

The Secrets of Mo Farah's Success?

BY DR. JESSICA LEITCH

Dr. Jessica Leitch founder of Run 3D based at Oxford University and her colleagues have undertaken 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



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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



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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

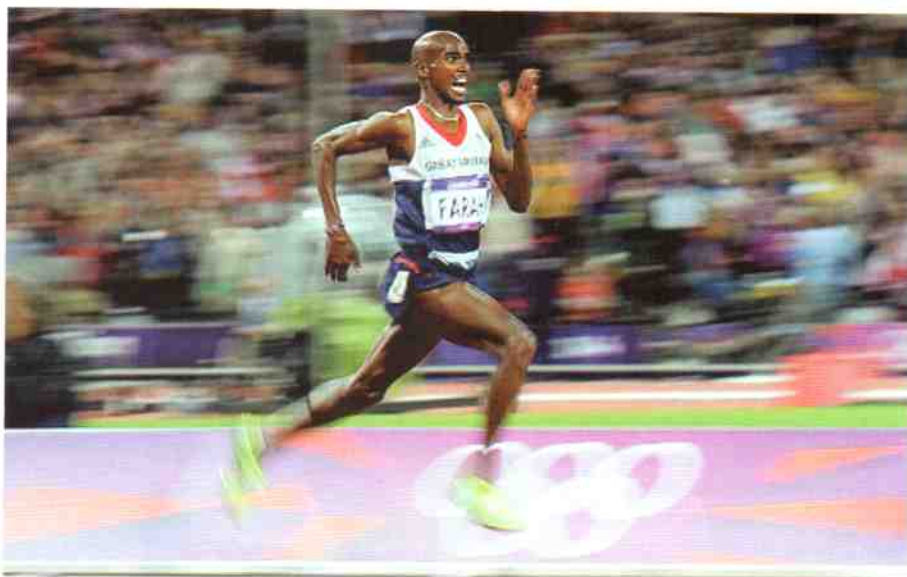


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out his body, Mo wastes less energy and is able to run more efficiently."

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.



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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."