materials that can be metabolized into ATP are stored in a number of forms throughout the tissues of the body. These reservoirs primarily take the form of glucose in the blood, glycogen in the muscle and liver, and 'fats' (stored primarily in two forms as triglycerides and free fatty acids). Muscle protein can also be metabolized to create energy, but this is not a major contributor to meeting the normal energetic demands of athletic training or competition. During athletic movement these energy stores can be mobilized to meet the fuel demands imposed by the necessary muscular contractions. Energy can be produced through 3 distinct metabolic processes.

**1. Alactic energy production**

When muscles start to contract forcefully, say for example if you were to stand up and begin to sprint, then this instant demand for energy would be met by existing stores of ATP within the muscle cell. When ATP bonds are broken apart to fuel contraction, a product of this reaction is the closely related ADP. ADP can be converted back into ATP, through reaction with another compound, called phophcreatine (PCr). Together ATP and PCr are often referred to as the high energy phosphates. While ATP is the most basic unit of biological energy, PCr is essential to rapidly synthesizing additional ATP in an energetic emergency (PCr is de-composed and donates a phosphate to ADP to form ATP). Hence cellular stores of ATP and PCr work together – ATP fuels the cell's energy furnace, energy is created and ADP is a by-product, and then PCr de-composes and provides the necessary phosphate to ADP so that ATP is re-constituted, and the cycle continues.

However, only very limited amounts of these fast-burning fuels can be stored within the muscle cell and cellular stores diminish rapidly (only being sufficient to fuel somewhere in the region of 3 to 7 seconds worth of high intensity activity).

**2 Lactate energy system (Oxygen independent glycolysis)**

During the first few seconds of high intensity activity the immediate supply of stored energy provided by the high energy phosphates quickly diminishes, and ATP levels within the muscle cell plummet drastically. Furthermore it is damaging, and potentially dangerous to the cell, to allow ATP stores to drop below critical threshold levels. Hence, within the cell there are sensors which are particularly sensitive to changes in the energetic status of their surroundings. When ATP stocks start to plummet, these cellular fuel gauges detect this change, and initiate the cells evolutionary survival strategy for coping with this particular form of stress. In order to continue fueling the intense muscular contractions, the body responds to decreasing ATP cellular stores by initiating the breakdown of stored carbohydrate (essentially glucose and glycogen).

When glucose or glycogen are processed, in the absence of an adequate oxygen supply (in other words anaerobically), ATP is created. There are a number of other end-products of these chemical reactions; most famously lactate. Historically, lactate has received much bad publicity, and is commonly held responsible for a number of the consequences of hard training – fatigue, cramps, muscle soreness, nausea, stitches, and so on. However, much of this bad reputation originated because for many years lactate was one of the few biological substances that sports physiologists could measure, and as a result, became the only suspect for wide number of training ill's. In more recent years, as scientific tools have become more refined, it has emerged that lactate is not the root cause of residual fatigue or muscle pain, and is not the single factor limiting middle-, or long-, distance running performance. Instead a number of contributing factors conspire to create feelings of fatigue, soreness, breathlessness and so on. Key among these contributory factors are gradual increases in the acidity of the blood caused by intense exercise, and accumulative damage to the muscle cell.

**3 The Aerobic System**

As exercise progresses, breathing rates, heart rates, the amount of blood pumped per beat, and a host of other simultaneous alterations to normal functioning occur. As a direct result, the supply of blood, and


*Rob Needham wins a close 800m at Bedford*

hence oxygen, to the working muscles increases dramatically. However, these changes do not occur immediately upon imitating exercise. Consequently, there is a lag time in providing adequate oxygen to the contracting musculature. The duration of this lag time depends on a number of factors – most obviously the intensity of the exercise and the training status of the athlete. However, after the first few seconds of intense activity, as blood supply begins to progressively increase, more and more oxygen becomes available to the working muscles. As oxygen supply increases, the energy production begins to shift from primarily anaerobic to primarily aerobic metabolism. Aerobic energy producing pathways start to become pre-dominant after 30 to 40 seconds of continuous effort, and in the case of prolonged exercise are the major contributor to overall energetic requirements.

Aerobic energy-producing pathways hold a number of advantages over their anaerobic counterparts. Firstly, once the system has been kick-started into action, it becomes a very efficient process. Energy can be mobilized from large reserves held as glycogen in muscle and liver storage, and from energy rich fat stores. Furthermore, the chemical reactions that take place during aerobic energy production do not result in the formation of toxic, acidic-inducing by-products (as is the case with anaerobic chemical reactions).

Hence aerobic energy production is fundamental to performance in any event where sustained effort is essential. As distances increase, the relative contribution of aerobic energy supply systems grow, and those of the alactic and lactic systems progressively decreases.

## The Biomechanical Energy Return system

There is one remaining system that contributes substantially to the energy of movement. However, this system is not a metabolic process, in other words, it does not require the burning of fuel sources stored within the body. Instead this system is bio-mechanical in nature, and contributes to movement through the re-cycling of mechanical energy stored within biological 'springs' during athletic movement.

Consider, for example, a pogo-stick. When a pogo-stick lands on the ground the combined downward descending mass of the person and stick causes the tightly coiled mechanical spring to be compressed. As the spring is compressed, resistance to downward momentum gradually increases until such time as the downward motion is arrested. At this stage, the by now tightly compressed spring has stored, within its coils, much of the energy imparted by the collision between the falling mass (the person and pogo stick) and the ground. And it is the re-utilisation of this stored mechanical energy, through the rapid restoration of the spring to its preferred dimensions, which provides the necessary energy to power the subsequent hop.

Taking another example; if we consider the unusual anatomy and gait characteristics of the kangaroo, we see an excellent example of the ingenuity of evolutionary processes in creating energy efficient solutions to movement problems. As we know, kangaroo's can travel at high speeds, for extended durations, covering large distances in the process. *(Wikipedia suggests a top speed of 70kph/44 mph* *and speeds of 40kph/25 mph for distances of up to 2k).* Kangaroo's can perform such feats, not because they have exceedingly large, strong hind-leg muscles. In fact, the hind-leg musculature of the kangaroo is not capable of generating sufficient voluntary, concentric, 'push-off' force to power their prodigious leaps. Instead, the primary role of these muscles is to contribute to overall 'springiness'.

*And how does muscular activity facilitate this spring-like function?*

In the kangaroo example, although the hind legs are incapable of pushing-off with the force required to generate sufficient hop speed and length, they are strong enough to fulfill a number of other functions that contribute to locomotive power.

Firstly, the muscles most obviously act to move the hind limbs into appropriate landing positions. The musculature also contracts prior to ground contact so as to 'fix' the limbs and the working lengths of both the muscles and tendons in positions, and at tensions, which will enable both safe absorption of the upcoming impact, and optimal storage of the resulting mechanical energy generated on landing. This strong co-contraction of the leg musculature also provides the structural stability around the joints of the hind quarters necessary to prevent collapse on ground contact.

And so, evolution has equipped the kangaroo with a unique set of tools to complement their unique mode of locomotion; relatively short, strong hind-quarter muscles to provide pre-tension to their spring-like, long, resilient, elastic tendons, and long, flexible feet and toe's which themselves deform on contact and act as spring-like structures while also enabling the necessary steering of forward propulsive forces.

In humans, it has long been accepted that the tendons of the lower leg behave like tight springs during running and jumping movements, and that in doing so contribute significant amounts of energy to both vertical and horizontal propulsion. However, more recent is the growing awareness that spring-like behaviour is not confined solely to the actions of the tendons. In fact, the ability of an athlete to function like a stiff spring on contact with the ground is dependent on the interaction of a variety of trainable attributes. Furthermore, it has also become apparent that this ability to re-cycle elastic energy contributes far more to athletic movement performance than was previously appreciated. This is not to suggest that the only role of muscular strength is to tension the tendons. Muscular strength is essential for every physical aspect of athletic performance; rapidly re-positioning the limbs, providing structural integrity to the skeleton, generating the stabilising forces necessary to prevent collapse on ground contact, powering acceleration, maintaining efficient postures despite the shock loading of ground contact, and fulfilling all of these functions under varying conditions of speed and fatigue. The point is not that strength plays a minor role in athletic

movement. The point is that strength plays a slightly different role to that which we more traditionally believed.

Muscular strength, the coordination necessary to accurately position the limbs in optimal biomechanical positions to manage and re-cycle recoil energy, and the ability to function as a 'stiff', energy-efficient spring are the big three complementary, interacting, inter-dependent attributes that ultimately enable optimal athletic movement performance. So, in essence, strength, movement skill, and the ability to appropriately 'stiffen'; all interacting in the right proportions, in the right movement sequences, and with an exactly timed precision.


*Above: Neville Taylor presents the Peter Coe Mile Trophy to George Elliott the winner from Billy White (227) and Jamie Dee. Below: Alf Wilkins presents the Frank Horwill Mile Trophy to Sophie Tooley the winner from Gemma Shepherd and Lydi Hallam*

# AGM Agenda

**Secretary: David Reader,**
**Tel 07929 860389, Email: davidreader@britishmilersclub.com**

Notice is hereby given that the **Annual General Meeting** of the members of the above-named Club will be held at HOLIDAY INN HOTEL, 61 HOMER ROAD, SOLIHULL, B91 3QD

## Date December 8, 2013 - 2.30pm

## AGENDA

1. Apologies for absence
2. Consideration of Minutes from Annual General Meeting held on 9 December 2012
3. Matters arising from them
4. Chairmans Report
5. Financial Report
6. Competition Report
7. Academy & Coaching Reports
8. Election of Officers
9. Consider amendments to Constitution.
10. Consider £5 increase in Annual Subscription and Joining Fee for 2015
11. Any other business

Dated 28th October 2013
David Reader
By order of the Committee

**Anyone wishing to put their name forward for election or wishing to assist the BMC in any way should make themselves known.**

Would appreciate advise of attendance to ensure accommodation of numbers

**ANNUAL SUBSCRIPTIONS for 2014** are due on the 1 January. Please pay promptly to ensure you receive your membership card for you to benefit from special low members rates for races and courses. Still £20. Send to: British Milers Club, Pat Fitzgerald, 47 Station Road, Cowley, Uxbridge, Middlesex, UB8 3AB.

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