“Great wits are sure to madness near allied, and thin partitions do their bounds divide”
(John Dryden, 1681).

“There is no great genius without a tincture of madness”
(Seneca, 1st Century A.D.).

Many great artists and scientists appear to have gone slightly mad following their lofty achievements. Isaac Newton was arguably the greatest physicist of all time, introducing the concept of gravity and making major advances in optics, mechanics and mathematics. He was also intensely suspicious and distrustful of others and in later life dabbled in alchemy and sought hidden messages in the Bible. Of course, alchemy was not thought a mad pursuit in Newton’s day and he could have been afflicted with mercury poisoning as a result of his experiments (Keynes, 2008).

Beethoven and Van Gogh are also said to have gone progressively mad, though the reasons are equally debatable. Beethoven’s mania may have been due to alcoholism, syphilis, or lead poisoning (apart from his profound deafness, which would distress anyone, let alone a musician). There are theories that Van Gogh’s mood swings were caused by porphyria rather than bipolar disorder, that he lost his ear in a duel with Gaugin (claiming self-injury to maintain his friendship) and that his “suicide” was an accidental shooting by two boys playing cowboys (whom he also protected).

For others, the genius and madness appear in parallel. Nikola Tesla was a brilliant applied scientist whose inventions rivalled those of Edison. He obtained around 300 patents in radio and electricity technologies, pioneering alternating current and hydroelectric power. However, he claimed to be in communication with other planets, to have invented “death rays” and suffered from bizarre compulsions.

John Nash, the Nobel-winning mathematician who developed “game theory” for the social sciences also suffered paranoid delusions throughout his career. He was hospitalised involuntarily and had to feign sanity to be released. He still heard the voices but learned how to live with them and not to talk about them. “I wouldn’t have had such good scientific ideas if I had thought more normally” he said.

Sometimes it is a matter of chance or social milieu that determines whether an individual is deemed brilliant or crazy. To the Counter-Reformation Church leaders, Galileo was not necessarily mad (probably just heretical) but they clearly failed to appreciate his genius and subjected him to a lifetime of house arrest. In other times and places Picasso and Einstein might have been committed to an insane asylum rather than revered for their original thinking.

Many lists of creative achievers throughout history have been compiled along with mental health symptoms and diagnostic categories retrospectively assigned to them. Unfortunately, these are mostly anecdotal, speculative and lacking in proper controls for comparison (Waddell, 1998). Some have argued that the connection between genius and madness has been over-egged because of a few high-profile cases such as those described above.

The best evidence in support of the genius-madness link comes from behaviour genetics (Kuszewski, 2009). The close relatives of creative people are more likely to be schizophrenic and vice versa (psychotics having more creative relatives). Einstein, for example, had a son who was schizophrenic, while Bertrand Russell had many schizophrenic relatives. According to Simonton (1999), “creative hits and crazy misses” are mixed within many illustrious family pedigrees, including the Darwins, Galtons and Huxleys.

The first degree relatives of creative people are actually more prone to mental disorders than creatives themselves. This is because actual illness (as opposed to its genetic predisposition) is likely to impede a creative career. The exception seems to be writers, who themselves show high rates of many behavioural disorders, including psychoses, mood disorders, substance abuse and suicide (Kyaga, 2012).

Could the environment also be involved? Traumatic events in childhood and orphan status seem more common in those who make outstanding contributions to art and science (Simonton, 1999). In a study of 700 high achievers, Goetzel et al (2004) found that three-quarters had troubled childhoods, especially loss of a parent. The “school of hard knocks” could provide motivation and inspiration (Dickens and Chaplin come to mind here) while at the same time generating psychological disorder. However, this idea is opposite to the common-sense view that parental support and encouragement is beneficial to achievement, rather than maltreatment and deprivation. Indeed, the Goetzezs found that wealth was more common in the backgrounds of famous people than poverty. And of course, pathology in the parents may be genetically transmitted to their children, thus accounting for some of the associations reported.

Similar thought processes, such as unusual and grandiose ideas, together with a determination to promote them, seem to link genius and psychosis. Certain neurotransmitters and gene loci have been cited as common to
According to Eysenck (1995), unconventional thinking is characteristic of a constitutional personality trait called *Psychoticism* (P). This has many facets, including tough-mindedness, lack of empathy, impulsiveness, risk-taking, adventure-seeking, bizarre thinking, and a refusal to adhere to social norms. High levels of P predispose to psychopathy and clinical psychosis, as well as to creativity, thus accounting for the overlap between them. A good deal of research over recent decades has supported this theory. A related trait is called *schizotypy*. An optimum number of indicators for this relates to creative achievement, rather than full-blown schizophrenia (Kuszewski, 2009).

Dopamine function (or dysfunction?) may account for the link between genius and madness (Gromisch, 2010). Dopamine is the chemical messenger in the meso-limbic and cortical areas of the brain concerned with approach, reward, positive mood and achievement-seeking. Genes that modulate dopamine levels are reported to affect novelty-seeking behaviour and to relate to Impulsivity and Psychoticism. Recreational drugs that are addictive and sometimes lead to delusions and hallucinations (e.g., amphetamine psychosis) tend to raise levels of dopamine in the brain. By contrast, anti-psychotic medications are usually dopamine antagonists (this being one of the reasons why compliance is difficult). Untreated schizophrenics have more D2 receptors in the striatum and lower D2 binding in the thalamus (Manzano et al, 2010).

Genius and psychotic are both inclined to loose associations (i.e., "thinking outside the box"). This can be observed as unusual responses on a word association test or in some of Salvador Dalí's surreal images (e.g., the Lobster-Telephone and the Mae West Lips Sofa). Such flexibility of thought seems to be increased by dopamine.

Another description of the schizophrenic thinking style is that it tends to be over-inclusive, with the boundaries of relevance being set more broadly. To most people, an apple falling off a tree and the movement of planets in the solar system would appear to have nothing in common, but Newton was insightful enough to connect them under the grand unifying concept of "gravity." Of course, not all such generalisations turn out to be that useful but many great scientific theories depend upon the ability to perceive improbable connections.

Exactly how loose associations or over-inclusive thinking promote genius is unclear. If enough crazy ideas are generated, one or two might hit the target by chance alone. This approach is deliberately harnessed in "brainstorming" sessions which use random "flashcards" as a means of generating fresh ideas. Certainly, it is difficult to be creative operating within received wisdom and some of the greatest artists and composers were the "rebels" least shackled by the traditional rules of their art. However, the "shotgun" theory smacks slightly of "monkeys on typewriters". (It would take a long time for them come up with the complete works of Shakespeare). Outstanding advances in science, like the theories of evolution and relativity, and great works of art, such as Wagner's *Ring Cycle*, cannot be generated by chance alone. Profound imagination and high-level spatial intelligence is usually required in addition.

Application to the point of "work addiction" is also often involved. Edison reckoned that genius was 1% inspiration and 99% perspiration. Simonton reports that the most creative people are also the most productive. There is a positive correlation between quality and quantity of output, implying that each masterpiece is likely to be interspersed with much that is mediocre.

The human tendency to *apophenia* may be implicated in both creativity and madness (De Young et al, 2012). This refers to seeing meaningful patterns where they do not exist and it underlies superstition and hallucinations (e.g., seeing ghosts and hearing "voices"). This perceptual style has survival value because failing to spot a predator in the forest is a bigger (potentially fatal) mistake than seeing one where it does not exist. Exaggerated apophenia is characteristic of schizotypal individuals and is enhanced by dopamine.

Another mental "illness" linked with creativity is *bipolar mood disorder* (previously called "manic-depressive psychosis"). This is characterised by extreme mood swings, occurring over a period of months, and it seems particularly to afflict artists, writers, musicians and comedians. Among highly talented people who appear to have suffered mood disorder are Peter Tchaikovsky, Robert Schumann, Vincent Van Gogh, Virginia Woolf, Spike Milligan, Paul Merton and Stephen Fry (who presented a TV documentary on bipolar disorder detailing his experiences).

Genetic analysis shows links between bipolar disorder and schizophrenia (Lichtenstein et al, 2009; Owen et al, 2007). Sufferers are often tortured souls, particularly when the "Black Dog" affects them, and their feelings may be tapped to give greater depth and sensitivity to their art. On the other hand, the "flight of ideas" experienced in the "manic" phase of the mood cycle can result in exceptional productivity (Jamison, 1993). As with the trade-off between schizophrenia and genius, bipolar disorder balances troughs with peaks in a way that might account for its evolutionary survival. Treatments are available for bipolar disorder but there is a danger that, by smoothing mood, they could impede the creative forces.

Then there are the *autistic spectrum disorders* (such as Asperger's syndrome) in which a deficiency in social communication is sometimes accompanied by "savant" skills in fields like music, mathematics and spatial
intelligence (Jarrett & Sutton, 2008). In the film Rain Man (1988), Dustin Hoffman plays Raymond Babbitt an autistic whose exceptional memory is exploited by his brother to count cards in Las Vegas casinos. (This was loosely based on a real-life savant called Kim Peek, who may in fact have had a chromosome disorder). The artist Louis Wain, who became famous for his surrealist cat paintings was hospitalised for schizophrenia, but others have argued he was actually autistic.

These various “disorders” can all contribute to extraordinary contributions to art and science. Some tendency to psychotic traits seems to be beneficial (thus accounting for the maintenance of such genes) but too much makes the individual disorganised and is hence detrimental. It is notable that creative artists and writers have profiles similar to those of psychotic patients on clinical scales of the Minnesota Multiphasic Personality Inventory (MMPI) but are less extreme – in fact, roughly half-way between normal controls and full-blown schizophrenics (Simonton, 2005).

What is the mechanism whereby schizophrenic genes promote survival? The clue may be in the behaviour of bower birds, the males of which make colourful and elaborate constructions in order to attract a female (the Taj Mahals of the bird world). Creativity has also been shown to promote mating success in men, as measured by number of sex partners. Since there is no such connection for women, it is not surprising that men’s productivity in art and science exceeds that of women by around ten times (Clegg et al, 2011).

Obviously, it does not do to be totally and permanently “away with the fairies”; some measure of control needs to be maintained. Consider James Joyce and his daughter Lucia, who was being treated by Carl Jung for schizophrenia in 1934. Joyce doubted she could be schizophrenic because her thought patterns were so similar to his own. Jung disagreed, comparing father and daughter to two people who had arrived at the bottom of a river. According to Jung, James had dived there, whereas Lucia had fallen in.

Genius and madness have much in common but there are also important differences between them. Mostly these are to do with intelligence, self-insight and contact with reality. Salvador Dali said: “There is only one difference between a madman and me. The madman thinks he is sane. I know that I am mad“. Certainly, Dali was eccentric, self-absorbed and grandiose with a flamboyant moustache and a manic stare. But he was also a skilled draftsman, who produced brilliant, imaginative artworks, which made him rich, famous and able to enjoy a life of luxury. He was not, therefore, totally mad.

References

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