Chapter 22

An Arthurian Romance

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"Nurture counts more than nature, baby"
Robert Winston in the Sunday Times, July 1st 2001

"Nothing has an uglier look to us than reason, when it is not of our side"
Edward Frederick Halifax

1. Prejudice and Justice

Unlike the other contributors in this book, I'm not a scientist and my degree in Art History isn't an obvious entrée into the world of individual differences. I came to know Arthur Jensen and something of his science as an 'outsider'. I've taken the liberty of butting in on the discussion because of a passion to see justice done, both to the man and to his subject. The subject is acutely relevant to the modern world with its magnified cognitive complexity; the science is crucial if we are to escape from serial failure in social policy. As for the man, Arthur has chosen science over personal popularity; his resolute integrity is even heroic. But my first impression of Arthur was very different; I suspected him of sporting horns.

I did my degree when my two children were at primary school. The course was a Marxist-informed, Foucauldian, 'social construction of the self' kind of affair. It was taught with great verve; the experience was, for me, an entirely invigorating change from previous years of endless stain removal and mopping. However, as soon as I'd graduated, I fell in love with science — which I had rather forgotten since a childhood crammed with ponds, microscopes and nature clubs. I decided to work on science documentaries such as the 'Equinox' television series on Britain's Channel Four. A television documentary later provided the impetus for me to learn about intelligence

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research. I started with the full canteen of shining intellectual prejudices typical of a liberal, educated journalist. The learning process has taken me a long way from where I began. Since I remember what my thoughts and biases were then, I try to polish them now and again so as to remind myself why it is important to communicate effectively about intelligence and individual differences.

I first heard of Arthur Jensen in 1994 while working on a BBC series presented by the malacologist and geneticist Steve Jones (University College London). The six films were about genes and human origins. The brief of the assistant producers was to find stories that demonstrated "what happens when scientific information about genes is dropped into various cultural contexts". The sub-text, which we all agreed on, was that it makes no sense to say 'a gene for . . .'. All of us on the team perceived biology to be entirely subsumed by culture. I suppose it was a post-modern series; ideas wafted in and out of the programmes that were, on the whole, rather unintelligible. But we were sensitive to human diversity and very well-meaning.

2. Princess of Darkness

Herrnstein and Murray's book 'The Bell Curve' came out in the Summer I started at the BBC. Although I hadn't seen a copy, I knew that it was both bad and wrong. In fact it was rather delicious to revile it, one was so *right* in doing so. I'm not sure that anyone I know had seen a copy, but we talked about it a fair bit in the office and one of my friends tried to get Charles Murray to agree to give us an interview — to provide one programme with a frisson of wickedness. 'The Bell Curve' did not make as big a splash in the British media as it had done in the USA, so when Charles Murray did not agree to be interviewed by our series, we turned our attention elsewhere. I was not at that time particularly interested in intelligence. But even with that brief exposure, I developed one strong opinion. The prime spot, the throne of the prince of darkness, so far as this hereditarian nonsense about IQ was concerned, definitely belonged to Arthur Jensen. I remember that his name conjured for me a sense of almost beyond the pale madness. That he was utterly wrong-headed I felt with conviction. Not that I had read any of his papers.

3. Intelligence, Genes, and the Standard View

Two years after working on the BBC series, I was trying to think of a good idea for a one-hour science documentary. Days and dozens of calls later, I ended up one afternoon in the office of behavioural geneticist Robert Plomin to learn what I could about his work on individual differences in intelligence. He was leading an intriguing new genetic study. Plomin had designed a way to try to find specific genes implicated across the range of intelligence. He agreed to let us film the work his team were doing in London, Cardiff, Iowa and Pennsylvania. There are a number of approaches one can take in

intelligence research. One route is to go from the top down — to try to quantify and analyse the behaviour and then move down through the layers eventually to genes and molecules. Another way is to start with various genes and move up through layers of possible mechanisms to arrive once more at the observable behaviours. These two methods are not mutually exclusive; they may easily be incorporated together in a single research programme. Plomin and his team seemed to be attacking the problem from both ends simultaneously with some success. I knew immediately that it would be a good story for television. That was my focus, to develop the story in such a way that I could get a television editor excited about paying for a film.

When I went to visit Plomin, I was ignorant of the scientific literature on intelligence and individual differences. Nonetheless I kept a suite of opinions that I wasn't even aware of explicitly. They emerged over time, often in discussions with others or in response to reading various papers. I think, from having talked to people about it subsequently, that my thoughts at that time characterise almost the 'standard view' of intelligence among liberal, pro-social and reasonably well-educated people.

I now recognise that we lay people outside the psychometric community have a combination of intuition and ideology instead of a theory of intelligence. But that is to be expected. We don't go around in our daily lives thinking 'gosh it's Tuesday, I really ought to develop a coherent theory of intelligence' any more than we think that we need to develop a theory of energy consumption in order to eat. Hunger does that perfectly well. We do not need a proper scientific theory of intelligence in order to think.

But if we want to answer questions like 'why are some people brighter than others?' we do need to turn to science. Instead, we more often confuse our theories of social justice with our assumptions about intelligence. I will come back to this point later because it is really at the heart of why I am writing this chapter.

Channel Four Television expressed an interest in commissioning a film about intelligence and the work of the Plomin team. So I plunged into reading what I could of 'the literature', without a compass to begin with. Gradually I hooked somewhat into the network — they seem to exist around the key practitioners in any subject — where I heard through the grapevine that Arthur Jensen was coming to give a talk in London. I told my partner that I intended to call Arthur and invite him to have tea with me. I am appalled to confess that my desire to meet Arthur that first time was exactly analogous to the gruesome desire that many journalists would have in getting an 'exclusive interview' with spectres such as Harold Shipman (the British serial poisoner) or some Hannibal Lecter type apparition. Arthur's acceptance of my invitation to tea was a thrill, like the prospect of going to a dance with a devil. I took him to Brown's in London because, in my imagination, the grave and sophisticated ambience of the fine hotel would provide an excellent backdrop for this éminence grise of badness, this well-mannered gentleman with a trident under his waistcoat.

4. Having Tea with Arthur

Worryingly, evidence is less of an antidote to illusion than one might hope. Over assam and cucumber sandwiches Arthur was gracious, thoughtful and engaging. Still I wanted

to call out 'look everybody, I'm having tea with Arthur Jensen'. Not that any of the cosmopolitan beauties in buttery leather and peacock silk would have been any the wiser (nor would they have raised an eyebrow had I been entertaining Nabokov I suspect). Arthur is around five foot ten and of medium build. His large, smooth face reminded me of a goshawk with a wide forehead, gently curving nose, very clear blue eyes and slightly electrified eyebrows. A novelist would describe his mouth as that of an aesthete, rather severe, not the lips of a sensualist. His overall bearing combined the beginning of frailty that comes with age, plus the vigour that I guessed were the endowments of a disciplined and health-promoting life. His posture was upright, he wore, I believe some kind of greyish suit with a v-necked woolly under the unbuttoned jacket and those shoes that physicists usually wear — very sensible and quite the wrong colour. In conversation, Arthur's face is rather immobile, most of the expression comes from the eyes, which are lively and lambent. I was struck by the contrast between this man's reputation — bête noire, incendiary, proponent of racist science — and his presence in the flesh. He was mild, serious, gentle, unassuming.

Arthur's unworldliness reminded me of Chauncy Gardner the Peter Sellers character in the film 'Being There' whose simple utterances were mistaken for profundity. Like Gardner's fame, Arthur's fame (or notoriety) seemed utterly accidental, something of which he was almost oblivious. He was either unaware of, or unwilling to uphold certain social mores too. For example, when we talked about the work for which he has become well known, he would talk about 'Blacks' or 'Whites' without going sotto voce. This made me feel uncomfortable; I remember covertly checking other scone eaters to see whether they had heard, trying to pull my head into my body, like a tortoise; without success, of course. I should say that Arthur was not making racist comments; my unease stemmed from his lack of restraint, his willingness to talk about 'Blacks and Whites' the way we talk about trees and hedges. My own discomfort (which I mention because I am sure it is common) arose from a fear of being exposed to racism within me, near me, or other people thinking it of me. I was definitely curious about whether this man was emotionally racist or whether he was simply perversely blind to what were widely taken to be the human implications of his scientific research.

We talked a lot about music, one of Arthur's great passions. He plied me with stories that manifested his devotion to various maestros, such as how he managed to bluff his way into Toscanni's rehearsals. Arthur's memory for the details of an event and what such and such a conductor had said circa 1932 was alarming. I am having to work here, to avoid invention, about that afternoon a few years ago, and I'm much younger than he is. I was very much taken with his enthusiasm for knowledge, for new insights, fresh approaches to understanding the world. As a science producer, I've met dozens of 'top scientists' yet it's always a treat to meet someone with an unjaded palette, a ravenous appetite to learn. I've been surprised at how many successful scientists are mealy-mouthed in the face of new evidence, unmoved by data that disconfirm treasured theories or ideologies. Jensen exhibited an intense if choosy interest in life. He wasn't indiscriminately wide open to just any old thing, but his excitement did seem to be kindled by a healthy variety of topics. The 'healthy' is clearly a value judgement, I mean only to say that spending time with someone with only one interest is a little hard going.

The life of Gandhi has been a key influence and source of inspiration for Arthur who is quite a Gandhi scholar. Arthur told me some amusing stories about the life of this man whose insistence, on combining asceticism with a large entourage carrying the technology of the time, caused one of his patron-admirers to say 'you've no idea how much money it costs me to keep you in the poverty to which you are accustomed'. Arthur felt impelled to do something useful with his life and viewed Gandhi as an exemplar of time well spent. However, Arthur's respect for Gandhi did not persuade me (by association) that Arthur was a Good Person: Hitler, after all, was a vegetarian. Oh no, I wasn't about to be 'bought off' so easily.

We broached the subject of intelligence and the causes of differences between individuals. Arthur talked about his work and that of others including Hans Eysenck, whose post-graduate student he had been for some years. He told me about Eysenck's enviable approach to writing a book. No writer's block or displacement activities for Hans; he would come into the office in the morning and pace up and down while dictating a continuous flow to his secretary. He would stop after a couple of hours to resume other tasks for the afternoon, beginning dictation again the next morning. Within a number of weeks the completed book was transcribed by the dutiful secretary and delivered to the publisher. We talked about the relatively new discipline of evolutionary psychology and how it is essential for scientists to develop a proper understanding of intelligence, both from the species perspective (insights into function and phylogeny), and the point of view of individual differences.

After a few hours we parted. I left Arthur on Piccadilly expecting to help him into a taxi. He airily waved my offer away; he remembered London pretty well, he said, and preferred to walk. I would not have been the least surprised had he told me he had memorised a street map from his time as a graduate student, but he's probably made many interim trips to London since then. We left on pleasant terms. My afternoon had been a mixture of unfulfilled expectation (no whiff of burning flesh) and pleasure in hearing the vividly related stories about conductors and their foibles. For Arthur, I'm sure it was simply another sandwich, another journalist.

Arthur's reputation as a Caligula of the far right rests on a paragraph in his 1969 Harvard Educational Review article in which he discussed a putative relationship between genes and racial intelligence differences. Briefly, Arthur suggested that one might not need to invoke special reasons to distinguish intelligence differences between races from differences within races. He claimed that genes might play a part in intelligence differences between Blacks and Whites in the same way that genes were thought play a role in intelligence differences among Whites.

The link between intelligence and important factors such as income and status makes it socially important to understand the causes of differences between individuals (regardless of race). An alternative explanation to the genetic hypothesis that Arthur adumbrated seemed very likely to be true. The environment that many Black people inhabit (in both Britain and the USA) is often vastly different from the environment of Whites (I mean to include the psycho-social environment as well as the economic background). I thought that the effects of having a lower income, poorer resources and being subjected to racism would easily be potent enough to account for the well observed performance difference on IQ tests. I wondered how seriously Arthur took the

effects of enduring racism. I wondered why he had chosen to work on race differences, a subject that seemed to be socially divisive. I should say that after this first meeting I remained agnostic about Arthur and the question of racism. I was undecided in my opinion of whether Arthur was racist over and above the ordinary way in which we all carry various prejudices around with us, however much we protest this ugly fact.

5. The Burden of Knowledge

Over the next few months I continued to read the scientific literature on research into individual differences. It's an extensive literature so I sought help from people with a range of viewpoints to guide me to important articles. I was also aided by a couple of academic books that came out around that time such as Sternberg and Grigorenko's edited collection 'Intelligence Heredity and Success' — in places quite a fizzing collection of papers that disagreed with one another rather fruitfully. I telephoned or met several scientists whose work seemed important within the discipline. I've found in most of my encounters with new areas of science, that there is usually a strong consensus about who's 'important' in any given subject, almost without regard to which 'side' they purport to be on. These 'people maps' help enormously in orienting beginners in a new territory.

It's a common experience that when you first go somewhere new — either a physical place or an intellectual territory — you have all sorts of insights and responses that become dulled through familiarity. This is true of people making television documentaries — one starts on a subject as an 'outsider', but after a few weeks or months marinating in the subject, one becomes saturated. After that it is a struggle to maintain that jargon-less position of not-knowing. Surprisingly quickly it seems, colleagues begin to say 'you've forgotten the audience, you're going too fast, remember what you used not to know' and so on. I had that experience when I began learning about intelligence research. I started with an inexplicit but nonetheless well developed conceptual framework, the standard tabula rasa environmentalist view. My ideas changed in the light of what I read. I began to understand about the heritability of intelligence and the powerful effect of genes. The evidence was abundant, good quality, overwhelmingly persuasive. Then I would go into editorial meetings at Channel Four and talk to people who held exactly the opinions I had begun with.

In one particular respect, making a film about intelligence research was signally different from my earlier experience of working on a film about superstring theory. Big Science — particle physics, string theory — rightly captures people imaginations, for it is wonderful stuff. It was a tremendous privilege to talk to giants in the subject and to be the recipient of so much generosity from experts who kindly gave up their time to tutor me. The big difference for me was that with physics, especially such an exciting but arcane branch (as it was then, now it's booming), I went in saying 'I don't know, teach me', whereas when I went to meet Robert Plomin to learn about his research, my attitude was much more, 'well I have a sackful of my own views already, but by all means, please try to cram in a little of what you know'. So there was much less openness, much less willingness to say 'I don't know'. I found when talking to friends about

the film project that I wasn't the only one to come to the subject with lots of pre-conceptions. With superstrings, friends would say 'what the heck are they?' leading me to cobble together anything I could muster, whatever I'd heard or read that morning probably. When we talked about intelligence, though, it was another story; everybody had an opinion, everyone thought they knew all about it already. The reasons for the two kinds of responses to the two different subjects are obvious but perhaps worth articulating.

Unlike superstrings, which would need a particle accelerator as big as the solar system to persuade them to leave a legible signature, the behaviours that say 'intelligent life' are easily observable phenomena. Indeed studies reveal that spouses match each other more closely on intelligence than on any other trait. This suggests that we are intuitive experts in the art of intelligence measurement. There are counter examples, but it is nonetheless a general truth. There are many possible explanations for this assortative mating. Like other constructs such as 'beauty', we usually know it when we see it; and we know it doesn't reside merely in the tilt of the nose or the curve of the hip. Incidentally, we also know that our intuitions are imperfect. We can be thrown off the scent when people have the 'wrong' accent or the 'wrong' clothes. Intelligence like beauty can be under-appreciated for social reasons. Kate Moss was presumably beautiful before she was 'discovered' by someone in the beauty industry, yet her accent, her milieu and her clothes made her potential to be a world famous supermodel less obvious.

6. The Art of Balancing Contrasting Views

Working on the television project was more challenging than I had anticipated. This was partly because of certain industry practices and partly because I felt threatened in several ways, which made me feel uncomfortable. Commissioning editors often require that documentary television producers achieve 'balance' by offering contrasting points of view. This sounds innocuous, until you face a subject where the debate that the scientific community is having is not the debate that the public thinks they are having. The public thinks that the debate in intelligence is about whether genes are important or not. The scientists moved on from that discussion decades ago. They are trying to figure out not whether genes are important or not, but which genes are important. They are looking for correlates in neuroscience or trying to understand non-genetic pathways in biological development.

Television often distorts subjects by taking the view that audiences will only be interested if the film has some tension — usually generated by conflict. Tension is a natural and successful element of much television drama, but it is sometimes contrived and misleading in documentary. When I produced the film about Plomin's work, I sought diligently for opposing views. I came across the work of Stephen Ceci. Ceci is passionate about understanding intelligence using non-genetic approaches. Thinking I had found my legitimate opposition we went to film an interview with him. Although I was very happy to meet Professor Ceci (he has an interesting perspective and great personal integrity), I was heartily disappointed to hear him say 'I'd be extremely

surprised if anything Plomin did failed to replicate'. So much for my oppositional viewpoint. In the end I was faced with the choice of recruiting a polemicist from outside the field, or dragging in to the film a scientist without a serious reputation in the subject.

7. Confusions Surrounding Intelligence

At roughly the time I first met Arthur, I was struggling with three aspects of the subject. Firstly, I was uneasy with the idea that one could measure something as complicated as human intelligence. Secondly, I had a common sense explanation for intelligence differences between people — privilege and the lack of it. I didn't understand why genes had to be included in the discussion. In addition, I felt that genetic influence would imply a fatalistic attitude towards achievement. The third facet, vague but potent, was the miasma of shame that seemed now and then to infuse the subject. This was the fog of eugenics, of Nazi racist ideology. There is a fourth issue that I will return to later — an amorphous but serious anxiety about race and genetics. Just thinking about that was like a 'final frontier' for me. But first the easier aspects of my confusions.

7.1. Definitions and Measures of Intelligence

The first point is about definition and measurement. Ian Deary from Edinburgh University set me straight on definitions. He pointed out that a clear definition is often the end point of science, not the starting point. It's quite legitimate to study something in order to find out what it is rather than the other way around. This might sound obvious to the point of facile, but I know I am not the only one to have wasted time debating the utterly spurious point that 'we need to know what intelligence is before we can find out about it'. As for measuring intelligence, I did not have to be repelled by the notion that the might of the astronomically well-connected human brain can be captured by a single number. That is simply not the claim. The claim is that a reasonable battery of IQ-type tests will yield, with stolid reliability and with remarkable accuracy, a ranking order that shows where each person stands relative to others in the population under study. This point about the relative nature of IQ scores is important. The power of IQ scores lies in the fact that they show, better than any other single variable, the level of one person's intellectual 'juice' relative to another's. In any case it is mistaken to imagine that any psychometrician thinks that IQ scores capture everything that is interesting, lovable or worthwhile about a person.

7.2. The Causes

My second confusion was about the causes of differences. Why look further than nurture in the form of class, social and economic factors which confer advantage with reckless caprice? It is an intuitively reasonable explanation. The problem with relying on common sense is that it serves us a little unevenly. What we call common sense is a

bundle of implicit quasi-knowledge stemming from various sources. These include evolved intuitions (such as 'don't eat it if it smells putrid'), assumptions about the natural world that stem from our limited perceptions (such as 'the sun revolves around the earth') and bits and pieces of information that we pick up from the world, only some of which will be based on science. It became clear to me that I was mistaken in thinking that the contents of my mind had been selected purposefully, as a child collects pebbles on a beach. The contents of my head are partly chosen by me for good reasons, but lots of them have simply blown in, the mental equivalents of bits of old crisp bag, tarred, straggly feathers, ring pulls from discarded cans. My assumptions are by no means all well founded or even apparent to me. My common sense told me that the powerful impact of the environment on intelligence differences is obvious. It took me some time to understand that I needed sometimes to ask whether my hunches were grounded on good science or a more brownfield site.

7.3. "What About the Nazis?"

Distinguishing scientific questions from social issues was absolutely crucial in dealing with the last of the three areas that bothered me. I wanted to know why people always said 'well what about the Nazis?' when I told them I was doing a film about IQ. I also hoped that in finding out I would be better equipped to gauge the moral temperature of Arthur and other scientists in the field.

The Nazi Holocaust is iconic in its status as a landmark for everything vile, depraved and cruel that humans can do to one another. Because of this, it is actually very hard to think clearly about anything to do with the regime at all. I can illustrate this point nicely. The Nazis were quick to recognise the health hazards of smoking cigarettes. Alone, In Europe, they campaigned against tobacco with some success. In post-war Britain, everything associated with Nazis or even Germans was repudiated, including the anti-smoking movement. Britain gave up 'giving up' for decades because it smacked of Nazi Germany. I needed to find out whether intelligence research was contaminated by association in the same way. I found two points of contact between the Nazis and intelligence research.

The first point is that the Nazis did mental testing. They used tests to identify mental defectives (in contemporaneous language). Was this a baleful programme? The French psychologist Alfred Binet first developed a systematic approach to mental testing in 1904. Binet's explicit programme was to identify feeble-minded students so that he could offer them additional educational support. Testing is not in itself a nasty enterprise. The moral status of a testing programme depends on questions such as what the testers are doing it for, and whether those being tested are volunteers or not. Testing people for 'defectiveness' in order to exterminate, involuntarily sterilise or incarcerate is invidous beyond words. I don't know enough about the type and application of tests used by the Nazis to comment on the scientific status of their mental testing programmes. They could easily have been valid and effective. The important point is to distinguish the science from the social policy. They are not mutually inter-dependent. I will come back later to an important point about testing and the Holocaust.

7.4. Eugenics — The "Red-rag" Word

The second point of contact between intelligence research and the Nazis is that the Nazis embraced eugenics. Eugenics is, as Richard Dawkins once said, a 'red-rag' word. It is almost impossible for anything coherent or sensible to come out of a paragraph with the word in it. Let's try to separate the science from the social meaning of eugenics. There are two sorts of eugenics, positive and negative. 'Positive' eugenics is the amplification through selective breeding of heritable traits that are judged to be beneficial. A good example of this exists in modern day Singapore where the Prime Minister, Lee Kuan Yew, has talked about the benefit to the country's human capital of encouraging intelligent families to have more children. 'Negative' eugenics aims to curtail deleterious traits in a population through various programmes of weeding people out. Possible methods include infanticide, homicide, abortion, sterilisation, legislation, social policy and even social pressure.

Eugenics was founded by Charles Darwin's half cousin Francis Galton. Galton was the larger-than-life father of research into intelligence and individual differences. Galton recognised that personality as well as physical characteristics were heritable but, like Darwin, he lacked a good theory of genetics — the agency of inheritance. Galton thought that it would be both possible and good to boost desirable traits and to avoid many illnesses and disabilities through selective breeding. Galton's vision of an 'improved' society was shared by many of the intelligentsia; leading thinkers both left wing and right took up the spirit of eugenics with great enthusiasm.

The Nazis took up both positive and negative eugenics but the spirit of Nazi eugenics was very different from Galton's conception. Galton's 'improvements' to society were based on values that elevated health and virtues such as the enjoyment of hard work. The traits that Galton valued were an ad hoc collection. Some of them (such as vigour) overlap with traits that contribute to the modern concept of 'fitness', but they were not supported by a consistent biological theory. Nor was the Nazi eugenic programme based on a coherent biological theory. The Nazis had a different aim from Galton. Their intention was to use eugenic practices to create a state based on Nationalist ideology that promoted Aryanism. 'Racist' is rather an etiolated term to describe the agenda, since its success depended on genocide; it required the extermination of all non-Aryan people in the state's jurisdiction.

Galtonian eugenics differed from Nazi eugenics on another substantive point. Where Galton favoured educating people in the benefits of elective human husbandry, the Nazis empowered the state to make reproductive choices on people's behalf. This distinction remains important today. I might wish for a child who enjoys hard work, but I would resist the state's right to determine that my child showed an inappropriate level of moral turpitude and shiftlessness. It is one thing to make value judgements about various traits and judge them to be good or bad — we all do that. But that is not to say the state rather than the individual should have dominion over our 'breeding' choices. Galtonian eugenics was about encouraging individuals to make salutary choices (the original term which he abandoned was viriculture, which carries the meaning rather well).

Nazi eugenics was a programme of torment and slaughter founded on racism and ideology, not science. But, of course, we don't excoriate the Nazis simply for their

failure to use science properly. It is their values that shock us to breathlessness. They used whatever means would allow them to achieve their goals — from surgical appliances to gas chambers. It is a mistake to dignify that yoking of ideology to brute mechanisms by calling it science.

7.5. Nazi Abuse of Eugenics

Backtracking for a moment, science does have something to say about mental testing and the Holocaust. The important point I alluded to earlier is this. If the Nazis had taken seriously the idea that testing reveals the mental component of biological fitness, then a systematic testing programme would have ensured the protection of the Jewish people. The Nazis failed to use biologically informed eugenic principles when they led the Jews to the gas chambers. There is a lot of literature on mental ability, genetics and Jews. The Jews are quite clearly, as a group, the cognitive élite of Europe. As with any population science, this statement is probabilistic and epidemiological in nature. It makes no predictions about particular individuals, but only speaks about averages. In the light of this, it is possible to interpret the Nazi Holocaust as another example of the proletariat revolting against the cognitive elite — as later happened in Pol Pot's killing fields of Cambodia. Incidentally, one of the great modern fears of testing is that if an élite is identified, they will subjugate the underclasses. H. G. Wells' story *The Time Machine* is a good literary example. In that story, the upper caste Eloi had dominion over the cave dwelling, lower caste Morlocks. In life rather than literature, it is nearly always the other way around. History usually reveals the élites being persecuted by the masses, or by a despot who fears the élite.

I admit to recognising certain confusions in my own and others' reactions to eugenics. As usual these muddles persist because we conflate science or technology with policy. It is the *aim* of the Nazis that we repudiate. No science or technology could have lessened the crime of the policy; though certainly the crime of the policy was harnessed to an indescribably evil strategy. But it is essential that we understand the distinction between science or technology and the uses to which they are put.

7.6. Eugenics, Sex, and the Individual

Many parents today actually welcome certain eugenic practices. We are grateful for tools such as amniocentesis. These investigative procedures inform us about the condition of the foetus. They are often used in decisions about whether or not to carry to term a foetus with disabilities. Amniocentesis is certainly eugenic, as are other screening tools that lower the rate of babies being born with painful, severe and sometimes terminal diseases. I think it is fair to say that we are all biased towards some of the percepts of eugenics — none of us would wish our children to be born with severe disabilities, though we feel uncomfortable owning up to it. Another confusion is that while we publicly derogate the prospect of intelligence screening, in practice the greatest use of screening is in mothers who are at risk for carrying a child with Down syndrome. Down syndrome is the largest single cause of mental retardation. This

chromosomal defect causes several health problems, but let us not disguise the fact that the retardation aspect of the disorder is a great concern for prospective parents.

The last point I want to make about eugenics is that, at a basic level (sometimes with family involvement), mate choice (our choice of sexual partners) is almost entirely eugenic in its function. For other species, and ancestrally for humans, mate choice was a potentially dangerous exercise. It necessitates search costs, demands time and energy, exposed us to predators and jealous rivals. In the absence of variation in heritable fitness there would be very little point to it. One might just as well mate with the first creature of the appropriate sex that one encounters. Mate choice happens because of the genetic advantage to offspring, conferred by parents having sex with 'good quality' partners. Mate choice is a grindingly powerful engine of evolution. All species that have two sexes (including some hermaphroditic species such as slugs) engage in choosing partners for sex. We sophisticated modern humans don't choose our partners with a conscious view to having 'designer children'. Indeed many of us choose not to have children at all. But the long arm of evolution has shaped in our own minds, propensities to find attractive, features that are 'cues of biological 'fitness' such as good health and a degree of charitableness. This does not mean that we always choose 'high fitness' partners, but it unquestionably tilts us toward them. We are not conscious of the way evolution has shaped our proclivities any more than we are consciously aware of our kidney function, yet our preferences and our renal systems serve us well. Mate choice is none other than pre-copulatory eugenics.

8. Dining with Arthur (and Barbara)

I found the process of familiarising myself with the literature on intelligence daunting; not just because of my ill-suited background, but also because of the discipline it required. Nor had I ever worked on a subject that exercised my emotions so much. I received some help in this from Arthur who came to England in the summer of 99 to do some research. We didn't sit around talking about the agonies of reconciling various inconsistent intellectual positions. Arthur is not given to that style at all. I learned more by example, from listening and talking to him about various research projects he was interested in.

8.1. What "Is" and What "Ought"

I got to know him better during this period. We had a few meals together and I met his wife Barbara (he told me 'she is the best decision I ever made'). I came to admire him immensely for all kinds of reasons. One of them relates to the business of thinking about unsavoury issues such as eugenics. Arthur possesses a clarity of thought that borders on the pathological. I mean by this, that at times he reminds me of the Commander Data character in Star Trek. Data is a humanoid robot endowed with extraordinary processing power, but has been programmed without emotions. This can be used to great comic effect when he misunderstands, say, a woman's sexual approach. Yet occasionally Data's unique lack of sentiment enables him to rescue his colleagues from a catastrophic

situation. Arthur isn't emotionless in quite this way, but he does maintain an impenetrable firewall between his understanding of 'things as they are' and 'things as one would like them to be'. He has immense intellectual courage; he never evades or side-slips facts because they reveal unsightliness. What I first read as lack of emotion, I now see as a remarkable humility. Arthur cares far more about the truth, about good data, than he does about his reputation, his standing, even his comfort and personal safety.

Like many people, I feel like a skewered halibut when pressed about certain unwelcome facts, flapping and writhing to get off the point. Arthur does not share my squeamishness; he's extremely bald, non-judgemental, factual. I used to misunderstand this as science without the humanising 'common touch'. I know better now, it's because he cares very deeply. Arthur has spent years trying to make a contribution in the field of education for the disadvantaged. He is data-driven because he feels passionately that social progress requires us to develop a clear grasp of the world as it actually exists. I share his view that policies for a make-believe world are doomed to failure.

I have thought a great deal about Arthur because he is, in some respects, indexical of an intellectual position. He has, like the hoover, become eponymous. Jensenism carries its own much-battered portmanteau. I've thought about the difficulty of standing up for him, which sounds schoolgirl-pathetic; but is nonetheless at times a reality. I want to explain why.

8.2. Good and Bad Guys

Arthur stands for the 'bad guy position' whereas people who think that IQ differences have no genetic basis find the 'good guy' position theirs for the taking. It is shamefully hard to resist the safety of running for what is perceived to be the moral high ground and turn instead towards the science. Science is after all, the most reliable source of answers to the empirical questions about what causes us to vary.

In developed industrial societies (as opposed to hunter-gatherer societies) the value of high intelligence is amplified. Whereas some benefits certainly accrue to the brightest men and women in pre-agrarian societies (there is some evidence of this), the advantages of intelligence in a socially mobile, modern society are huge. They include access to better education, housing, jobs, money, health care (in some regions) and holidays. When we think about social justice and fairness, most of us think that we have made progress. We have switched (or slowly and bloodily disengaged) from a system in which people were born into political power into one in which that power is vested in elected representatives of the people. Money and influence, however, did not immediately shake loose and become widely available to all after we gained democracy. Social inequality, income inequalities are still with us.

8.3. Meritocracy and Justice

In Britain, the hard to define but deadly easy to decipher, notion of 'class' provided some of the stickyness that prevented assets from flowing freely around the nation.

British society is not class-free in the new Millennium, but the virtues of merit, of social mobility, of allowing people to rise through the ranks according to the breadth of capacity rather than length of vowels, are widely praised. Yet what do we expect of a merit-based society? We expect a meritocracy to deliver fairness. In a proper meritocracy, opportunity will be open to all. Presumably some environmental equalisation will take place so that accident of birth no longer determines important outcomes such as education, health and wealth. The bright child in the sink estate will not waste her potential nor will the intellectually flaccid Duke find shelter in a sinecure afforded by nepotism. Many of us hope that such a meritocracy will substantially reduce income inequality. We might also feel that at last we have a society in which people get what they deserve to a great extent. These are serious errors.

A fully meritocratic society would exaggerate the inequalities. We must not confuse equality of opportunity with equality of outcome. If it were possible to iron out all gross environmental differences between us, the remaining differences would all be genetic. All remaining mental ability differences would then be heritable differences. In the 'equal environments' scenario, instead of being attenuated, the differences between us would be even larger. Where money adhered before to family and class, in a meritocracy, money would attach to genes. Now, rich but dim folk are sheltered by family money and bright but poor folk at least have some chance of success. In a full-fledged meritocracy, the divisions between smart alecs and dunderheads would cut very deep. This does not imply that we should avoid merit or meritocracy. But it's certainly crucial that we understand the science so that we can think ahead and see what a meritocracy would really imply and how we should respond to it.

8.4. Nature Versus Nurture

The concept of fairness inflects the way we view genetic explanations of individual differences. Most of us would like the good things in life to be fairly and evenly distributed among all people regardless of size, sex, race or belief. After all, part of the function of government is to provide a mechanism for sharing out various 'goods'. These goods include tangibles such as money and intangibles such as health and dignity, for example. In experimental economics, there is lots of evidence that our species behaves much more fairly than is 'rational' in the economic sense — we're not saints, but we're not totally grasping either. We know that physical attractiveness is uneven, genetic, unfair, hard to change and advantageous, but we're so accustomed to it, that though we try to 'beauty up', we know more or less what our range is. Intelligence is like beauty in this respect. It is a chance affair, it can be a benefit, but we don't judge our friends or loved ones by it. We know that it is just part of the package and that there is a lot more to a person than their ranking on the beauty pageant of life. Part of our resistance to genetic explanations of individual differences derives from antipathy towards making explicit the intrinsic unfairness of a genetic lottery.

The business about nature and nurture is variously described as a false dichotomy or a tired perspective. Yet it still rakes in the column inches and citations. We see a note of triumphalism in newspaper articles or even journal papers that 'find for' the

environment. "Nurture counts more than nature, baby", crows one article written by a Labour Peer from this week's cuttings. What is so great about nurture? What is the basis of our gut reaction in favour of environmentally causal hypotheses? My guess is that we have at least a tripartite confusion. One, we think that we are choosing between malleability and determinism — the environment is amenable to change whereas genes aren't. Neither of these statements is true. The environment can be notoriously difficult to change and genetic predispositions can be compensated for (think of eyeglasses, hair dye, low-salt diets). Two, we are muddled about blame. When something bad happens we are eager to identify the locus of blame. This is well illustrated by countless heart-wrenching newspaper stories in which a series of events leads to a dreadful calamity. Suppose a Black child is failing at school; we want to know why. Our emotions and sense of fairness rightly tell us that the racism and poverty endured by this child are bad. But it is a mistake to assume that the racism and poverty which we repudiate are the cause of her poor performance. We don't want to blame the child herself for her performance, yet we feel we must assign blame somewhere, so we blame the environment. When we set it out honestly, it becomes clear that it is the will to blame that confuses us. We think we have two alternatives: blame the child (her genes) or blame the environment. Again, this is false. We don't have to assign blame. Our goal should be informed understanding. It is perfectly legitimate to improve the quality of this child's environment regardless of whether or not it improves scholastic performance.

The child's performance could be poor for a number of reasons. Are we even fighting her corner by claiming that her environment kept her from succeeding? We can easily see the error in this by imagining the reverse. As a thought experiment, imagine a world where racism and poverty increase academic performance. Would we then approve of racism and poverty? Most certainly not. Racism and poverty are environmental features that a civilised society must march against, quite regardless of their effects on performance. As an aside, racism and poverty have often been given as reasons for the success of various 'geniuses', as in stories that begin 'he fought so hard to get away from his background'. They do not make us approve of the background that our genius worked so hard to escape. Science will enable us to find out about causal directions and effects of environments. But we cannot afford to conflate social justice with the science of individual differences.

The third pillar supporting our veritable temple of confusion, is that we imagine that if it is widely known that parenting effort does not raise IQ, then parents won't bother with it. Yet running along a damp beach with sand squeezing between the toes might not change a child's IQ, but it might make the day one to remember. Plenty of experiences enrich life, without enhancing IQ. Raising IQ is surely not the goal of providing a child with a 'good environment'.

Lots of the issues that I had to confront when I first met Arthur had to do with my capacity to learn new facts that did not sit well with my own theories of social justice. I want to be very clear about this. The transition that I have experienced, my Arthurian romance, did not begin by my having one interpretation of the data only to be seduced by another. I scarcely knew anything of the data when I began. The change is that I have become more perceptive about the distinction between my comfort with certain facts,

and the objective truth status of facts. The two are unconnected. The status of a fact depends on the totality of evidence that supports it. My comfort level is personal to me and reflects my concepts about how I would like the world to be.

We are curiously equivocal about genes and their effects. We say we dislike 'genetic determinism' yet every time a baby is born to a human mother, we thrill to the perfection of the tiny anemone hands and feet. We rarely stop to praise biological (mostly genetic) determinism for seeing to it that we get the right species. How terrifying pregnancy would be, if for nine months we had to ponder the possibility of being delivered of a fine baby bobcat or weasel. I've encountered two opposing views on the connection between genes and intelligence. One view is that it is absurd to suggest that genes contribute very much to intelligence. The other is that it's ludicrous to claim that genes are not largely responsible for intelligence. The third thing I've noticed is that these opinions are frequently found lurching from neuron to neuron in the same brain.

No one believes that just anyone could become Mozart or Einstein if they simply 'put their back into it'. Nor are we asinine enough to blame severe mental retardation on laziness or bad parenting. We seem happy assigning genetic influence to both the right and the left tail of the gaussian distribution. What about the rest of the range — where most of us sit? Do we imagine that genes kick in at the sharp ends but don't influence all the rest of us in the zone that is in and around the average? It is hardly parsimony. We should expect genes to influence our intelligence right along the range — as they do with height or with any other personality trait.

Differences in ability are striking to teachers and parents. But we are both inconsistent and tortured about these differences at the level of policy. This makes us not kinder, but ineffectual and dishonest. I recently visited eight state schools to interview principals and administrators with the purpose of finding an elementary school for my daughter. I picked up various leaflets that the schools distributed for the edification of parents. One of them stridently insisted that 'every child is gifted, you just have to identify the special talent belonging to your own child and nurture it'. This is patently false. Most children are average. That is what average means; this fact is harder to escape than the earth's gravity. Some children are extremely un-gifted and some are 'gifted' (such a horrid term, but frequently used in the USA where they go in for that sort of thing). Is it helpful to tell some poor woman that if she hasn't found the special gift of her intellectually deeply un-gifted child that she has not searched properly? Why not instead take the heat off, admit that there is the same gaussian diversity in intelligence that exists in every other complex variable in nature across all two-sex multi-celled species. The mother would probably be relieved to hear that she is perfectly entitled to love and nurture her child without needing the child's 'special gift' to legitimise her parental care.

Parents with several children usually notice that their children are not perfectly equal in intelligence. Do they love their children in rank order of their intelligence? I don't know whether this question has been studied systematically or not but, anecdotally, I don't see evidence of that. Indeed what little evidence there is, supports a prediction consistent with evolutionary theory — that parental resource allocation tracks reproductive value (number of likely future children) rather than intelligence. When we think about what counts in a person, intelligence is one of many qualities that we

esteem. David Buss's, landmark study of traits preferred by mates, conducted in 37 different cultures, found a universal desire for kindness ahead of intelligence. Among friends, and employees, we value lots of characteristics such as loyalty, integrity and conscientiousness as well as intelligence. Intelligence is by no means a sine qua non. Murray & Herrnstein (1994) put it nicely; "intelligence is a trait not a virtue".

It is crucial for us to think clearly about intelligence and what it means for us, both privately and publicly. One reason that we should bother to set this out is because it is virtually certain that scientists will, in time, learn very much more about the genetic basis of the differences in intelligence between individuals. Anyone even peripherally involved with the subject has a moral duty to work towards generating clarity rather than fear. If scientists, policy makers and the press are clear-headed about the facts then future discoveries will be greeted with interest not dread. What will happen otherwise when the first laboratory creates a 'smart chip' that picks up all the known intelligence enhancing alleles in our DNA? It will be a quick and easy to read off the likely range of an individual's intelligence. The second step will follow, someone will want to compare allelic frequencies across various racial groups. Should this be stopped in case we find out directly from the DNA that groups vary in allelic frequencies? We have an opportunity to extricate ourselves from the confusion caused by muddling our values with science. It is incumbent upon us to avoid being caught on the hop.

8.5. The Race Question

Now to that fourth 'final frontier' point I mentioned much earlier. Genetics and race; one cannot write about Arthur and avoid it. I asked him once after dinner, on his way to the tube, if he was racist. I thought at the time that I was being a bit daring. When I look back on it I feel ashamed because I was not, as I thought, bearding the lion in his den, I was simply being callow and jejune. I came to understand that later from his answer. Anyway, what he said was this: 'I've thought about this a lot and I've come to the conclusion that it's irrelevant'. He did not mean that *racism* is morally irrelevant. He meant that against the importance of developing a proper scientific theory of individual differences in intelligence, the personal attributes of Arthur R. Jensen are trivially insignificant. It is typical of Arthur that he deflected attention away from himself toward the subject he cares about. Had someone asked me the same question, I would have fallen over myself in my haste to lunge for the moral high ground, to demonstrate what a good person I am. I find it almost intolerable to be thought racist. Readers will know that Arthur has spent decades being very widely abused and accused of racism. It is striking that he rarely defends himself. He is obdurate that the science is distinguished from the scientist and he cares a great deal more about the former.

Just before we begin the discussion about race I want to comment on the term itself. It hardly needs to be said that we are one species. I have never met a scientist who thinks a race is a discrete group of people. Race is better thought of as pools of concentration of various gene frequencies. Rather than thinking about rigid boxes, it is more accurate to think of pools that flow into one another. The mechanism that creates the pools is sex, and the mechanism that creates the flow is sex. Gene frequencies of one type or another

ebb and flow according to the intensity of the inbreeding or outbreeding of any particular population. Most of the literature on race differences in intelligence is devoted to descendents of three major racial groups, African, Caucasian and East Asian. None of these are taken to be immutable 'types'. Nor are any of these three major groups thought by anyone I've ever met to be homogeneous. Africans have more diversity than the other groups, but they all show moderate diversity. It very much depends on which end of the binoculars you are looking through. We all look exquisitely similar down one end; from the opposite end, some differences are apparent.

Race differences and racism are two different things. They are often muddled together to nobody's benefit. The suggestion that studying race differences is intrinsically racist is a logical absurdity and harmful. Race is an emotive subject. That is not at all absurd; such ghastly things have happened because of racism. It is not surprising that we rather shrink from the task of thinking clearly about racial differences. But difficulty is not an excuse, just a challenge. There are already several well-known examples of biological differences, which it is immoral not to explore, such as different reactions to drugs, different propensities to disease and so on. It is vital to explore racial differences when we develop new drugs for exactly the same reasons that we must take sex, age and pregnancy into account. One quick point about studying race is that, racism needs neither facts nor science to support it. Racism is endemic within White, Black and East Asian populations. Racism exists where there is cognitive stratification and where there is none. Racism is not caused by intelligence differences.

Average intelligence differences between racial groups is a nettle with even more stingers than other topics of racial differences. Why? My guess is that we have confusions about how we value intelligence. What are the facts and how should we separate them from our values?

We know that on average, Blacks score around 15 points lower on IQ type tests than Whites. We know that on average, East Asians score around 7 points higher than Whites on IQ type tests. We do not have any direct evidence that the causes of these differences are genetic. However these differences are fairly stable. We know too that if we invoke socio-economic status and racism as the explanation for lower average test performance, then the same factors should lower the average scores of East Asians wherever they have suffered those privations. But East Asians' average scores do not look that way, even in the presence of those factors. I don't know of any evidence that contradicts the genetic hypothesis but I know of much that supports it. It seems that there are a number of questions we could ask ourselves in order to help us sort out the muddle. I'm not intending to try to answer these questions, I just thought it a good idea to set them out.

(1) What is the cause of the Black–White IQ difference?
(2) If the differences were found to be influenced by genes, what would follow?
(3) Could anything good come from a proper scientific understanding of racial differences in IQ?
(4) What bad would come from such knowledge?
(5) Should the scientific enquiry be stopped?
(6) Could anything bad come from a lack of knowledge about race differences?
(7) What would we like the differences to derive from? And why?

(8) If the Black–White difference on IQ scores was found to be in the opposite direction would we find it more acceptable?

The value of setting out various questions is that it can help us to unpick the tangled threads of the scientific issues versus the social issues. The two questions I want to return to are the third and the eighth.

The short answer to question 3 — 'Could anything good come from a proper scientific understanding of racial differences in IQ?' — must be that policies based on ignorance certainly haven't done anybody any good. The longer answer is that scientific understanding is essential if we have any hope of making sound policy.

One good example of this is education. In Britain our educational system is something of a procrustean bed. Many children will not and cannot succeed because they do not have the mental ability to accomplish the only available esteemed goals — A levels or university. Rather than worrying about whether the way to enable more children to have higher education is by lowering the entrance requirements or increasing student loans, we should learn from the science of intelligence research and be much more visionary. It is not a matter of re-defining entrance thresholds, we should be providing children with achievable goals all along the ability range. Providing challenges for children *wherever* along the range they fall, taking account of their needs, instead of pretending that whipping the teachers will create more students able to pass A level physics. The cognitive diversity of the population is seriously under-appreciated. That is true for both ends of the distribution, there is as little point in whipping Oxbridge for elitism as whipping the state school teachers for poor achievement. We must be able to stretch out the range at the top of the distribution as well as accommodate students along the rest of the range. If we take diversity seriously, we will appreciate very quickly that race, after all, is something of a distraction. In terms of policy, it's not race that's salient, it's range.

Range is more important than race in many issues of policy because of the distribution of IQ. If we plot the bell shaped curve for the distribution of intelligence among Whites and add to the same graph the gaussian distribution for Blacks we find the overlap is 80%. Knowing someone's colour tells us precious little about them. By chance alone we would expect to find a greater IQ gap between any two Whites drawn at random from the White population, than we would find by randomly selecting a person from each of those two populations. The bell-shaped curve that represents a Gaussian distribution is the most powerful tool in our armoury in enabling us to predict the range that we need in education and the world of work. As well as advising us about the range, the bell curve is informative about proportions. It tells us how many people diverge from the average, and in what proportion and direction. Surprisingly, 30% of the whole variance exists in only 3% of the population, so the ability range at both ends is rarely adequately met. The failure to understand population IQ distributions is pernicious. Both individuals (often teachers) and institutions become beating sticks when those assessing performance take little account of the range and distribution of the performers.

Now to answer question eight. 'If the Black–White difference on IQ scores was found to be in the opposite direction would we find it more acceptable?' Our answer depends,

of course, on who is reading the question. My hunch is that it would be a cause for celebration among many people who aver racism. The kick we would get out of this reversal, merely illuminates the fact that we don't like racism. The argument (replete with delicious cliché) goes something like: 'if X is shown to have innately lower average intelligence than Y, then X will be consigned to the scrapheap'. Would it be better if Y was on the scrapheap? Who ordered the scrapheap? It is not a logical part of the proposition, but it keeps sneaking in like a tomcat at the back door. Surely we shouldn't build our fortress against racism on such flimsy ground as the population average in one particular complex trait? It's so obviously nonsensical. It can only be that case that we are running scared from genetic influences on average intelligence differences between individuals or populations because we can't face up to the fact that we have conflated intelligence with human worth, a truly egregious error.

We are slavish and pusillanimous when it comes to intelligence research. We should welcome any proper scientific insights that increase the effectiveness with which we can make good social policy. Instead, we grovel in scientific self-abasement, fearing that we will lose our claim to moral rectitude if we acknowledge the subtle and minor differences between us. Our proper revulsion of racism should not lead us to make the mistake of policing what we learn about the world and each other. Suppose it is true that the Black–White average difference in performance on IQ type tests owes exclusively to genetic differences. Would that make Whites superior? If it would, then we are definitely forced to admit that every parent of two children with non-identical IQ scores has one inferior child and one superior child. The logic is inescapable. It must follow too, that among our friends, and in every marriage (few spouses have identical IQ scores) there is a mixture of inferior loved ones and superior loved ones. We know this is quite false. We are hiding under the bed for nothing.

If what we want is for humans to respect and care for one another regardless of who they are, we don't need permission from science. If we are concerned about inequalities in goods such as health or wealth, we can create policies to ameliorate those differences. Moreover, without a proper understanding of the causes of those differences, continued failure is certain.

Arthur's suggestion that genes could contribute to Black/White differences in average intelligence is supported by massive amounts of data and by a strong consensus among the silent, scientific majority of psychometricians. But new evidence could alert us to the fact that this view is wrong. One fact I would stake my mortgage on is that, if data showing the error of Arthur's work came to light, he would be the first to publish them; his honesty and integrity run deep and wide.

9. Arthur — A Great Scientist

I am grateful to Arthur for his intellectual generosity for which he is well known among his colleagues. I have certainly experienced a volte-face, I have come to admire Arthur immensely. I am very proud of my friendship with someone who by reputation, I once vilified. Thinking about intelligence has been rewarding, often uncomfortable, always provoking. It has forced me to try to articulate what it is exactly that I care about in

people, what matters. Intellectual honesty, the willingness to be open to facts that look at first glance to be frightening, does not come easily. Arthur is a renunciate. He has chosen the stony path of scientific truth over the smoother course of popularity and public acceptance. If Arthur had worked in any other field, I'm certain that honours would have fallen into his lap, for he is a great scientist. The battle between the forces of reason and ideology is frightening, even for a bystander. I have felt at times like a person at sea, clinging for all I'm worth to the mast while the winds are blowing hard. When the calm comes, I see that the winds of science could not blow me on to treacherous rocks that would scupper my values; they have instead blown me further on course towards being able to implement them.

Reference

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