Article

MPR

Music Performance Research

Vol 1(1): 66-75
ISSN 1755-9219

Mozart in Psychology

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ABSTRACT This text is based on a lecture given at a British Academy symposium on "Mozart 2006: Classical Music and the Modern World", 28th January 2006, in connection with the 250th Anniversary of Mozart's birth, and repeated at the Teaching, Learning and Performing Music conference, RNCM, on 1st July 2006.

KEY WORDS: Excellence, listeners, compositions

The nature of psychology

Any celebration of a person, such as Mozart, must have as its dominant preoccupation that person's uniqueness, the ways in which he is different, special and pre-eminent. History (including historical musicology), and its literary cousin biography, are the tools by which we articulate, frame, and come to terms with human particularity.

Psychology, as a science, is mainly preoccupied with similarity. It seeks to uncover regularities and laws of behaviour and thought, showing the commonality that lies beneath the surface of diversity. Science has ever been thus. Uncovering simplicity beneath complexity is its crowning triumph.

Because science attempts to explain many phenomena in terms of fewer underlying constructs, it has often been termed a reductionist enterprise. The term reductionist carries with it a whole set of cultural connotations: levelling out, cutting down to size, debunking, homogenising. When applied to human beings and their products these connotations are resisted by many as undermining human dignity. I see it differently. When applied to extremes of human behaviour, psychology can be one tool for rescuing us from the twin perils of deifying and demonising. Whatever else we may want to say about individuals such as Mozart on the one hand, and Osama Bin Laden on the other, it does not help our understanding to reject their common humanity. A musical genius is not superhuman. A mass murderer is not sub-human. It is in showing how common human material can develop into uncommon end points that we turn freaks back into human beings, thus restoring, not undermining, their place in humanity.

But Science is not simply about forms of explanation. It is also about method. In par-

ticular, hypotheses about underlying similarities are subject to rigorous test through systematic observation and experiment. This always implies the accumulation of a representative sample of cases, common and agreed methods of measurement, and clearly understood circumstances that would undermine a particular explanation, and incline us to abandon or modify it.

In the discourses on human thought and behaviour there are many varieties of explanatory reductionism that are not science. Astrology is one such. With some trepidation, I would venture that psychoanalysis is not a science either. This is in no way to denigrate the huge impact that psychoanalysis has made on culture, and the benefit it may bring to individuals. But acceptance of a particular interpretation can be largely a matter of persuasion, based on such qualities as coherence and compellingness. For these reasons, I have nothing further to say here on the various attempts to "psychoanalyse" Mozart, whether in biography (such as the work of Maynard Solomon, 1995) or in the psychoanalytic literature (e.g. Ostwald & Zegans, 1993).

What Mozart-related questions has scientific psychology shed light on?

There are two main areas in contemporary research. The first, to which I have made some personal contributions, is studying the development of the highly outstanding musician. Here science must rely on historical documentation from previous centuries in comparison with relevant contemporary data, primarily derived from survey studies.

The second, with which I have had rather less to do, is studying the effects of Mozart's music on those who are exposed to it. This has to do with the perception and reception of Mozart. Contemporary reception phenomena are amenable to the full range of psychological investigations, including experimental manipulation.

Developing excellence

Much of the psychological interest in Mozart during the last half-century or so has been concerned, one way or another, with the issue of understanding and assisting the development of excellence across the life span. Why is it that some people reach high levels of achievement within a domain of human activity, when others, of apparently similar backgrounds and abilities, do not? Can we use research findings to increase individual achievement? Can Mozart's case be assimilated within the broader research picture that has emerged?

Several researchers have studied populations of high musical achievers (sometimes in comparison with lower achievers), to discover if there are systematic social or individual factors that high achievers have in common. For instance, in a study of 250 young people learning musical instruments during the 1990s, a research group of which I was part (Sloboda, Davidson, Howe, & Moore, 1996) found striking correlations between achievement level and the amount of daily practice undertaken. By the age of 12, children who would later gain a place at a specialist music school were undertaking, on average, two hours of daily practice. This compared with a norm of 15 to 30 minutes per day for the average child learning a musical instrument at this age (that is, a 400-800% difference).

The same study showed that, in general, high achieving musicians started music lessons earlier than the lower achievers. It is hard to find high achievers in classical music who started regular instrumental lessons later than the age of eight. If we know the amount of daily practice done by an individual, and we also know the age at which practice started,

we can compute a very useful statistic, which is the total amount of practice accumulated by a particular point in the lifespan. This statistic shows:

It requires an average of 3,500 hours of practice to achieve Associated Board Grade 8 standard, which is taken as the minimum entry requirement for higher study in classical instrumental music.

Young adult musicians at the start of their professional performing careers (i.e. after conservatoire level study), tend to have accumulated around 10,000 hours of practice on their chosen instrument (as compared with less than 7,000 by conservatoire graduates on a teaching track).

Given the limitations on how much daily practice is feasible at different ages, it normally takes at least 10 years to acquire the amount of practice needed to per-form at a level that would generally be recognised as excellent.

These data raise questions about individual motivation. How is it possible for some young people to devote absolutely heroic amounts of time and effort to daily practice, way above any norm for their age cohort? Here is an area where our data, and that of others, offers a very clear answer. Parental behaviour of the high achievers is significantly different from the norm (Davidson, Howe, Moore, & Sloboda, 1996). Parents of high achievers show a very significant level of personal engagement in the learning activities of their children, particularly in the phase from early childhood through pre-adolescence. Key characteristics of parental behaviour of high achievers include:

Direct and active parental supervision of practice on a daily basis (i.e. sitting with the child and directing the flow and sequence of the session).

Parental presence in the instrumental lesson on a regular basis.

Regular dialogue with the instrumental teacher about what specific practice tasks are required.

A variety of research findings converge on the conclusion that children under the age of 12 rarely possess the self-motivation and self-organisation to practice effectively without supervision and the motivational support of a key adult figure. Although there are anecdotal tales of young children having to be dragged away from their instruments, these are very much the exception rather than the rule. In every area of endeavour that has been studied, progress is hugely accelerated by the constant presence and active engagement of a trainer, coach, supervisor or mentor, not simply during a weekly lesson, but on a day-to-day basis. This is well understood in sport and athletics – but it has seemed peculiarly difficult for the music community to grasp. Children don't like to practise, and even when they do, they don't do it ffectively unless helped to!

This contemporary research is relevant to understanding Mozart's development. Mozart developed a regime of regular daily practice from an early age, and his father was completely essential to maintaining both the duration and quality of the practice. Indeed, Andreas Lehmann (1997) has shown that, like Mozart, most of the great keyboard prodigies of the 18th-20th century actually lived in the same house as their first teacher, who was often a relative.

Lehmann's study, which examines 14 historical prodigies, shows that they all started lessons before the age of nine, and 12 out of 14 lived with their first teachers. In all cases their practice was supervised. Only two, however, Mozart and Bach, had parents who were professional performers. This latter finding also accords with modern research. Very few of the parents of the high achievers in our study were professional musicians. It is the quality of support that matters, not the musical level of the parent.

Mozart's compositions

Although Mozart came to wide notice as a performer, it is, of course, primarily as a composer that he holds his current place in history. If the 10-year rule applies to performance, then it should apply to composition as well.

The most significant contribution to the scientific study of composition is undoubtedly the work of Dean Simonton (e.g. Simonton, 1991). He has extracted systematic data from the lives of over 100 eminent classical composers, and has shown some very interesting statistical relationships between the variables he extracted, which are summarised in Table 1.

One key variable is what Simonton calls "age of first hit". This is the age at which the composer composed his first piece that has secured a place in the standard repertoire (as codified by Halsey, 1976). Other variables included "age at first composition", which was the age of the first recorded composition. In Simonton's sample, the mean age of first composition was 16, and the mean age of first hit was 26, thus confirming the 10-year rule. It takes 10 years of compositional effort to produce a piece that will gain lasting recognition.

Unfortunately, Simonton provides no individual data on the composers he studied, so I have reconstructed some of the key data for Mozart. To date each composition I used Boerner's (2004) chronology, which lists all 600 compositions in the Kochel catalogue in date order of composition. To obtain a current indication of compositions which hold a lasting place in the repertoire, I consulted Kenyon (2005). This contains a list of some 40 key compositions on which Mozart's contemporary reputation can be said to stand.

Table 1. Comparison of two composer prodigies with statistical norms derived by Simonton

	Simonton (1991) average of 120 classical composers	Mozart	Mendelssohn
Age of first lesson	9	4	5
Age of first composition	16 (+ 7)	6 (+ 2)	12 (+ 7)
Age of first compositional "hit"	26 (+ 10) (+ 17)	18 (+ 12) (+ 14)	16 (+ 4) (+ 11)
Total compositions	102	~ 600	~ 170
Maximum annual productivity	20	43	14

Mozart's first composition was an Andante in C for Keyboard (K1a) written in 1761 at the age of 6. The first composition appearing in the Kenyon list is the 145th piece he composed, the aria *Exsultate Jubilate* written in 1773 when the composer was 18, 12 years after his first composition. Thus, if anything, Mozart appears to lag behind the 10-year norm.

The comparison with Mendelssohn, another child prodigy, is instructive. Mendelssohn's first composition was at age 12, and his celebrated Octet, arguably a more mature piece than *Exsultate* was composed only four years later when he was 16. And depending on how you count pieces within a common opus number, the Octet was either Mendelssohn's 20th or 56th composition. Mendelssohn seems to have "made it" as a composer at a faster rate than Mozart.

However, Simonton's data can help us to place this difference in context. Simonton also recorded the age at which formal instrumental instruction began for all the composers in his sample, and found that the average age was nine. In other words, composers tend to have had around seven years of performance training prior to beginning composition. Simonton has shown that there is a statistically significant relationship between age of starting lessons and age of first compositional hit. The earlier training started, the earlier the first hit came. This makes sense – general musical training must be relevant to compositional skill as well as direct compositional experience. It is generally accepted that Mozart's formal tuition began at the age of four, and Mendelssohn's at around the age of five. Thus Mozart composed his first hit 14 years after starting instruction, with Mendelssohn taking 11 years, a much less dramatic difference between the two composers.

A final intriguing aspect of Simonton's work is the discovery of a positive relationship between an early start to training and compositional productivity. This is not just about lifetime output, but also about rate of productivity at the height of compositional powers. Simonton discovered the maximum annual output for each composer in his sample. Composers who start instrumental instruction early tend to have the biggest annual outputs; Mozart's annual output peaked in 1788 with an astonishing 43 compositions in that one year, five of them appearing in the Kenyon list.

Why is compositional productivity important? It turns out that productivity is a very important predictor of eminence (and this holds for other areas of creativity than musical composition, including painting and scientific publishing). The more someone publishes, the more likely they are to have published a work that has lasting value. This is somewhat counter-intuitive. Many believe that quantity is achieved at the expense of quality. Not so in creativity. Quantity and quality go together. There are two reasons why this many be so. One is that practice makes perfect – the more you do the better you get. The other is that all creativity has an essential element of "trial and error". You cannot guarantee consistent value when operating at the boundaries of what is known and what is possible. Every creative act is an experiment, involving risk and variation. That being so, the more you produce, the greater the chances that something you produce will be successful.

So one rather straightforward answer to the question "Why did Mozart produce so many works recognised to have lasting value?" is that he also produced a very large number of works over his 30-year compositional career that are NOT accepted as of similar value. If one takes the Kenyon list of 40 works as indicative of Mozart's lasting contribution, then this would represent something rather less than 7% of his total output, almost none of that coming from the first 300 compositions, which represent half of Mozart's compositional achievement.

Since we have chosen Mendelssohn as a comparator it is worth pointing out that in a compositional career spanning 45 years, Mendelssohn's output only just reached Opus 120 (representing some 170 compositions). Mozart had already chalked up 120 compositions by his 11th year of composition at age 17. Similarly, Mendelssohn's peak productivity never reached Mozart's heights. 1844 was Mendelssohn's peak year, with a mere 14 compositions.

Effects of Mozart's music on listeners

In a sense, the brief review of Mozart's compositional prowess has already introduced the

recipient. When we speak of a piece of music as having "secured a lasting place in the repertoire" we are summarising a complex social phenomenon that arises because of the multiple effects of Mozart and his music on large numbers of people spread over time and space. Individual compositions get into the mainstream because people have repeatedly chosen to have these pieces, and not other pieces, performed.

At the root of the lasting popularity of any music is the desire of individuals to hear and re-hear that same piece. With some pieces, including many of the works of Mozart, that wish to re-hear can last a lifetime. Unfortunately I do not know of any serious psychological research which tracks re-hearings of Mozart compositions (or indeed any other music) over spans measured in decades, or examines systematically the motivations for such re-hearings.

Most experimental work on changing musical taste and preference involves tracking relatively crude judgements (such as degree of liking) over a relatively brief period of repeated presentation of that piece (cf Hargeaves, 1984). Such work is not hugely useful for our purposes because it plucks music from its social and cultural contexts. In real life, the decision to re-hear a particular piece is not based simply on immediate sensory experience. Music tends to come with cultural signifiers that affect our response even before first hearing. At the most personal level this could be the recommendation of a friend. At the wider level, the value already placed on that piece by respected cultural arbiters (critics, pundits) will influence our willingness to engage. If sources we respect tell us that a piece of music is great, or profound, we are more likely to search for, and find for ourselves, that profundity.

There is good experimental evidence that prior reputation can significantly affect (some might say contaminate) judgements about the value and interestingness of a piece of music. This has been done in studies where different groups of people have been told different things about the composer same piece of music. When the composer was described as having a high reputation, people liked the music more, remembered it better, and were more willing to expend effort in learning how to perform it. Performers also performed it better, thus creating a virtuous, or even self-fulfilling cycle (see Weick et al. 1973).

When, as is the case with Mozart, cultural forces conspire to place a creative artist on a unique pedestal, then there arises an equally strong cultural impulse to prove that the effects of Mozart are not simply artefacts of his high reputation, that we are not victims of a phenomenon akin to "the emperor has no clothes". We want to claim that there is something *inherently* special about Mozart's music that accounts for his unique and preeminent cultural position. Much Mozart-based musicology has been an attempt to do that through different types of musical analysis.

Psychology's recent major contribution to this effort has, in a way, exemplified how difficult it is to disentangle Mozart's music from his popular reputation. This is the story of the infamous "Mozart Effect" which has come to dominate the psychological literature on Mozart since its discovery by Rauscher et al. (1993).

The scientific starting point is relatively simple to describe. In October 1993 Rauscher and colleagues published a brief piece in the scientific journal Nature. Its title was "Music and spatial task performance".

For some reason, this piece was almost immediately noticed by the media. What follows is believed to be the very first media report of the work (Knox, 1993). As reportage goes it is relatively accurate (see text box on the following page). The term "Mozart ef-

fect" appears in this press story. It does *not* appear in the original Nature article, and indeed Rauscher asserts in a recent personal communication with me that neither she nor her research colleagues coined the term. She does, however, say that within a very short time of the Boston Globe article, "all of a sudden the term was everywhere". Note that, from a scientific point of view, all that the authors demonstrated was that one specific piece of Mozart had a very short-lived enhancing effect on adult spatial test performance. There was no indication that other Mozart pieces would have this effect, or that the effect was in any way specific to Mozart.

Mozart makes you smarter Calif. researchers suggest

By Richard A. Knox, Globe Staff

Boston Globe, October 14th 1993

Listening to Mozart is not only a music lover's pleasure. It's a brain tonic.

Frances Rauscher and colleagues at the University of California at Irvine had 36 students do a series of geometric puzzlers after 10 minutes of listening to Mozart's Sonata for Two Pianos in D major.

The students performed similar mental exercises, familiar to takers of IQ tests, after 10 minutes of a relaxation tape and 10 minutes of silence.

Mozart elevated the students' test scores by eight or nine IQ points compared to the other two "listening conditions," the researchers report today in the British journal Nature.

The results recall anecdotes about bursts of creativity after exposure to music. (Albert Einstein preferred Bach.) Unfortunately, the researchers found, the **Mozart effect** wears off after the 10 minutes or so it took to administer the IQ test.

The Californians have not yet tried the contemporary composer Philip Glass or rap music. Somewhat high-handedly, perhaps, they predict that less complex or more repetitive music "may interfere with, rather than enhance, abstract reasoning." (1)

We can briefly trace the fate of this study in both subsequent scientific research and in the media and popular press. The two stories could not be more different. Scientifically**,** the Rauscher study has proved hard to replicate (Steele, Bass and Crook, 1999). One overview using a specific statistical technique called meta-analysis concluded that there was no strong support for a robust effect (Chabris, 1999). A second metanalysis (Hetland, 2000) suggested a robust effect, but considerably smaller than the 8-9% improvement of the original study. Studies by Schellenberg and colleagues showed that the effect depends on whether the participants like the piece or not (Nantais & Schellenberg, 1999), and suggest that what seems to matter is the arousal inducing characteristics of the music rather than the specific composition (Thompson, Schellenberg, & Husain, 2001). Thus scientific research has shown no long-term effects of listening to Mozart, and there is almost no re-

liable evidence for the effect occurring with children.

In the media, the false idea was rapidly promoted that listening to Mozart had long-term positive effects on the intellectual development of children. It is unclear where this completely unsubstantiated claim came from. It may have been through confusion engendered by a quite different strand of research in which Rauscher and colleagues were involved, in which they showed that music training (specifically piano instruction) had long-term effects on spatial reasoning in pre-schoolers (Rauscher, Shaw, Levine, Wright, Dennis, & Newcombe, 1997). But this second study does not involve the music of Mozart in any way.

The idea that hearing Mozart makes your children smart spread around North American society like a cancer. In 1998 this culminated in the State of Georgia passing legislation to distribute free classical music CDs to new mothers. In the same year, the State of Florida passed a bill requiring day-care centres to play classical music every day. A major commercial enterprise built up around the Mozart effect, with books, CDs, and toys all being marketed on the supposed benefits to children of exposure to classical music. Spearheading this multi-million pound money-making enterprise is a series of misleading pseudoscientific books by self-styled "expert" Don Campbell using the title of the "Mozart Effect" (now copyrighted to him). On a recent visit to New York I found that the foyer of the Lincoln Center for the Performing Arts was almost completely devoted to a display of sale items designed to personally enrich Don Campbell, with no critical disclaimer from the management of the Center anywhere on display.

Why did this happen? Bangerter and Heath (2004) have provided compelling evidence that the Mozart effect addressed deep-seated anxieties of middle-class parents about their children's educational advancement, particularly in the early years of education. Bangerter and Heath hypothesised that this anxiety should be greatest in those states where there were greatest concerns about the effectiveness of the US public education system. For each state where data were available they counted the number of articles in local papers on the Mozart effect between 1993 and 2001, and also obtained data on national test scores at fourth and eighth grade, 1990 spending per pupil, and 1990 teacher salary. They found a strong statistical relationship. States with lowest educational indicators had proportionally higher number of articles about the Mozart effect.

I recently asked Frances Rauscher whether she thought the media attention was specifically helped by the term "Mozart Effect". What if she had chosen a piece of Couperin for her study. Would we now be seeing a Couperin effect? Rauscher thinks not:

> *I don't think the term "Couperin Effect" has the same appeal as the term "Mozart Effect." Just about everyone in Western society has heard of Wolfgang Amadeus Mozart, even those who have never heard a note of his music. I'm sure the movie Amadeus, which actually was first broadcast in 1984, contributed to his fame. The tragedy of his early death added to his appeal, I believe. I speculate that had we chosen a different composer, and found the same effects, the media would have publicized a "classical music" effect, rather than an effect named for the —composer – unless, of course, the composer were Beethoven or some other musical behemoth. (Personal communication, December 29th 2005)*

I would concur with Rauscher's view, and would add that Mozart's reputation as a child prodigy also allowed aspirant parents to, perhaps unconsciously, identify Mozart's precocious achievements with what might be possible for their own children. What Rauscher also points to is the shallowness and superficiality of the general public's knowledge about Mozart. The power of the Mozart effect is in no way dependent on any real knowledge

about the man and his music. Far better for those who wish to exploit Mozart for financial gain that the average citizen is ignorant of reality. It is a crude myth of Mozart which best sells books and CDs in their millions to anxious parents, just as it is a crude myth of Osama Bin Laden that best sells the foreign policies of the current US administration to millions of anxious voters.

Conclusion

I hope this brief presentation has demonstrated that psychology has something specific to contribute to a rigorous understanding of Mozart as an exemplar of a high-achieving creative artist who has maintained iconic status through more than a century of western culture. I hope to have shown two things:

1. That Mozart's development and career trajectory can be placed within an explanatory framework that accounts for a very large number of creative careers, in music and in other domains. To that extent Mozart is not special or superhuman.
2. That because of his iconic status, he can very easily be the subject of powerful myths and legends which have little to do with historical reality or the nature of his work, but have a great deal to do with the contemporary needs, preoccupations, and anxieties of the societies in which his reputation survives.

Note

(1) I am grateful to Frances Rauscher for identifying the Boston Globe piece as the first known reference linking her work to the term "Mozart Effect", and to Kay Williams for tracking down the full text.

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