GENIUS EXPLAINED

MICHAEL J. A. HOWE

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Genius Explained

In *Genius Explained* Michael J. A. Howe addresses the commonly held belief that genius is born not made. Controversially, he suggests that genius is not a mysterious and mystical gift but the product of a combination of environment, personality and sheer hard work. The exceptional talents of those we call geniuses are the result of a unique set of circumstances and opportunities, but in every case they are pursued and exploited with a characteristic drive, determination and focus which the rest of us rarely show. Michael Howe develops these ideas through a series of case studies focusing on famous figures such as Charles Darwin, George Eliot, George Stephenson, the Brontë sisters, Michael Faraday and Albert Einstein in this fascinating and accessible book.

Michael J. A. Howe is Professor of Psychology at Exeter University. He is a Fellow of the British Psychological Society and the author of numerous articles and books including *The Origins of Exceptional Abilities* (1990) and *IQ in Question: The Truth about Intelligence* (1997)

Preface

I learned about geniuses at school. They were, I discovered, a race of godlike individuals quite unlike ordinary people, possessing marvellous and practically boundless capabilities that the common run of men and women could never dream of.

After some years my conviction that geniuses form a breed apart began to waiver. There were too many unanswerable questions. The idea of a class of intellectual giants who are inherently superior to everyone else seemed just about conceivable, but what about near-geniuses, or creative inventors and discoverers who are regarded as geniuses by some people but not by others? If there could be differing degrees of genius, and no clear dividing-line between them and others after all, how could geniuses possibly be a separate breed? And if they were not, could there really be genuine grounds for believing that geniuses are fundamentally set apart from those ordinary men and women who make themselves exceptionally capable by their own strenuous efforts?

Despite these difficulties, many people are reluctant to relinquish the belief in geniuses as a kind of super-breed. There is a suspicion that once these wonderfully creative individuals are perceived as being not altogether unlike ordinary people, geniuses will start to seem less fascinating and less admirable than we want and expect them to be. Stripped of their aura of apartness, geniuses might cease to be the exotic figures whose wondrous feats dazzle and astonish us, adding to the quality of our own lives.

There is no need for these fears. Having spent some time exploring the early lives of a number of geniuses, directing my attention as much towards the ways in which they resemble other and unexceptional people as towards their extraordinariness, I find that neither my admiration for them nor my astonishment at their creativity has diminished at all. These individuals really are amazing: their achievements are often quite wonderful, and far beyond anything that most of us could dream of doing. The fact that they spring from the same flesh and blood as everyone else makes geniuses all the more impressive, not less. Their triumphs are the

achievements of individuals who have been able to shape formidable capabilities from the same basic materials that millions of people are born with. Discovering how that has happened is often difficult but invariably fascinating. It is heartening and invigorating as well. Geniuses are often heroic figures, and finding out how they became what they were is truly inspiring.

Of course, my view that geniuses began their lives made from much the same basic materials as all the rest of us is one that not every reader will be easily persuaded to share. Some time ago I began to scrutinise the evidence relating to the more common belief that people who do exceptionally well in various spheres of expertise – including science, mathematics and the arts, and also numerous sports – do so largely as a consequence of having been born with special gifts or innate talents. At that time I was working, with my friends John Sloboda and Jane Davidson, on a research study investigating the backgrounds of young musicians. Among the hundreds of parents, music teachers and young people we talked to, the majority were (and still are) firmly convinced that a few children are born with an innate gift for music, and that only those who possess such a gift stand a chance of excelling as musicians. That account is perceived by numerous people as being straightforwardly factual, no more debatable than the Pope's Catholicism.

Yet although those who hold that view do not question its truth, they can rarely produce positive evidence in support of it. Believers in innate talents may observe that people are very different from one another, which is undeniable, but hardly a convincing reason for concluding that some must have been born with special gifts. They may also remark that they cannot think of alternative reasons for individuals becoming as different as they are, especially when young people have been brought up in the same family and have attended the same school. But the logic behind an insistence on special innate gifts being the cause of genius, in the absence of independent evidence of the existence of such gifts, amounts to no more than asserting:

1 I cannot think of an alternative explanation to mine.
2 Therefore, my explanation must be the correct one.

In reality, however, the truth of a theory is never confirmed by someone's inability to think of alternatives. My failure to provide a better explanation for the presents that appear on Christmas Day is not a sufficient reason for anyone sharing my belief that Father Christmas brought them down the chimney. With geniuses, the idea of their being born with special gifts is a plausible possibility, but, as we shall see, there are alternative explanations that are more convincing.

Writing is always a solitary activity, but plenty of people have given me help, assistance, advice or encouragement, and I am grateful to all of them. Listing names is always potentially embarrassing. As when making a list of wedding guests, one is painfully aware that the more who are included the larger the number of others who might feel pained by their exclusion. So, taking a coward's approach, I shall keep the list very short. Howard Gruber first made me aware that psychologists do not have to be Freudians in order to have profound insights into genius. John Sloboda and Jane Davidson have been closely involved in the investigations of young musicians to which I have contributed. It has been good to work with them. Among those researchers investigating expertise and high abilities who have been especially helpful and encouraging, Anders Ericsson has been particularly inspiring, and he and Andrew Steptoe, Steve Ceci, Bob Sternberg, Andreas Lehmann, John Radford and Joan Freeman have all aided my efforts by inviting me to write on issues that are explored in this book. At Cambridge University Press my original editor Catherine Max and her successor Pauline Graham gave plenty of encouragement. Friends and colleagues at Exeter University have also been very generous with their support. Finally, but not least, my thanks to Sylvia.

Contents

1 Introduction

Genius appears to be a mystery, immune to scientific analysis. Unlike the mundane kinds of expertise that ordinary men and women gain through training and practice, genius is seen as a quality that is bestowed from above on particular individuals who are chosen to receive it. For the eighteenth-century German philosopher Immanual Kant, genius was an incommunicable gift that cannot be taught or handed on, but is mysteriously imparted to certain artists by nature, and dies with the person.[1] That view is still widely shared today. Confronted with the challenge of explaining the purity and perfection of Mozart's music, the editor of a book on genius insists that the task is impossible, adding that, 'We can only answer, "because he was a genius", which is tantamount for saying that we do not know. For in each age and in each art, genius is that which defies analysis.'[2]

Should we even try to argue with that conclusion? It is undeniable that the greatest human achievements leave most people spellbound. Listening to a recording of *Cosi fan tutte*, I feel pressed to concede that the causes of genius must always remain mysterious. We can admire genius, wonder at it, be moved, dazzled and amazed by it. But *explain* genius? That seems to be another matter entirely. Our best efforts to understand its origins may fall flat, and perhaps we would be foolishly lacking in humility to think otherwise. Genius is a magical quality that resists understanding, it seems. Its origins will always resist our efforts to fathom them, and that's that.

Yet many people would dearly like to know more about the circumstances that create geniuses. They intrigue us. Their achievements touch our own lives. Galileo and Newton changed the world by transforming mankind's understanding of the earth's physical existence. So did Darwin and Einstein. Numerous men and women have had their minds uplifted by great artists and musicians. Writers like Shakespeare and Dantë have altered the very languages in which our thoughts are rooted. There is no lack of reasons for making strenuous efforts to uncover the influences that have made certain individuals exceptionally creative or inventive.

[1] Quoted in Norris (1989), p. 154. [2] Murray (1989), p. 1.

A number of practical concerns fuel the desire to know more about geniuses. What are the origins of remarkable accomplishments? Where do exceptional capabilities come from? Is it possible to deliberately manufacture a genius? We would benefit in a number of ways from having a better understanding of genius and its causes, not least by becoming better equipped to encourage today's young people to be more creative.

Confronted with the strength of opinion insisting on genius being a mystery, it is hardly surprising that many people have assumed that efforts to explain it must end in failure. But is that pessimism justified? It is certainly not helpful. Starting out with the belief that something is inherently mysterious creates extra barriers to understanding.

How might progress be made? I begin by proposing that the disciplines of biography and psychology form the two main sources of evidence that can help us to discover how and why children turn into the particular men and women they eventually become. The need for biographical information is obvious enough. Biographers are attracted to what is distinct and unique about a person: they take on the job of tracing and putting into perspective the events that mark a young person's progress towards maturity. By 'psychology', I refer to the scientific field of study in which researchers explore the ways in which people are influenced by their biology and their experiences. Research-based inquiries into children's development have helped to illuminate the effects of childhood experiences. Researchers have also studied the acquisition of expertise, drawing attention to the kinds of knowledge and skill that set apart especially capable men and women from those who are less competent.

It is easy enough to assert that psychological evidence is just as essential as biographical knowledge, but can we be confident that the findings of psychological research really will help us to understand how and why someone becomes a genius? Readers may be sceptical, and perhaps conscious of the limited extent to which light was cast on creative accomplishments by the psychodynamic psychology permeating those 'psychobiographical' accounts of great artists' and thinkers' lives that blossomed in the middle of the twentieth century. So just claiming that psychological science can make a contribution is not enough: we need convincing that it really does. Has research actually provided genuinely new insights? Do they help remove the mystery about geniuses? We can make a start towards answering these questions by applying research findings to the investigation of some early feats by Mozart, a genius whose stupendous accomplishments present some especially thorny puzzles. Can psychological investigations help untangle them? Ascertaining that will be a good test of their value.

Here are three facts about the young Mozart that appear to defy expla-

nation. First, he began to compose music when he was no more than four. Second, by the time he was six or seven Mozart was such a brilliant performer on both harpsichord and violin that the young prodigy and his older sister were able to travel around Europe demonstrating their talents on money-making tours. Third, Mozart had an amazing memory for music, and it was reported that at fourteen he wrote out the complete score of a lengthy multi-part musical composition, Allegri's *Miserere*, after hearing it performed on just a couple of occasions.[3] All three of these feats are remarkable by any standards. They certainly appear quite mysterious. It is hard to see how they can be explained without appealing to magic or miracles. Perhaps he was born possessing some innate gift that made him totally different from other children. It seems impossible to imagine any other way to account for Mozart's dazzling childhood accomplishments at composing, performing, and memorizing music.

Can psychological research help to provide alternative explanations? Let's start by looking at the young Mozart's composing. He did indeed begin creating music at an exceptionally young age. But by the standards of mature composers, Mozart's early works are not outstanding. The earliest pieces of all were probably written down by his father, and perhaps improved in the process. Many of Wolfgang's childhood compositions, such as the first seven of his concertos for piano and orchestra, are largely arrangements of works by various other composers.[4] Of those concertos that only contain music original to Mozart, the earliest that is now regarded as a masterwork (No. 9, K. 271) was not composed until he was twenty-one: by that time Mozart had already been composing concertos for ten years. Similarly, Mozart's first symphonies, written in the style of J. S. Bach's son Johann Christian Bach, who helped and encouraged the nine-year-old boy when they met in London in 1764–5, consist of movements lasting no longer than four minutes and have been said to be almost copies of J. C. Bach's.

So Mozart only started producing the distinctive music that we associate with him after a lengthy period of training. The same is true of other great composers. An investigation by John Hayes, who examined the output of seventy-six well-known composers, established they *all* took a long time to reach the peak of their capabilities.[5] With seventy-three of the seventy-six, Hayes discovered that no major work was produced prior to the tenth year of their composing career. (The three exceptions were Shostakovich and Paganini, who each composed a substantial work after only nine years, and Eric Satie: *Trois Gymnopédies* was written in his ninth

[3] Sloboda (1985). See also Gardner (1997).
[4] Weisberg (1998).
[5] Hayes (1981). See also Simonton (1994).

year of composing.)[6] In Mozart's case, none of those compositions that are sufficiently original to be included among his major ones appeared prior to the twelfth year of his musical career.

It is of course extraordinary for a young child to be composing at all, and Mozart's early career as a composer was undeniably phenomenal. But knowing that even Mozart did not begin creating original masterpieces until he had been receiving serious training for a substantial number of years encourages us to challenge the assumption that his early attainments are impossible to explain without recourse to magic or mystery.

But what about Mozart's extraordinary early performing? That, surely, must be inexplicable, even if his early composing is not. Yet, here again the findings of recent psychological research suggest that whilst Mozart's precociousness was remarkable enough, it was not miraculous. That is evident from the results of investigations examining links between musicians' performing standards and the training they have undertaken. The research findings make it clear that in all performing musicians, high levels of skill depend upon large amounts of daily practice. In one study, for instance, researchers estimated the number of hours of formal practice notched up by German student violinists in their early twenties. By the age of twenty-one the best students in the performance class of a conservatoire had accumulated around 10,000 hours, and the less accomplished violinists (who were training to be violin teachers rather than performers) had practised for around half that time. There was not a single case of a player reaching very high standards without practising frequently and regularly over a period of years.[7] Further investigations by John Sloboda, Jane Davidson and myself have confirmed that the best performers accumulate more practice than less capable ones. It might have been expected that a few gifted young players would advance through the successive musical grade examinations much more easily than the others, but there was no evidence of that happening. In order to move ahead by a fixed amount, the most promising players spent as much time practising as the others did.[8]

It would be absurd to claim that practice is the *only* cause of success as a performing musician. Yet the sheer amount of formal practising appears to be the best single predictor of a player's level of accomplishment,

[6] Hayes' method for deciding if a particular musical composition meets the criterion of being a 'major' one was simple but ingenious. He looked in current catalogues for items that are available in several recordings, the reason for insisting on the availability of more than one version being to exclude immature compositions that could have been recorded simply for their novelty value. [7] Ericsson, Krampe, & Tesch-Römer (1993).

[8] Sloboda, Davidson, Howe, & Moore (1996).

despite the fact that the measures of practising available to researchers are rough-and-ready ones, unreliable because they are largely retrospective, and taking little or no account of either the quality or the appropriateness of young people's practising activities. Practice and preparation are equally vital in other fields of achievement. For instance, around ten years of sustained training are needed for a chess player to reach international levels, and it takes comparable periods of time to reach the highest standards in mathematics, the sciences, tennis, athletics, and a number of other sports. As in music, although it is widely believed that certain gifted individuals can excel without doing the lengthy practising that ordinary people have to engage in, the evidence contradicts that view.

Returning to Mozart, are we now any the wiser about his precocious performing skills? Nobody knows for certain how much time the young Wolfgang Amadeus Mozart actually spent practising, but it is clear that his father, Leopold Mozart, subjected him to an arduous and unusual regime. From the child's earliest years much of the boy's time was devoted to musical activities. There were few opportunities to play outdoors or make friends with other children. Leopold Mozart, a capable violinist and a highly ambitious music teacher, went to great lengths to make his son into an outstanding musician, having had considerable success at teaching Wolfgang's sister, Nannerl. The father was anxious to display his children's abilities (and his own teaching skills) in the best possible light, and he was not above subtracting a year from their ages on the posters advertising their public performances.

Let's assume that Mozart's father made his son practise for an average of three hours a day from the age of three. In that event, by the time the child was six (when he and his sister were first taken around Europe on the musical tours in which they displayed their talents), Mozart would already have practised for a total of around 3,500 hours. That is roughly as much time as the typical young performer today takes to reach the standard of a good amateur player. In Mozart's day it was (as it still is) unusual for a young instrumentalist to have already practised for more than 1,000 hours by the age of six. So if the young Mozart had experienced substantially more training and practice than that, this would largely account for his standard of performing being superior to anything his audience had previously observed in a child of his age.

Lacking the knowledge we now have about the likely consequences of prolonged practising, it would not have been at all surprising if spectators watching the youthful Mozart's performances could not give a rational explanation for the feats they were witnessing. They would have seen nothing like them. But we, unlike Mozart's contemporaries, can perceive that there was no real mystery involved. These days, it is by no means

unknown for children to reach the same levels of performance as the young Mozart did. Most of today's instrumentalists begin later than Mozart, but among those who do start musical training unusually early some young players achieve appreciably higher degrees of expertise than his at the equivalent age.[9] In the hundred or so years following Mozart's birth, piano sonatas became more technically difficult, requiring more demanding playing techniques, and there has been a definite tendency for music prodigies of generations later than Mozart's to play music that is increasingly difficult.[10] Compared with the most precocious young performers of the eighteenth century, the skills of more recent prodigies are more advanced.

So the task of explaining Mozart's childhood feats as a musical performer, like that of accounting for his early composing, is not the impossible one that it first seemed to be. Impressive as his early accomplishments were, they can be accounted for in the same ways that help explain the developing capabilities of hundreds of other young musicians who have patently not been geniuses.

There remains the third of Mozart's exceptional early abilities, his memory for music. This, like his composing and performing, appears at first to be a complete mystery. But can that feat too be explained in terms of the same processes that lead to high levels of competence in unexceptional young people?

In fact, accounting for Mozart's memory feat is surprisingly straightforward. There now exists a substantial body of research findings demonstrating that a person's ability to recall information about a particular topic is closely tied to that individual's existing knowledge and interests. Almost anyone who has a strong enthusiasm finds it easy to remember new information that is related to it. For instance, every Saturday afternoon many British soccer enthusiasts can recall all the scores from the league match results after hearing them just once.[11] To anyone who does not study the football results that may seem a remarkable feat, and up to a point it is, and yet week after week thousands of ordinary people manage it. Similarly, chess experts can remember huge amounts of information about moves in games of chess. Comparable feats of memory are not uncommon in connection with other fields of knowledge, with numerous ordinary people whose jobs or interests encourage them to gain specialised information finding it easy to remember new facts that can be linked to whatever the individual already knows.

Mozart's relative youth at the time he performed his feat of musical

[9] Lehmann & Ericsson (1998). [10] Lehmann & Ericsson (1998).
[11] Morris, Gruneberg, Sykes, & Merrick (1981).

recall would not have been a handicap, because the increased remembering that specialised knowledge makes possible transcends age differences. Although adults do better than children at most tests of memory, the reverse is true when the task involves information that children, but not adults, can connect to their existing knowledge. For example, in a study in which ten-year-olds who were good chess players were given a memory task that required them to recall chess pieces arranged in legitimate positions, the children performed better than adult participants who were not expert players. But items that were unconnected to the children's special interest were recalled more accurately by the adults.[12]

For all that, Mozart's memory feat still seems remarkable, and it *was* remarkable. To a non-musical person, a memory feat like Mozart's seems to involve recalling an immense sequence of separate notes. But imagine the unusual everyday life of the young Wolfgang Amadeus Mozart. He inhabited a world of music, hour after hour, day after day, in the company of a father who was an expert teacher. By adolescence, the sheer amount of Mozart's musical knowledge would have been enormous by most people's standards. He would have recognised many familiar structures and patterns, eliminating the need to recall each note separately. As a result, compared with a non-musician Mozart would have perceived the task very differently, with the information that needed to be remembered being meaningful and interconnected. And although Allegri's *Miserere* is a lengthy composition, it is one that happens to contain a great deal of repetition. For a person as knowledgeable as Mozart, that would have lightened the burden of remembering.[13]

We can now see that it is entirely possible that all three of Mozart's remarkable early feats could, after all, have been achieved through the operation of mental processes that were broadly the same as the ones that give rise to the more modest skills and achievements of ordinary people. It no longer appears inescapable that Mozart must have begun life with some mysterious special gift of genius. Of course, what we have achieved by unravelling the likely causes of certain of Mozart's early feats falls far short of a full accounting for his creative achievements. I have not even begun to sketch out the uniquely creative powers that enabled a masterpiece like *Don Giovanni* to be forged. But a start has been made, and it is a

[12] Chi (1978).

[13] A complicating factor is that our capacity to assess the magnitude of the memory feat is constrained by the impossibility of knowing whether or not Mozart's recall of the music really was as accurate as it has been assumed to have been. The evidence verifying Mozart's accuracy at remembering rests on the statement of one singer, who had no opportunity to assess the precise match between Mozart's version and the original score. Minor discrepancies from the original would probably have gone undetected by Mozart's audience.

fruitful beginning because it gives revealing glimpses of the ways in which a young person might have gained certain of the qualities that made the creation of works of genius possible. There is no denying that the eventual accomplishments of an individual like Mozart are quite superior to anything that most people are capable of, and yet it begins to seem conceivable that the underlying capabilities Mozart depended upon may not have been fundamentally different in kind from ones that are shared by numerous men and women with no claim to genius.

One way to make progress towards explaining the human attainments that result in their creator being seen as a genius is to discover how a person masters the knowledge and mental skills that make those accomplishments possible. That is the approach taken in this book. The creative activities that are most directly involved in the construction of masterpieces will not be neglected, but my primary aim is to trace the routes by which a few outstanding individuals gained the capabilities their achievements have depended upon. Charting individuals' early advances is, I think, a particularly effective way to help reveal the origins of genius.

I am convinced that it is indeed possible to understand genius and its causes. A major aim of the present book is to unearth the influences that have helped make a few rare individuals capable of remarkable feats of imagination and discovery. When that has been achieved, providing us with some understanding of the contributing factors, the absurdity of appealing to mystical forces will be evident. There is simply no need to believe that mysteries or miracles are involved.

Our efforts to account for genius will run into numerous difficulties, of course, if only because explaining how a young person becomes the adult individual he or she turns out to be is never easy. But although it is possible that with those men and women whose lives and feats are the most striking of all the barriers to understanding will be especially daunting, and that the problems that have to be overcome in order to discover how certain children grow up to be geniuses are vastly more challenging than the ones involved in charting the progress towards maturity of an ordinary boy or girl, there is no compelling evidence that this must be so. I am not convinced that there is anything about the lives and achievements of geniuses that is in principle less amenable to explanation than the lives and achievements of other people. The children's writer Enid Blyton was no genius, but explaining how she was able to turn out the thousands of words she produced every single day is as much of a challenge as accounting for the accomplishments of authors who were far more creative. That geniuses are special is undeniable, but the view that they are special for reasons that are mysterious needs to be challenged.

It would be immensely difficult, and perhaps impossible, to delineate each and every one of the events that had to take place in order for, say, the young Mozart, or the young Einstein, to become capable of their achievements, and then go on to create them. I do not attempt that feat. Some readers may feel that any investigation that stops short of such exhaustive documentation must fail to provide an adequate explanation. My own view is that this is rather like insisting on believing that although Joe Bloggs has admitted making the crop circle that appeared last week in his neighbour's field, the one that appeared yesterday must have been created by aliens from a distant galaxy, or like saying that even though most of the tricks performed by Mr Uri Geller are within the capabilities of skilled conjurors, his claim to possess mysterious special powers must nevertheless be believed. In each case the more reasonable assumption would be that where insufficient evidence exists to fully explain a new event, an explanation that is based upon observed causes and broadly follows the lines of one that accounted for a similar event in the past is preferable to one that invokes unverifiable causes or mysterious special powers.

There are gaps in what is known, but these create problems rather than mysteries. That distinction between problems and mysteries is a crucial one. A mystery is a state of affairs surrounding some phenomenon that resists any explanation in terms of known causes. A problem, in contrast, is a state of affairs in which there exists uncertainty about the explanation for something, but in which there is every reason to believe that one can be found, provided that the necessary resources are available. For me, discovering the best railway route between Madrid and Vienna would be a problem. It is not a mystery, since I am confident I can find the answer, as long as the missing information is forthcoming.

In the chapters that follow I show that the challenges involved in arriving at a full understanding of the achievements of geniuses belong within the category of problems rather than mysteries. In principle at least, there are no points at which explaining human accomplishments becomes impossible except by resorting to miracles or magic. The qualification 'in principle' is needed because in some instances it will never be possible to obtain all the information that a full account would need to draw upon. For instance, we shall never discover how William Shakespeare became the genius he was, if only because we know too little about his early years.

The creative undertakings of a genius involve two broad (and overlapping) stages. First, there is the matter of acquiring those capabilities the person draws upon. Second, there are the inventive activities that directly contribute to masterpieces. In most of the present book's chapters the emphasis is on the former stage, and I explore the ways in which a number