ADHD and its Implications for the Justice System
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Kia ora and welcome

ADHD / da Vincis is a deep passion of mine. My youngest son, Bryn, was diagnosed as ADHD when he was 5½. It came as a relief to have some reason for the turmoil we had experienced for so many years. I thought he was just like his older brother, Liam, and would eventually settle down. Liam, my easy one, hospitalized three nannies with exhaustion, in fact one of the nannies couldn't eat or drink for a fortnight.

Of course Bryn is a bit like his mother, and a bit like his father, and his brothers, and very much like his grandmother. So I just thought it was normal but stunningly exhausting. His 21st birthday party will mainly be taken up with telling stories of coping with him growing up and a massive bill to cover the $22,000 of damage he inflicted on the house each year. Bryn is now 16 and a bit cheaper than he used to be, and still one of the most fabulous people I have ever met.

When we realized that Bryn met all the criteria for ADHD it was obvious that the rest of the family did as well. Mine is a very colourful family to live in.

As an academic I started hunting through the literature and linking it up to my fields of expertise in innovation, entrepreneurship and education. Six thousand ADHD articles later I've developed my own insights which I would like to share with you.

ADHD as Entrepreneurs

I was working for Industry New Zealand at one stage and knew their first 562 clients. These were the bright lights of New Zealand, the entrepreneurs who were changing the face and fortunes of this country. Every second person I met I thought "Oh my goodness, another entrepreneur who seems to meet the criteria for ADHD".

I came across Canadian research that showed that 50% of entrepreneurs are in the ADHD spectrum. And it struck me how these people with abundant qualities and trove of tales on the challenges they had faced in life, were the successful face of ADHD. It was remarkable how many of them said, "Look, I am no good, I am pretty useless, I dropped out of school and I am not good with my accounts". They tell me all the terrible things about themselves and yet they are the ones who are transforming our country. That was exciting.

Abundant qualities, exhausting challenges

But at the same time, hunting through the literature, I found 17 studies from different parts of the world that showed that on average 50% of prisoners also tick the boxes of the ADHD criteria. So this is a knife edge. Either they become stunningly impressive, or cause themselves and others great misery – or sometimes both outcomes at the same time.

So how do we tap into these abundant qualities? How do we ensure this potential is turned into gold, and how do we cope with the negative side effects? Both the abundant potential and the exhausting side are true. I am not going to tell you that it is not damned exhausting. I really don't know how teachers cope with a child in the ADHD spectrum in their class. It just seems beyond belief that they can do so.

One of the books I came across labeled people in the ADHD spectrum as da Vincis, because what we know of Leonardo da Vinci is that he would have ticked all the boxes on the ADHD criteria. This appealed to me. The negative labeling focusing on deficit and disorder did not reflect the exceptional people I knew who met the criteria. So henceforth I will refer to da Vincis.

One of the things I have done is to pair the characteristics – both the strengths and the weaknesses. For example da Vincis may be:

highly energetic	or	hyperactive,
action orientated	or	don't stop to think,
entrepreneurial / intrapreneurial	or	unmanageable,
intrinsically motivated	but	very hard for others to motivate them,
they are passionate	or	just a bit too intense,
they are self directed learners	but	won't follow the rules,
highly creative	but	unfocussed,
imaginative	but	forgetful,
a problem solver	but	really impatient with routines,
great in a crisis	but	they create the crisis anyway,
strong initiative	but	not a team player,
adventurous	but	dangerous,
humorous	but	completely over the top,
characterful	but	has mood swings,
courageous	but	then ignore consequences,
they are hyper-focused if interested	but	completely distracted if not interested,
very insightful	but	discount other people's views,
they are highly optimistic	but	then ignore the issues,
they love new ideas	but	get easily bored,
they cope with uncertainty	but	are disorganised,
and they are uninhibited	or	uninhibited - it depends on how you see it

My website www.adhddavinci.org has a self evaluation questionnaire that shows the extent to which a person is a da Vinci. Each characteristic has both a positive and a negative expression. The evaluation provides a score to show the extent to which the positive abundant qualities are expressed, or the negative challenges. If a person is mostly expressing the negative challenge then they must have the potential for the abundant quality. But we are so busy struggling with the challenges we rarely make the effort to celebrate the qualities.

Look at these two lists – one describing ADHD and the other describing giftedness:

Behaviours Associated With ADHD (Barkley, 1990)
Poorly sustained attention in almost all situations
Diminished persistence on tasks not having immediate consequences
Impulsivity, poor delay of gratification
Impaired adherence to commands to regulate or inhibit behaviour in social contexts
More active, restless than normal children
Difficulty adhering to rules and regulations

Behaviours Associated with Giftedness (Webb, 1993)
Poor attention, boredom, daydreaming in specific situations
Low tolerance for persistence on tasks that seem irrelevant
Judgment lags behind development of intellect
Intensity may lead to power struggles with authorities
High activity level; may need less sleep
Questions rules, customs and traditions

Does this second list on giftedness sound anything like ADHD to you? It does to me!

Prevalence

But where do you get ADHD / da Vinci characteristics from? About 80% appears to be inherited, it is genetic, and influenced by about 50 to 100 genes. But we have no idea which genes.

I want to emphasize that you don't *have* ADHD any more than you *have* tallness or *have* shortness. You're taller or you are shorter. It is like a standard normal distribution with strong da Vinci characteristics at one end, and at the other end are the peasant farmer genes – people who are happy to fit in and do their daily toil. Relative to the average Kiwi I am fairly ADHD, but relative to my family I am pretty mild.

Kiwis though are a very ADHD lot - because we are all migrants or from migrant stock. Nobody had to come here. Nobody! Nobody got forced across the border because there was a war going on. Nobody got sent as convicts. People came by choice to these last two rocks before you fall off the planet.

Māori are a particularly interesting group. They came 3,000 km in open waka across the Pacific ocean, then turned around, went back again, picked up more people and came back to New Zealand. My goodness - that is not the personality type that hangs close to Mum, and never takes a challenge. There is something really interesting about the Māori gene pool. On an international comparison Māori rank as the third most entrepreneurial people in the world, just ahead of Kiwis in general. With these genes it is no wonder.

The data on prevalence is hard to compare but it is probable that about 10% of New Zealand children would meet the criteria and about 7% of adults. This is about twice the level of the US but medication levels are about a quarter.

Co-morbid challenges

One of the challenges is to work out which problems relate to ADHD and which to other conditions. Somewhere between 50% and 80% of people who meet the ADHD criteria also have other disorders. Most commonly these are learning disorders especially reading, of which dyslexia is the most common. Other co-morbid conditions are Conduct Disorder, Oppositional Defiance Disorder, Dyspraxia, Aspergers, Autism, Tourettes Syndrome, Anxiety, and Depression.

Ten differences

My research into ADHD has highlighted ten differences affecting the brain. In this presentation I will describe each of these differences, the impact, and what the justice system can do to cope with the challenges and unleash the potential that these differences create.

1. Heavy Metal Toxicity

A large scale British study found that da Vincis have 70% more lead in their bodies than the general population. The researchers also tested violent criminals for heavy metals. The patterns of highs in lead, aluminium and chromium, with lows in magnesium, zinc, and selenium were very similar to the da Vinci group – except much more so.

Rudi Giuliani, New York's former mayor, credits the 25% drop in crime in New York to his "broken windows" policy in which he instituted tough sentencing for minor crimes. However the drop in violent crime occurred across the whole of the United States, and in a consistent pattern 20 years after lead was removed from petrol in each state. Other explanations for the decline in crime include the Roe vs Wade decision which made first term abortions legal, an improved economy and increases in police numbers. It is likely to be a combination of all of these factors.

My research into heavy metal toxicity has led me to a number of conclusions. Firstly it seems to me that if most da Vincis have much more lead in their bodies than the average population, and if 80% of da Vincis inherited the genes, then da Vinci genes must lack the capacity to chelate lead out of the body.

My second hypothesis is that Conduct Disorder, which is characterised by violence, may actually be lead poisoning. There is a very high correlation between ADHD and Conduct Disorder - 30% - 90% of children in one group could also be classified in the other group. Violence is not a characteristic of ADHD but it is certainly a characteristic of lead poisoning.

A group of American psychotherapists were contracted to provide behavioural modification training for some violent criminals. They tested the inmates for lead levels, and were staggered to discover that 93% had lead poisoning. They concluded that it was not behavioural modification that was needed but lead chelation.

Action steps for managing high lead levels

We need to routinely test da Vincis for heavy metal toxicity. The standard test is a urine test that checks for recent, high level exposure to lead that is being excreted. This is of no use for testing da Vincis as they have normal exposure to lead over their lifetime but it is not being excreted. There are other tests that pick up on the impact of the lead on the body. The IUHMT (Indicative Urine Heavy Metal Test) is a useful option and very low cost (about 10c per person for the test materials). The alternative is the more expensive porphyrin test (about $220 per test) which is used in research on heavy metal toxicity.

Where lead is found, we need to chelate it out. The old systems were quite risky, some taking it only out of the cells and not out of the body, and others stripping every good mineral out of the body. In the last three years HMD (Heavy Metal Detox), a herbal product that extracts just heavy metals from the cells, and safely chelates it from the body, has become available in New Zealand. It is the result of a million dollar three year study in a Russian foundry. At one stage HMD could be bought over the counter at herbal stores, but the stores now require a letter from a doctor or medical herbalist, as it is desirable to have good advice on a total programme for heavy metal chelation.

Research is needed on the prevalence of heavy metal toxicity especially lead in at risk populations, and the impact on health and behaviour from chelation.

2. Nutrient deficiencies and intolerances

Da Vinci's are typically low in omega 3, magnesium, zinc and vitamin B6. Access to some of these nutrients is blocked by lead in the body. In New Zealand selenium deficiency is also likely, as our soils lack selenium. These nutrients are the precursors to the neurotransmitters nor-adrenaline and dopamine. So this explains some of the reason why these tend to be deficient in da Vincis.

As cavemen and cavewomen when we lived alongside waterways we used to have a diet rich in omega 3. But our modern, processed diet tends to be low in omega 3, so many people benefit from taking fish oil supplements. Da Vincis, though, have a much greater need for omega 3 than the general population.

In the United Kingdom a large scale trial of prisoners on the effect of providing a fish oil capsule and over-the-counter multivitamin showed a remarkable impact on behaviour. After taking the medication for at least two weeks, there was a 35% drop in reported offences. The study had all of the scientific safeguards of being placebo controlled, double blind, and with a randomized selection of candidates.

It begs the question – if giving supplements to a group of prisoners who have not even been diagnosed as deficient in these nutrients had such a large impact, what could be achieved with identifying the needs and matching them?

Da Vincis are also more prone to intolerance to some foods - the most common one being extruded proteins such as in WeetBix and cornflakes. This is especially a problem for those who also score highly with Conduct Disorder. The protein is denatured through high heat and pressure such that the food becomes a neurotoxin which, when fed to rats, kills them within two weeks. Salicylates, such as in oranges, can have a similar effect as ADHD on some people.

Action steps for managing nutrient deficiencies and intolerances

Medical herbalists are skilled in testing for nutrient deficiencies and intolerances. However there is no risk in taking omega 3 and a multivitamin and seeing what effect it has. Selenium is best taken by eating one to two Brazil nuts per day.

Removing breakfast cereals with extruded proteins can be trialed for two days to see if it makes a difference. Prisons should avoid using these kinds of cereals completely.

It surprises me that there are many large scale, well researched studies on the reduction in offences from taking omega 3 and multivitamins, and yet prison diets remain woefully devoid of nutrients, and supplementation is not routinely available.

Youth delinquent behaviour can also be tackled through coaching parents and children in diet, nutrition and cooking. Efforts to improve the offerings in school tuck shops need to be continued. There is also the option of providing at-risk people omega three and multivitamins free on prescription. Compared to improving diet, this is likely to be a stop gap measure with ongoing issues of compliance – but it is cheap, effective, and easily instituted.

3. Low nor-adrenaline

Nor-adrenalin is a hormone and neurotransmitter that increases stress. It is the chemical that makes you stress enough to do your work before the deadline, or get to school on time. But in da Vincis, nor-adrenaline is very low. So they do not have enough stress until the deadline is very close. Hence procrastination on doing boring things like homework.

On the other hand, in a crisis, most people are running around like chickens with their head chopped off. But da Vincis are now calmly in the zone - which is why they are so often found excelling in crisis jobs like the police, military and fire brigade. It is also why they thrive in risky situations including committing crime.

Action steps for managing low nor-adrenaline

There are many implications for teachers and parents to assist with low nor-adrenaline but there are few implications for the justice system.

4. Volatile adrenaline

Adrenaline appears to slosh in and out more readily in da Vincis. Children from troubled families and war veterans have 40% less capacity to put adrenaline away. So they can tend to get stuck with high levels of adrenaline for longer.

Da Vincis tend to come from dysfunctional families because their parents are themselves da Vincis with their own challenges. Also da Vincis' lives are genuinely dangerous because they are always getting into trouble. So for a variety of reasons da Vincis can have higher levels of adrenaline, and less control over it.

Children raised in smoking families are also prone to high levels of adrenaline. The effect of nictotine is to initially raise adrenaline followed by dopamine. This is why people giving up smoking can be very irritable. They are only getting enough nicotine to raise adrenaline but not the feel good dopamine. These children can have very stressed behaviour that looks like ADHD but is really just the effect of second hand smoke.

Volatile adrenaline can lead to stressful and irrational behaviour and anxiety.

Action steps for managing volatile adrenaline

With adrenaline sloshing through the system, da Vincis can produce some aggressive outbursts. This can be the start of a slippery slope that leads to jail. The behaviour did not come from badness but from a biochemical spike. So whenever possible I suggest the behaviour is ignored or managed, rather than escalated.

One of the challenges for police officers is that offenders when caught have loads of adrenaline rushing through their veins. In this state the logical brain is simply not working. Instead it has been switched over to fight/flight survival instincts. It is no wonder that questioning generates a mountain of lies and denial.

CO_2 can put adrenaline away. It is as simple as breathing into cupped hands normally for 12 seconds. Try it and a sleepy, soporific feeling will wash over you. This is an easy skill to teach da Vincis to manage excess adrenaline, and may be useful for managing suspects when caught.

5. Low dopamine

Dopamine is a neuro-transmitter that helps you feel good. It is an internal reward system that is released by doing pleasurable things and gets boosted from gambling, sex, drugs, smoking, risk taking, nicotine, and eating. Da Vinci's are low in dopamine so they are more likely to engage in these risky behaviours to stimulate the release of dopamine in the brain.

Addictions come from the rapid release of dopamine. Not from the normal release, but from rapid release. Because da Vincis go to such effort to release dopamine, they are much more likely to engage in behaviours that cause a rapid release of dopamine leading to addiction than the normal population. Ritalin releases dopamine. In normal doses it is fine but when taken in massive amounts, such as when consuming the drug P, it becomes addictive.

I want to debunk Ritalin. I am a supporter of the use of Ritalin, and similar drugs, for children who <u>really</u> need it! We know that Ritalin is so effective, so dramatically effective, that not giving it to a child who needs it is like not giving insulin to a diabetic. To me it is cruel to deny this support. It is not addictive when taken as prescribed as it is out of the blood stream within four hours.

Research tells us that Ritalin reduces the abuse of drugs and alcohol as teenagers by 83%. I think a major reason behind this statistic is that da Vincis with Ritalin support were able to gain some self esteem because it was possible for them to have friends, to learn, and to spend less time in trouble.

When my son was 5½, he was about to be expelled from school. We got him diagnosed and on to Ritalin. Within ten minutes the effect was dramatic. We still

had our energetic, characterful boy with masses of personality – but he could now think before he acted. Life was transformed for him. What intrigued me was that after two weeks we experimented with taking him off Ritalin in the weekend. He was 50% better than he had been two weeks earlier. Just having a respite from always being in trouble, had made such a difference. Bryn is now an exceptional teenager, managing his life well. I doubt if we could have got to here without the support of Ritalin.

Ritalin prescribing has the risk of ending up in the blackmarket for P. There are new drugs on the market that are almost as effective that cannot be used like P.

Action steps for managing low dopamine

Set tough challenges
One implication is to set big, tough challenges for da Vincis. The temptation is to make expectations easier because they are not coping. But it is better to stretch them with a real challenge to boost the dopamine and draw on their SQ thinking.

Ritalin
It needs to be easier to get prescribed Ritalin or similar drugs. I support the requirement for a specialist to make the decision, rather than a GP. However it can take a year to get to see a specialist and be an expensive and stressful process. I have also heard of several well meaning psychotherapists who are reluctant to diagnose ADHD, and who claim the profession prefers to use just behavioural modification without Ritalin support. This is contrary to research findings that show behavioural modification on its own has almost no value for a child who also needs Ritalin support.

Alcohol abuse campaign
Alcohol abuse is by far the most serious drug impacting New Zealand, with da Vincis disproportionately affected. It costs the country over $4billion per year, or quadruple that if the social effects are considered. For example over 90% of all crime is fueled by alcohol, poverty is magnified by alcohol, and alcohol has severe effects on the health of the working age population.

The last campaign for responsible drinking cost just $4.5million. Curbing drinking behaviour is tricky in a country where alcohol is consumed by most people and sits on a social pedestal. But it is time for a serious attempt to impact the drinking culture. In my view it needs to be a comprehensive social marketing campaign with the same commitment to change that the successful drink:driving campaign demonstrated. My thoughts on how to achieve such a social epidemic can be found on my website, www.windeaters.co.nz.

6. Low connectivity of the frontal lobes

Da Vinci frontal lobes have less activity, less blood flow, and are slightly smaller. This is the executive management centre. It is the part of the brain that tends to mature with age, and explains why some da Vincis outgrow it.

Without the frontal lobes making judgements of what is important, everything is noticed. Everything! So attention deficit is really noticing everything. Every smell, touch, taste, feel, noise, activity - everything. It is very hard for da Vincis to ignore all of the sensory inputs.

It also explains why the criteria for ADHD looks like the criteria for being a full on child. It is. Young children have low levels of connectivity of the frontal lobes so they lack judgement. It is hard for them to think before they have acted. So this part of the brain has a developmental delay that makes them less mature than their peers.

This judgement piece of the brain takes all of the information, selects what is important and what is not, and makes an informed decision. It explains why da Vincis tend to be uninhibited. Da Vincis act on a whim rather than rational analysis. It also explains why consequences have such little effect on modifying da Vinci behaviour. So penalties in the justice system don't prevent the behaviour – they have acted before they thought about it.

It also explains why entrepreneurs are willing to take risks when others are trapped in analysis paralysis. It is a vital strength in simply making things happen. SQ gives them insight and intrinsic motivation, and the low executive judgement allows them to simply act. No wonder, 50% of entrepreneurs meet the criteria for ADHD.

Action steps for managing low connectivity of the frontal lobes

Penalties to manage the behaviour
Parents of da Vincis are often astonished that no level of consequences appears to have any impact on behaviour. The same is true for the justice system. However there are some penalties that can provide the circumstances to help da Vincis manage their lives better. For example weekend prison, home detention, day reporting centres, residential programmes for young offenders and other such penalties can provide the structure and support to keep da Vincis out of trouble.

Tapping the forehead
Tapping the forehead stimulates activity in the frontal lobes and is a simple technique to teach.

Rethink age of responsibility
At age 16 a youth is considered to be fully responsible for their actions. However the frontal lobes (where judgment occurs) of a 16 year old da Vinci, may be closer to the maturity of a 12 year old.

Ride the rollercoaster till they outgrow it
Being uninhibited means there will be adventures and risks, successes and failures. It is a roller coaster ride. We can try to restrain da Vincis to be cautious and thoughtful, or just love the roller coaster ride with its highs and lows. Most da Vincis are not bad, they are just impulsive and foolish. They get into trouble with the law because they have not yet grown up. Most will eventually get past those wild teenage years, but if they get institutionalised into the prison system they may never make their lives work effectively.

7. Delayed development in the cerebellum

The cerebellum is a dense part of the brain about the size of an orange at the base of the skull. It is the brain part that automates learning. For example it automates being able to make the eyes flow from left to right across a typed page. The Dore Programme found that 100% of dyslexic people could not get their eyes to smoothly flow from left to right. Hearing words and making sense out them is also automated in the cerebellum.

My theory is that many learning disabilities are caused by delayed development in the cerebellum. Da Vincis often have learning disabilities as a co-morbid challenge. I doubt the cerebellum directly impacts on ADHD. However learning difficulties are one extra burden to manage.

Action steps for managing delayed cerebellum development

Brain gym activities speed up the development of the cerebellum. Some practitioners have developed sophisticated techniques to match the activities to the needed development. Reportedly this has provided significant benefits for da Vincis. I suspect the greatest impact is to help them with solving co-morbid challenges, which in turn removes one more reason why they are misfits in society and deem themselves failures. These programmes can be offered to da Vincis in the justice system.

8. Toxic bodies, toxic minds

Numerous studies produce different causes that correlate with ADHD behaviour. The question is, “How can all of these causes be true when ADHD is also 80% genetically determined?” At first sight these appear to be completely unconnected - but are they?

For example:

- There are 41 peer reviewed articles showing a link between food allergies and ADHD
- Ninety percent of hyperactive children have a history of at least three ear infections, and they are nearly four times as likely to have had at least six ear infections than the normal population
- A Pittsburgh Youth Study found that tobacco-exposed boys were significantly more likely to develop oppositional defiant disorder (ODD), or to have combined ODD and ADHD, than other children. They were also more likely to develop delinquent behaviour early in life
- A tenfold increase in organophosphates correlates with a 55% increase in the odds of meeting the criteria for ADHD
- Chemicals linked to behavioural and learning problems include nicotine, alcohol, manganese, dioxin, and organic solvents
- A large scale Oxford study found children diagnosed with ADHD have significantly lower chromium, iron, selenium and zinc levels with raised cadmium, aluminium and lead. These are the same highs and lows as for violent criminals

There may be a common element to all of these diverse causes. Stress or toxic overload can lead to an overworked and under-effective liver. A poorly functioning liver allows toxins to build up in the body, leading to 'liverish' behaviour. This undesirable behaviour gets them in trouble which is stressful. This stress, along with the trapped toxins, causes the liver to be further burnt out. It is a cycle.

I have tested the liver function in over 800 people through measuring the liver's voltage levels. What is striking, is that all of those diagnosed with ADHD and/or exhibiting delinquent behaviour have severely depleted voltage in the liver. They also have low voltage in the pericardium which is linked to blocked emotions, and in the adrenals which is linked to mental and physical exhaustion.

Restoring voltage into these systems has a significant impact on behaviour, as measured by parental and child perceptions. It seems to be a first and necessary step before other interventions can work.

Action steps for managing toxic bodies and toxic minds

Using the scenar or M.E.A.D. analysis, check the voltage of organs and endocrines, and where it is low, correct it. This usually takes two hours and only needs to be done once. Significant improvement in wellbeing is usually evident within 24 hours.

9. SQ

Differences in brain frequency is perhaps the most fascinating aspect of da Vincis.

The beta brain speed (13-25 Hz) is wakefulness. You are probably in the beta mode at the moment. This is the brain speed that is useful for being in the right place at the right time doing the right things. I wish my son would have more of this in the mornings when he needs to get his shoes on and get in the car to get to school on time. It's the brain speed you use to manage your daily business.

Alpha brain speed (7-13Hz) is when you are drifting off, when you are daydreaming, when you are in the shower notching up an horrendous power bill while you muse, when you head off to sleep, or start to wake up.

Theta brain speed (4-7Hz) is lucid dreaming which is when you can remember your dreams.

Delta brain speed (< 4 Hz) is when you are deeply asleep.

And then there are gamma waves (40Hz) which are a very light ripple that can barely be detected. They are thought to link ideas together.

Da Vinci's are much higher in the alpha, theta and gamma brain speeds. Much higher! Dramatically higher! And they are much lower in the beta brain speed. So the orderly management of doing the right thing at the right time does not happen.

So people ask me, "Deb, are you trying to tell me that this hyperactive firestorm I am trying to cope with is actually in a meditative state?" Well yes. And the implications are huge.

One of the most exciting things I have discovered in my journey through ADHD is about brain speed and how it affects IQ, EQ and SQ.

IQ, intelligence quotient, is the linear lining up of neurons in the brain, in a sequence. It is a bit like Christmas lights – you fiddle with each of the bulbs until they are all connected and then the whole row of bulbs lights up. It's how we learn and think when we are being rational, logical and precise. It's a process.

For example we use it to multiply big numbers together. Having learnt the process we can now do it repeatedly for any numbers. It is also how we do research, by following a research method process.

IQ has constraints. It is bounded by a process, so it is not original thinking.

One of the great things about IQ is that it is measurable. But one of the terrible things about IQ is that it is …… measurable. Because it is so measurable we put it on a pedestal and say "Wow, you can do maths", or "You can pass this degree", or "You got lots of credits in NCEA". We know the old adage, what you measure is what you get. And IQ is very measurable so assessment for learning is focused on IQ. In the same way business performance measures are based on IQ. With IQ you measurably know that you know.

EQ, emotional quotient, is a different neuro-physiological process. In the brain there are bundles of up to 100,000 neurons. You form pathways through these neurons as you experience things. I think of it as being a bit like the Wainuiomata hill motorway. There used to be dense bush, and then lots of little tracks, and one turned into a well defined track, and then a road, and then it was tar sealed, and finally became a motorway. In the meantime most of the little tracks became vestiges. The brain does the same thing. An experience forms a little track. And with more repeated experiences it becomes a major, high speed route through the brain.

EQ is how you get to ride a bicycle, swim, or eventually become an Olympic champion. EQ is experience bounded learning. It is also how you get to understand yourself and understand others. So if you look at person's face you could say "She looks very pensive." How do you know? So here is a challenge – write a 500 word (referenced) essay on how you know the emotion on the face of the woman in this picture. You know that you know, but you are not able to explain how you know. You will mutter something about it being in her eyes. You've seen it before. You can't quite measurably describe what you know, can you? But you do know! You know exactly the mood of the woman's face but you can't prove it to me.

Somewhere I read some research that indicated that EQ is four times more important than IQ by the age of 40 in terms of success in life. Goodness knows how they measured it. I don't know. But it seems likely.

I teach at university. If I was trying to teach swimming at university we would put the students in tiered rows in a lecture theater and get them to draw diagrams of how to swim, and write essays about it. But in fact to really swim you have to use your EQ. You have to get into the water and experience it before you can become an Olympic swimmer! So that's the contrast between IQ and EQ.

You probably have not heard about SQ. This is the most interesting brain process. SQ stands for Spiritual Quotient or Sense Making Quotient. And I've also seen it as CQ for Creativity Quotient.

SQ is the ability to slow the brain speed down to alpha and theta brain waves. And then a light 40Hz ripple cuts across the brain linking together ideas in different parts of the brain. So if you take two different ideas and link them together you get creativity. But what happens when you take 100,000 ideas and link them together

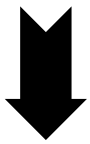
in that moment in your brain? No it's not a mess. It's insight! Inspiration! Wisdom! A sense of knowing! Intuition! It feels right! It makes sense! That's SQ.

It's how you get to be creative and insightful. It's how you get to break rules and make rules. It's how you get to go beyond the given. It's how you get to own your own ideas and be intrinsically motivated by them. You can't do it with IQ and EQ because they are bounded by previous experiences.

But SQ is very hard to measure! Who is to say "Your insight is right"? Who is to say "Your creativity is right"? It is much harder to measure! So SQ is not valued in the way IQ is valued. It has different qualities

Qualities of IQ, EQ and SQ

<table>
<tr><th>Intelligence</th><th>Qualities</th><th>Measurement Challenge</th></tr>
<tr><td>IQ</td><td>Knowledge, understanding, application, analysis, planning</td><td rowspan="3">Precise, measurable, right answers, within rules, deterministic, know that you know, consistent standards

 
Increasing measurement challenge

Imprecise, hard to measure many right answers, possibilities, many paths, uncertain outcome, inconsistent standards</td></tr>
<tr><td>EQ</td><td>Teamwork, people leadership, awareness, action, relationship management, emotional wellbeing, physical wellbeing, optimism, skills, experience</td></tr>
<tr><td>SQ</td><td>Evaluation, idea leadership, synthesis, judgment, insight, creativity, problem solving, intuition, resilience, breakthrough thinking, inspiration, commitment, vision, intrinsic motivation, self belief, enjoyment, flow</td></tr>
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Da Vinci's are exceptionally high in SQ thinking. Very, very, very high in it. This is one of the main reasons that 50% of entrepreneurs meet the criteria for ADHD. They can see things differently and are intrinsically motivated by their own ideas. But it can be a double edged sword. They will passionately create their own path, but whether it is the right path is another question.

Action steps for working with SQ

There are many implications for the justice system for working with da Vincis who naturally excel in SQ thinking.

Recognise Potential

Da Vincis may have strayed to the wrong side of the legal fence, but many of them have great potential to excel. Some are already being entrepreneurial, except they are selling drugs instead of legal products. Some are being leaders, but in the wrong direction. Some have some great creative ideas, but applied to crime. If these talents can be refocused on making a positive difference, then everybody wins.

Misfits in institutions and schools

Too often I see desperate parents dump their da Vinci children in boarding school with the belief that discipline and tough routines will sort them out. Instead we get scarred adults from a disastrous school experience. Prisons are also failed institutions for shifting da Vincis from crime to positive life choices.

Intrinsically motivated people bursting with their own ideas do not fit into institutions like schools and prisons. They don't follow somebody else's rules. But if they chart their own direction they can pursue it relentlessly. They will take an old car and fix it up as they learn. Or become a computer whizz while playing. But it takes real skill to provide the life environment that has the mix of structure, creativity, discipline, freedom to explore, values, expectations to excel, and opportunity to build on areas of interest.

Find intrinsic motivators

Da Vincis become mono focussed and passionate about doing their own thing in their own way. But they are completely disinterested in following other people's ways of doing things. So they are very hard to motivate with extrinsic motivation like stars, and marks, and money and rewards and qualifications. Once a da Vinci is motivated, stand back and watch the transformation.

Neuro-feedback systems

Da Vincis spend much of their time at alpha and theta brain speeds in SQ mode. But sometimes being in the beta mode is preferable. Beta is useful for being present, following rules, and being organised.

So NASA has taken their pilot training systems and modified them for use by children. Da Vincis can practice thinking at the beta brain speed so they can choose the brain speed to match the circumstances. It has enabled many at-risk da Vincis to make their lives work and get off dependence on Ritalin.

The da Vincis put a cap on their head which picks up the brain frequency, and then play ordinary PlayStation games. When they are in the beta brain speed, the game

plays normally. When their mind wanders to other brain speeds the game slows down or the controllers don't work well. The instant feedback enables the player to know when they have the beta brain speed.

We have just begun trials with a neuro-feedback device. We expect it to become a low cost, effective system that would be useful in the prisons or for at-risk da Vincis.

10. A tough upbringing

Da Vincis are always in trouble. Their life lurches from parents to teachers to police managing them for endless infractions. They are easily bored, stressed and anxious. Many also come from a dysfunctional da Vinci family, since ADHD is 80% inheritable. One research project found that 80% of marriages broke in families with a da Vinci child that had not been treated by the time the child was eight. So, many da Vinci children have the added stress of growing up in a single parent family.

A tough upbringing has its own challenges. Genes can bestow a genetic potential for behaviour that is not activated until an experience switches it on. For example, a child may have the genetic potential to be violent, but never become a violent person unless their life is exposed to violence.

We also know that the bone marrow will produce new brain cells that match the thoughts and behaviors they have most often. So if a person is often angry then their body will produce new brain cells that enable them to be more angry, more easily, more often.

So experiences can multiply the strengths - or the challenges - faced by da Vincis. By the time schools or the justice system catch up with them the patterns in the brain may be well set.

Low esteem is common amongst da Vincis. I was amazed by how many of the most exceptional entrepreneurs carried very negative messages about themselves from their childhood.

Action steps for managing a tough upbringing

Parent training
Da Vinci's make good parents look like bad parents. There are no magic bullets for managing da Vincis. All of the same principles apply as parenting other children – just more so! Below are some of the skills that can be taught to parents of da Vincis:

- Natural and logical consequences
- Provide choices
- Actively listen

- Take issues and concerns seriously
- Provide frequent and immediate feedback
- Use incentives before punishment
- Tell children what to do, not what not to do
- Give very clear guidelines
- Set clear boundaries
- Be consistent
- Create routines where possible
- Have opportunities for movement
- Match expectations to likely performance
- Use extinction for undesirable behaviour
- Compliment good behaviour
- Provide thoughtful rewards
- Time out
- Stand and think
- Plan for problem situations

Positive psychology

Positive psychology is a new branch of psychology that focuses on strengths not weaknesses. One exciting discovery is that people enhance their strengths and their weaknesses most abundantly when they apply their strengths most often in the most ways. So rather than focusing on the weaknesses what we need to do is focus on the strengths.

And da Vincis have such exceptional strengths like creativity, making things, humour, experimenting, music, art, adventure, computing, entrepreneurship, acting - all sorts of things! If we can get them to apply these abundant strengths then it will enhance all aspects of their behaviour.

With at-risk da Vincis it is great to say, "Look, forget about catch up! You have more creativity, more passion, more drive, more intrinsic motivation than the average person! Wow, go for it, use it!" And we can reflect back to them the ways that they are absolutely awesome. Because they are, but they have been told most often how bad they are.

Love them

Da Vincis need to be loved for who they are, and not for who they are not. There is nothing more powerful to ensure a da Vinci uses their brilliant qualities than to love them for who they are! I had a letter from a woman who read something I wrote that said, "I have hated my child for eight years. And after reading your article I love him all over again! And it has changed his life and my life completely!"

I want many more of those letters.

Kia ora and thank you