Bounce – A Critique

Introduction

The questions of talent development and talent identification are very important in elite sport. Many governing bodies of sport invest in programmes to identify and develop future potential elite performers. What is it that we are actually talking about when we seek to define talent in a sporting context? I would suggest that we are looking at identifying a player/athlete with the potential in a team sport to play a significant number of games for his country and that that team be consistently within the top four in the world. Within an individual sport I would suggest that we are looking at a player/athlete who has a very good chance of gaining a medal in a major world championship.

Recently there has been a plethora of popular books produced on the subject. Without actually clearly defining what they mean by talent there is a common theme running through these books. That theme is that talent is not something you are born with but is instead something that is developed solely through practice. One of the latest to hit the shelves and this time by a British author is **Bounce** written by Matthew Syed.

From the generous reviews to be found on the cover of Bounce one is led to believe that inside are to be found new and exciting discoveries regarding the development of athletic talent. Nothing could be further from the truth. One review that is not so kind is that of Adam Thompson in The Wall Street Journal: " **Bounce** presents perfectly unsurprising notions—Mr. Syed takes many of his from the sports world—as fascinating discoveries. He focuses on figure skater Shizuka Arakawa, for instance, estimating that she fell 20,000 times during her years of training before winning Olympic gold in 2006. He lauds the skater for not viewing her spills as signs of failure. The path to excellence, after all, is "steep, grueling and arduous. . . . And, most important of all, it forces voyagers to stumble and fall on every single stretch of the journey."

He could have summed up the entire Arakawa section in five words—we learn from our mistakes— but Mr. Syed avoids succinct bromides when he can conjure more convoluted ones. "You can accomplish all manner of things that seem so far beyond your current capabilities as to occupy a different universe,"(Adam Thompson: Wall Street Journal)

The American edition is sub-titled **Mozart, Federer, Picasso, Beckham and the Science of Success**, in fact the science throughout the book is either bad, misunderstood or quoted selectively to suit the author's beliefs.
The book is divided into three parts with no clear connection or consistent theme. The first part **The Talent Myth**, attempts to prove that talent has nothing to do with our genes and is instead solely determined by practice. Syed uses sweeping statements, extrapolations and false reasoning via a series of interesting but largely irrelevant and unconnected stories to try and justify his assumptions. Adam Thompson again:

“ Having spent more than half the book on a section called **The Talent Myth**, focusing on the practice methods of the super-successful, Syed begins jumping to other topics in sections called **Paradoxes of the Mind** and **Deep Reflections**. The grab-bag discussion centres almost entirely on sports, and concerns such diverse subjects as choking under pressure, superstitious athletes, steroid use and the role of race in sports. Again he uses sweeping statements Mr. Syed insists, for instance, that religious belief improves athletic performance: "The stats are unequivocal." He cites a handful of studies as evidence, but the only "stat" he supplies is from a study that followed a grand total of nine college athletes who were also Christians. (Thompson op cit)”

The second part of the book deals with certain unrelated, psychological aspects of performance. Many of the quotes in this section directly contradict the premise of the first section and in the end this becomes nothing more than a self-help book.

Part One starts with Syed whetting the appetite of his reader with the ridicule of the genetic basis for talent via humour and crude distortion e.g Had some genetic mutation spread throughout the local vicinity without touching the surrounding roads or villages? (note the use of the word **spread** as in a science-fiction virus film) (Bounce p7) The skills are so qualitatively different, so detached from our own lives and experience, that the very idea that we could achieve similar results with the same opportunities seems nothing less than ridiculous.

The metaphors we use to describe outstanding achievers encourage this way of thinking. Roger Federer, for example, has been said to have had ‘tennis encoded in his DNA’. (Bounce p10)

This is a description of the most simplistic reductionism. What do I mean by reductionism? By reductionism we mean the belief that the world is broken up into tiny bits and pieces, each of which has its own properties and which combine together to make larger things.[1]

But let’s take this further as the sentence in itself may sound quite plausible. Dawkins, who in the past has been accused of reductionism, says:

“The neo-Weissanist view of life lays stress on the genetic replicator as a fundamental unit of explanation. I believe it has an atom-like role to play in functional, telenomic explanation. If we wish to speak of adaptations as being “for the good of” something, that something is the active, germ-line replicator. This is a small chunk of DNA, a single “gene” according to some definitions of the word. But I am of course not suggesting that small genetic units work in isolation from each other, any more than a chemist thinks that atoms do.” [2]

In other words scientists believe in a unit of DNA as a replicator of inherited variation between generation and generation but DO NOT believe that this unit acts in isolation from other units or the environment. This reductionism can also lead to what is known as **genetic determinism** i.e. that the genes determine our behaviour and life chances. An example of this is the description of DNA as a blueprint for building the organism. Ironically it used by the modern writers of innate talent denial; Daniel Coyle in **The Talent Code** and Geoff Colvin in **Talent is Overrated** both of whom

show a basic ignorance of genetics and evolutionary biology. If someone were to write technical books with the same disregard for the evidence behind medicine, chemistry or history they would face public ridicule, but it seems the biological sciences are not treated with the same degree of literary respect. (The blueprint myth is dealt with adequately by Dawkins in The Greatest Show on Earth chapter 8).

Once the scene has been set Syed moves onto the research of Florida State University psychology professor Anders Ericsson. Nothing new here as the information has been widely available re the so-called 10,000 hour rule for years and been popularised in a number of recent books and talent development models. What follows though is the start of Syed's false reasoning. Syed himself states:

"One of the most remarkable findings of modern psychology is the extraordinary capacity of human beings to mould the evidence to fit their beliefs rather than the other way around; it is our capacity to believe in spite of the evidence and sometimes in spite of our other deeply held beliefs." (Bounce p162)

But he does not apply this lesson to himself as he goes on his path of false logic, which starts early on when discussing Ericsson's findings: "But there was one difference between the groups. Purposeful practice was the only factor distinguishing the best from the rest. Ericsson and his colleagues were astounded by these findings, sensing that they heralded a paradigm shift in the way excellence is understood - that it is practice, not talent, that ultimately matters." (Bounce p12)

What this should say is: But there was **one** noticeable difference between the groups **in their practice history.** Purposeful practice was the only factor **within the study into their practice history t**hat distinguished the best from the rest. Ericsson and his colleagues were astounded by these findings, sensing that they heralded a paradigm shift in the way excellence is understood - **that the volume of practice is extremely important in predicting success in playing the violin.**

Unless the study involves a whole gamut of other variables that have each been tested and eliminated the words **one**, **only** and **not** cannot be used in this context.

What the science is telling us is that many hours of practice are necessary to break into the realm of excellence.

This is generally the case but what the science is **not** telling us is to exclude the role of the individual's genes. Indeed there are also many cases of people who have spent thousands of hours practising but they do not achieve success.

On page 19 when talking about himself Syed states: "But these skills were not genetic; they were, in large part, circumstantial."

There is no doubt that the particular circumstances that enabled Syed to have good coaching, practice and competition in his development as a table tennis player were instrumental in his success; but he cannot categorically state that *these skills were not genetic.* There may have been a genetic element in his ability to concentrate, to practice, to take in information and a whole host of other variables. The interaction of genotype and environment is highly complex.

After discussing the work of Simon and Chase on chess players and then extending this to other games (no reference given) Syed states: “The amazing abilities of experts turn out not to be innate gifts” (Bounce p25).

What Syed is trying to argue is that expert board games players are no better at remembering random pieces than a beginner, therefore they do not have innate gifts of memory and that their “game sense” in chess is purely learnt through repeated practice. Again, the point about repeated practice is probably true but that does **not** exclude the role of genetic variation between individuals in more complex learning skills in the long term development of expert performance; to say *turn out not to be innate* cannot be justified. This flawed reasoning continues on page 30 when discussing the anticipatory skills of elite bat and racquet sports players:

“Top performers are not born with sharper instincts (whatever that means - SW) they possess enhanced awareness and anticipation. The key thing to note is that these **cannot possibly** (my emphasis SW) be innate skills. Federer did not come into the mortal world with knowledge of where to look or how to efficiently extract information on a service return.”

This is a return to the simplistic reductionism he expressed in the first few pages regarding “tennis genes”. No scientist believes in an innate “genes for tennis” approach that Syed is hinting at. (This kind of misnomer is to be found in Colvin’s Talent is Over Rated): “ It is his (Federer) regular practice that has given him his advantage not his genes.”

Again, belief in the validity of the first half of the sentence does not exclude the role of the genes. Let us see how this concept is dealt with in a different part of the book, On page 192 he states: “Or, to put it another way, why is superstitious behaviour so widespread when it seems to confer no tangible benefits? It’s here that things get really interesting and a little complex. And as with many interesting things the answer in deep evolutionary history. Let’s start by imagining a caveman going to pick some berries from some bushes near his rocky abode. He hears some rustling in the bushes, wrongly infers that there is a lion lurking in there, and runs away. He even gets a little superstitious about those bushes and makes an effort to avoid going near them in the future. Is this superstition a problem to our caveman? Well, not if there are plenty of other berry-bearing bushes from which to get his five a day. But suppose that there is a lion living in the bushes. The caveman’s behaviour now is not just precautionary but life-saving. To put it another way, a tendency to perceive causal connections that don’t actually exist can confer huge evolutionary benefits, providing a cocoon of safety in a turbulent and dangerous world.”

This is an example of Syed dabbling with a discipline commonly known as evolutionary psychology. Now let us substitute a different series of imagined events into Syed’s story:

Roger Federer’s great, great etc grandfather has very good anticipation of movement of wild animals and has a great capacity to learn these; because of this he is able to hunt successfully, not to get eaten and successfully pass on his genes to numerous offspring. After the first agrarian revolution Roger’s ancestor lived in a small village and tended his crops and these genes no longer offered a selective advantage. But

they were still there. Many generations later they offer an advantage within sport when subjected to **similar** stresses and stimulations that they were many thousands of years ago.

On page 35 Syed states: “The ascendancy of the mental and the acquired over the physical and the innate has been confirmed again and again.” (no reference given)

The sentence itself contains a familiar falsehood. Syed falls into the classic **blank slate** trap (for more on this see Steven Pinker’s **The Blank Slate**). Syed falsely separates the mental and innate from the physical and acquired. We are born with the likelihood of developing into a certain body type but this can be enhanced through training e.g. increased muscle size can be acquired through training. But, more importantly in this context is the false dichotomy between innate and mental. We are not born with a blank slate; our brains have common **wiring** as a species that is different from our nearest relation the chimpanzee, but more importantly in this context individuals within our species are not all born the same. Extreme examples can be seen in the case of those with autism, psychopathy etc; these are obvious differences but there is a whole range of variation in many mental attributes within our population.

Syed goes on to say: ”In other words, it is practice, not talent that holds they key to success.” Again, a false dichotomy; it is practice and talent that hold they key to success.

On page 43, carrying on with the same false conclusions but this time regarding fire-fighters, Syed says: “ Good decision-making is about compressing the informational load by decoding the meaning of patterns derived from experience. This cannot be taught in the classroom; **it is not something we are born with.”**

Again, it is the all or nothing theory i.e. “we can only learn this skill from our experiences therefore we are not born with it”. The ability to take in this level of complex information from experience is almost certainly unique to our species, therefore it is something we are born with, and within our population there is no reason to suppose that there will not be variation between individuals and that part of this variation will be influenced by our genes.

On page 54 the **not in our genes** route takes a familiar twist, this time being described in religious terms: “ But ought to dispel the myth that they emerged from on high.”

Even changing the emphasis from innate to **God given** in the case of Mozart’s talent does not necessarily follow from the previous pages on Mozart’s development. Page 59 sees the same message trundled out without any scientific evidence to justify the following statement: “ Child prodigies do not have unusual genes.”

Further along the chapter on child prodigies Syed quotes Brian Butterworth, Professor of Cognitive Psychology at London University as saying:

There is **no evidence** at the moment for differences in innate specific capacities for mathematics. (Syed’s emphasis)

There are, in fact, many papers showing the opposite e.g.:

Liability to disability in different aspects of mathematics and individual differences in mathematical abilities are influenced by moderate genetic influences and modest shared environmental influences. Moreover, group heritabilities from DF extremes analysis were substantial, which suggests strong links between genetic etiologies of mathematical difficulties and variation in mathematical ability in the typical range. Similar results for the three aspects of mathematics assessed in this study and their inter-correlations (.62 on average) suggest that the same genetic and environmental factors might affect them. Previous multivariate genetic research into learning abilities and disabilities has suggested that the observed overlap within and between different abilities is largely due to common genes (Plomin & Kovas, 2005).[3]

Similar evidence is also available for variation in relation to children's reading:

Family and twin studies have shown that there is a substantial genetic contribution to both reading disabilities (RD) and attention deficit hyperactivity disorder (ADHD), and recent twin studies have suggested that the overlap between these phenotypes is largely due to common genetic influences. Studies using a linkage approach to search for genes for susceptibility to RD and ADHD have identified regions linked to each of these phenotypes separately, with recent studies suggesting that some chromosomal regions may contribute to both.[4]

Even if such evidence were not available it is more likely to be so in the future as the methods of discovering the more complex genotype-phenotype interactions develop. Up until now twin studies and studies on specific individual genes (single nucleotide polymorphisms, SNPs) or small groups of genes have been used in the study of human performance. But more and more as technology becomes cheaper and more readily available genome-wide association studies (GWAS) will be used to detect more complex traits and interactions.

On page 85 Syed quotes Ericsson as saying: "When the human body is put under exceptional strain, a range of dormant genes in the DNA are expressed and extraordinary physiological processes are activated. Over time the cells of the body reorganize in response to the metabolic demands of the activity by, for example, increases in the number of capillaries supplying blood to the muscles."

Actually there have been a number of scientific studies on the genetic differences between individuals in their response to aerobic and muscular resistance training:

Family lineage is critical for humans as well. Since 1992 the HERITAGE Family Study has analyzed hundreds of families to find out how "heritable" exercise capacity is, or how much variation in a particular fitness trait is due to genetic inheritance. In one segment of the study, 98 families that had not been exercising were put on identical 20-week training programs on stationary bikes. Their aerobic capacity a gauge of how much oxygen the body can use during exercise was measured before the program and at the end. In terms of improvement, family members tended to be similar, while improvement varied widely among families. Even after five months of training, some people in families that benefited little on average did not improve their

aerobic capacity one iota, while others in families that generally showed marked improvement increased it up to 50%. Statistical analysis showed that about half of a person's ability to improve with training was determined by his or her parents. The amount any person improved in the study had nothing to do with how good he was to begin with—his "baseline aerobic capacity"—but about half of that baseline, too, was attributable to family inheritance. In work from the HERITAGE study that has not yet been published, the researchers have identified 20 genetic markers that can predict entirely the genetic component of an individual subject's aerobic capacity improvement after months of bicycle training.[5]

Other studies have also showed a link between endurance performance and genotype.[6,7]

There have also been numerous studies on the adaptations caused by muscular resistance training. What makes the studies on muscular resistance training so important is that the baseline levels of several genes predicted the degree of muscle hypertrophy and strength. See for example [8, 9, 10, 11]

After telling many interesting but unrelated stories, none of which could amount to scientific evidence, Syed gets to the philosophical statement behind the book:

To put it simply: the talent theory of expertise continues to reign supreme.
This strangely resilient paradigm has had, and continues to have devastating consequences (Syed doesn't say what these **devastating** consequences are). Why would any individual or parent spend time and energy seeking opportunities to improve if success is ultimately about talent rather than practice?

Again he repeats the all or nothing reductionist, genetic determinist view. No geneticist argues that talent (whatever that means) is solely pre determined by the genetic code. No geneticist denies the complex interactions between genes and the environment. But individuals are born with different potentials to succeed in different areas. None of this would stop a parent or individual from wanting to do the best for himself or his children. But only one person can be the best in the world in his given field.

He continues: " The talent theory of expertise is not merely flawed in theory; it is insidious in practice, robbing individuals and institutions of the motivation to change themselves and society."

Steven Pinker in the Blank Slate[12] has adequately dealt with this type of false reasoning The last sentence can be used to justify the exact opposite of what he implies. The theory that everyone can get to the top through hard work is the argument espoused by the American political right which ignores the grave inequalities in the environment of its citizens, leading to one of the least meritocratic societies in the advanced world:

One way to measure social mobility is to see whether rich parents have rich children and poor parents poor children, or whether the incomes of parents and their children are unrelated. Can children of poor parents become rich? Researchers at the London School of Economics have used this method to compare social mobility in

eight countries. Using their data, we have shown that, at least among these few countries, the more equal countries have higher social mobility (see graph).It looks as if the American Dream is far more likely to remain a dream for Americans than it is for people living in Scandinavian countries. Greater inequalities of outcome seem to make it easier for rich parents to pass on their advantages. While income differences have widened in Britain and the USA, social mobility has slowed. Bigger income differences may make it harder to achieve equality of opportunity because they increase social class differentiation and perhaps prejudice.

(Evidence: Social Mobility The Equality Trust).

For more evidence of this see [13,14,15,16,17]

The same argument has also been used by the liberal left to deny many aspects of human nature. Admitting we are different does not automatically lead to one wanting to stop social mobility or spend time and money, public and private, on wanting to create a more just society.

The section **Paradoxes of the Mind** continues with the same poor scientific reasoning:

But Shearer is not interested in basing his beliefs on statistical truth; he is interested in cultivating beliefs that create success (which is a **different kind of truth**). (My emphasis SW) (Bounce p153)

Syed uses the phrase ‘this proved’ on page 166 when referring on one psychological study.

This section does include his brief foray into evolutionary psychology, which I discussed earlier. As he develops his ideas he further lays waste, if unwittingly, his earlier ‘not in our genes’ theories:

The fact that pigeons and human beings share superstitious tendencies suggests that this kind of behaviour emerged quite early in evolutionary history. What is certain is that it is widespread, particularly within Homo sapiens. (Bounce p190)

Here he is describing behaviour common to pigeons and human beings that he claims is largely determined by our genetic code.

Further on Syed’s states: “Ekman’s experiment sounded the death knell of the cultural theory of emotion. His findings showed that many emotions are universal: hardwired into the brain at birth rather than learned through contact with any particular culture. Why? Because they are evolved traits rather than cultural creations, designed by natural selection to facilitate survival and gene propagation.” (Bounce p197)

Now read this again but substitute the word **environmental** for **cultural** and the word **talent** for **emotion**: Ekman’s experiment sounded the death knell of the environmental theory of talent. His findings showed that many talents are universal: hardwired into the brain at birth rather than learned through contact with any

particular environment. Why? Because they are evolved traits rather than environmental creations, designed by natural selection to facilitate survival and gene propagation.

Over the page Syed goes on: " From this vantage point, anticlimax begins to make perfect sense: millions of years of natural selection have sifted sequences of DNA just so that we can feel miserable on the aftermath of long-coveted triumph. Why? So that we are able to disengage from our triumph, enabling to focus on the next challenge. " (Bounce p198)

Deep Reflections deals with a number of important topics in sport e.g. drugs and race. However, they are spoilt by poor science either through selective research or basic misunderstandings. It is also in this section that I suspect a little self doubt starts to creep in as he seeks further re-affirmation for his beliefs in the footnotes:

In the opening part of this book we saw that any complex task success is primarily determined by practice rather than genes.. .(Bounce p239)

This re-affirmation is without any scientific justification. Further on in the footnote after explaining running is a simple task he says:

Are the differences in ability between population groups also genetically determined?

This is a fair question to ask but it is in trying to answer this question that Syed's predetermined "not in our genes" hypothesis affects his interpretation of the facts. This is caused by misleading the reader with examples of studies between populations when all along he has been denying differences between individuals. Syed does explain the difference between variation within populations and variations between individuals; but this is hidden away in the end of chapter notes at the end of the book. (Bounce p 282 and 283)

Before discussing this chapter at length let me re-cap: In the first half of the book the author was at pains to state, that differences between athletes are not caused by talent (a term that he never really defined); it was practice not genes that mattered. My argument is that it is dependent upon genes and environment and is very complex but could be simplistically summed up as "hard work beats talent if talent doesn't work hard", a mantra adopted by NBA player Kevin Durant (origin unknown).

It is also my contention that most genetic variation will be between individuals and not race specific. I am also very aware of racial stereotyping in sport. However, the arguments regarding individual differences and between race differences are presented in this book as if we are talking about the same thing. The chapter **Are Blacks Superior Runners** presents selective information to draw the conclusion 'it's not in your genes'.

Very close to the start of the chapter (page 241) Syed uses the term **racial scientist**. This is a very emotive term and conjures up the horrors of Nazi Germany. Nowhere does he explain what he means by "**racial scientist**", except to say that the racial scientist has a **yearning to generalize**. He then goes into a short section entitled **Flawed Generalizations** in which he is building a case against **race specifi**" running

capabilities. To illustrate this in his urge to eradicate inter-population differences he draws on a non-sporting example, that of sickle cell anaemia

Here is what he has to say: " Some scientists have resorted to smuggling (note the use of the word smuggling, as if to imply scientists are secretive and underhand-SW) in racial generalizations under an epidemiological guise. For example, blacks are said to be more pre-disposed to sickle cell anaemia. The truth is again more complex. Sickle cell anaemia disproportionately affects the descendents of populations who lived in malarial zones, which means a higher risk for those whose ancestors came from certain parts of sub-Saharan Africa. But it also implies a risk for those who hail from areas in the southern Mediterranean. Genetic diseases are not racial per se. Many so- called black diseases are in fact diseases of poverty with well established environmental causes. "(Bounce p242)

Now lets see what Steven Jones, Professor of Genetics at London University, has to say on the matter: " The most widespread trick which evolution has come up with in its battle against malaria involves changes to the red blood pigment haemoglobin. There are dozens of such mutations. In some places in West Africa, up to a third of children carry one or two copies of a gene for the mutated haemoglobin known as sickle cell…In India and the Middle East there are mutations involving other amino acids in the haemoglobin…… Italians, Cypriots and others have evolved more drastic defences… What seemed to be the same defence mechanism in separate places turn out to be genetically quite different"[18]

In other words contrary to what Syed would like us believe, the specific methods of defence against sickle cell anaemia are population specific i.e. different population groups have different genetic variations, and in this case those from sub Saharan Africa have a greater frequency of sickle cell anaemia. But none of this has anything to do with athletic capability and is therefore not relevant to the main theme of the chapter.

Yes, there are diseases that disproportionately affect people from racial minority backgrounds in the USA and across Europe and many of these are diseases of poverty caused by e.g. overcrowding and poor sanitation; but this does not mean that different racial groups are not more prone to specific genetic "disorders". This does not mean that we should not work to eradicate disease caused by poverty and the underlying poverty itself; nor does the fact that **blacks** are more susceptible to sickle cell anaemia make them inferior or unable to play quarter back. But we cannot deny science just because it doesn't fit into our predetermined view of the world.

On page 246 he discusses the early work of population geneticist Richard Lewontin: But he also found that in those genes where there is variation, the vast majority of that variation – around 85 per cent - exists between individuals **within** populations.

This is exactly my point; there are many differences between individuals caused by genetic variation.

Here is what Lewontin had to say regarding genetic differences between individuals and their interaction with the environment: "..how much difference there is between us that is a consequence of environmental variation in our life histories depends on

our genes. We know that from experiments that organisms that have some particular genes are very sensitive to environmental variation while other individuals with different genes are insensitive to environmental variation. Environmental variation and genetic variation are not different causal pathways. Genes affect how sensitive one is to environment, and environment affects how relevant one's genetic differences may be."

"..it would be reasonable to say that genes have some influence on I.Q. scores. We can only speculate about the source of the genetic variation."[19]

On page 251 Syed moves on to some interesting work by Dr Yannis Pitsiladis et al on the success of East African distance runners: "The more we studied the phenomenon, the more we have realized that the patterns of success are not genetic despite being specific to certain populations….but we can already say with reasonable confidence that social and economic factors are the primary factors driving the success of Kenyan distance running." (Bounce p253)

In the paper the authors state: " In conclusion, Kenyan runners are from a distinctive environmental background in terms of geographical distribution, ethnicity and travelled further to school, mostly by running. These findings highlight the importance of environmental and social factors in the success of Kenyan runners."[20]

Nowhere in this conclusion is individual genetic variation discussed, never mind ruled out as factor in the success of the runners.

To quote Syed: 'Scott Thomas, an expert in exercise and performance science at the University of Toronto, agrees. It's looking like there is some genetic component to performance, but it's not race linked.'

In other words, there is a genetic component in running performance, but is not defined by **race**.

Ancestral populations can be traced back via either Y chromosome genes, as they only come down the male line, or more commonly via mitochondrial DNA. The mitochondria is a small organelle where the chemical reactions of respiration take place that contains its own DNA. As mitochondria are only found in the egg and not the sperm cells all our mitochondrial DNA must have come through our mother's line, hence the term **mitochondrial eve**. Therefore, mDNA and the associated RNA molecules will come via a distinct lineage rather than through mixing. When it came to the Ethiopian runners:

Elite Ethiopian athletes are not a mitochondrially distinct group relative to the Ethiopian population. It appears that environment and, perhaps, polymorphisms in the nuclear genome are more important determinants of Ethiopian running success than mtDNA polymorphisms.[21]

Let us rephrase that in layman's terms ' The runners are not a distinct population group. It appears that training and variations in the **individual's genetics** are the important causes.'

Now, this time let us look at the findings of another paper, which concludes: International athletes differed in their mtDNA haplogroup distribution relative to the general Kenyan population. They displayed an excess of L0 haplogroups and a dearth of L3* haplogroups. These findings suggest that mtDNA haplogroups are influential in elite Kenyan distance running, although population stratification cannot be ruled out.[22]

But, the real theme of the book - **it's not in your genes** - soon comes back to the fore; denying or selectively ignoring the evidence, Syed states: "Just to be clear (if we hadn't heard this enough already – SW): it was not their genes that created this aerobic advantage but thousands of hours of running." (Bounce p255)

But again, this aerobic advantage is a combination of the thousands of hours of practice plus individual genetic advantage. The variation between individuals in V02 max (maximum oxygen uptake), the physiological parameter so important in aerobic sports such as distance running is largely determined by genetics as 50 – 80% of it is inherited.

On to page 256 and after the discussion of ACTN3, a gene associated with sprinting success he quotes an Australian geneticist, Daniel MacArthur as saying: "There's simply no clear relationship between the frequency of this variant in a population and its capacity to produce sprinting superstars"

Syed continues: "In the absence of a genetic explanation…".

Let us look at this again: "…no clear relationship between the frequency **of this variant" (i.e. one variant - SW)**

is extrapolated to: **"…absence of a** genetic explanation." (**i.e. all possible variants - SW)**

There are approximately 25,000 genes in the human genome; to say **absence of a genetic explanation** is either a poor use of English or a very poor understanding of the subject matter.

From the previous section you would have thought that Daniel MacArthur does not believe in any genetic explanation for human performance. In 2003 Macarthur was one of the first to study the links between genes and performance, when he said that there are: " highly significant associations between ACTN3 genotype and athletic performance"[23.]

Daniel MacArthur's views are expressed on his blog, genetic future. Here is what he said in 2008 regarding genetics and sprinting success: " I'm certainly not arguing here that genetics doesn't play any role in Bolt's success - or in the remarkable over-representation of West African descendents in Olympic short-distance track events, or the similarly impressive skew towards East Africans among marathon runners. In fact I think most geneticists would be staggered if this was the case, even though direct evidence for underlying genes is currently very thin on the ground."

Rather, my point is that an excessive emphasis on ACTN3 as a major explanation

for Jamaican success does a grave disservice to the complex interplay of genetic and environmental factors required for top-level athletic performance. This suggestion goes against everything we've learnt about the genetics of complex traits from recent genome-wide association studies, which have revealed that quantitative traits (like height and body weight) are frequently influenced by dozens to hundreds of genes, each of small effect; if anything, it's likely that athletic performance will be even more genetically complex than these traits.[24]

Syed then goes onto more work from Yannis Pitsiladis into genetic variation in Jamaican and African-American sprinters. He quotes Pitsiladis as follows: “Genetic studies of elite sprinters from Jamaica and the USA have not found that these athletes possess a unique genetic makeup; rather, they highlight the high degree of genetic diversity among ethnic groups. It is unjustified, therefore to regard ethnic differences in sporting success as genetically determined; to justify doing so one must identify the genes that are important. Until now, that has proved elusive.”[25]

Syed continues in the next paragraph re basketball and American football and states:

As we saw in the first section of this book, success in these complex sports is primarily determined by practice, not genes.

This sentence is interesting in a number of ways; we saw a lot of evidence in the first section of the book that practice in basketball was important, but we **never** saw any evidence that success in these sports had **nothing** to do with genetics. The sentence also follows on from a discussion about specific inter-population differences in sprinting and extrapolates these conclusions into complex team ball sports. But the most interesting part of the sentence is the part primarily determined by practice, not genes; i.e Syed has started to back track on his main premise.

Stepping back to Dr Pitsiladis we get the impression from Syed that Dr Pitsiladis believes that genes have no role to play in performance. Strong as the socio-economic argument is, Pitsiladis adds: “ This is not to say that genes aren’t important. You absolutely must choose your parents correctly.”[26]

Not only is Dr Pitsiladis a firm believer that genotype affects elite performance but also that genetic variation influences performance within more general populations e.g.:

Genetic variation in the human Angiotensin I-Converting Enzyme (ACE) gene has been associated with many heritable traits, including physical performance. Herein we report the results of a study of several physical, physiological and skill parameters and lifestyle in 1027 teenage Greeks. We show that there is a strong association ($P<0.001$) between the ACE I/D (insertion/deletion) polymorphism and both handgrip strength and vertical jump in females, homozygotes for the I-allele exhibiting higher performance-related phenotype scores, accounting for up to 4.5% of the phenotypic variance.[27]

In conclusion

There are sports where there is obviously a genetic component in the likelihood of success at the highest level i.e. those sports that require the athlete to have a specific body height or somatotype. Within the populations who compete in these sports there will be genetic differences in physiology that can be and have been measured that will discriminate between individuals. There is also an already measured genetic component to the willingness to practice. Within other more complex sports there are the same or similar variations between individuals in the genetic advantages they possess and also in genetic components as yet not identified. Excellence in sport is dependent upon body type, physiology and motor skill learning, all of which have a genetic component plus determined, intelligent practice which is depend on both genetic and social/environmental influences. To quote Matt Ridley[28] it is **nature via nurture** that is important in the development of sporting excellence, the false dichotomy of nature or nature is long since dead. Matthew Syed's book offers nothing new in the arena of talent development and confuses many important issues.

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