The Brain's Way of Healing
by Berry Liberman

Berry Liberman on Dr Norman Doidge

Very few people have the depth and breadth of knowledge of Dr Norman Doidge. His is a mountainous mind, fiercely focussed on exploring the potential of the human brain.

For years, Norman devoted his research into how the brain, when damaged, can repair itself with the more subtle, less invasive tools of neuroplastic intervention. His two books, The Brain's Way of Healing and The Brain that Changes Itself have sold in the millions, topping bestseller lists across the US, Canada and Australia and causing a revolution in the medical world.

Having studied the classics and philosophy as a young undergraduate in Toronto, Norman earned a medical degree, followed by psychiatric and psychoanalytic training at Columbia University in New York. This bedrock of philosophy compelled Norman to pursue life's big questions: What is mind? What is consciousness? What is life? Spellbinding in its brilliance, his work to date has had a profound impact on our understanding of the human brain. What was formerly thought, for centuries, to be in a state of degenerative decline, the brain is now understood to be "neuroplastic from cradle to grave, which means people have to rethink their lives."

For me, this truly was a conversation with a giant. I can't remember the last time I finished an interview and had to take some deep breaths, feeling like I just hung in by my fingernails—intellectually speaking. As a person, Norman is curious, generous and deeply thoughtful. He considers at all times each question and answer with great seriousness, wary of providing either false hope or false despair. When you challenge an entrenched paradigm, you need to be prepared for the outcome. I quickly realise that his answers carry a heavy burden, as people around the world look to his findings for miracle cures. Norman is wary of presenting neuroplastic interventions as working for all people, all the time, but rather as a profoundly beneficial re-imagining of how our minds work and their potential to heal and self-improve.

I've re-read this conversation at least a dozen times and each time I engage with another layer of thought I hadn't picked up the first time around. From God to science, we put walls around what we think we know so that we may contain the panic stemming from uncertainty. Perhaps the most profound thing I learned from Norman is how to cultivate the open mind, to maintain a truly agnostic position and remain open enough for long enough to re-imagine the status quo. As Norman says, "The mind isn't simply what the physical brain does; the mind also changes the brain"—so strap yourselves in folks, what follows is one hell of a mindbender.

BERRY LIBERMAN: I want to begin by framing some of your ideas. Neuroplasticity, as you

talk about it, is a way of healing rather than curing. Tell me about that distinction—between healing and curing?

NORMAN DOIDGE: I speak mostly of “healing” in my work. Healing comes from the old English word, “haelan,” which means not only cure, but to make whole again. The neuroplastic healing I describe involves restoring lost functions, and people often say they “got their lives back” and feel whole again.

Cure is more about getting rid of a disease or symptoms. In a few of the cases I describe—such as those with Parkinson’s, brain injuries—the patients still have the underlying disease or injury, but they are functioning as they did before they had the illness, and so the “feeling whole again” is what they experience. Their brain laid down new circuits to work around the damaged ones. I also like the holistic nuance of the word healing, because neuroplasticity is about mind, brain and body working together, as a whole. What I show in The Brain’s Way of Healing is that we have overlooked the extent to which we can actually use the body, the senses and the mind to heal the brain.

And so just to go back a step, how do you define the concept of neuroplasticity?

Neuroplasticity is a property of the brain that allows it to change its structure and function in response to activity and mental experience. For about four centuries the mainstream view has been that mind and brain were separate; you could change your mind, but not the structure of the brain. Its circuitry was formed and finalised in childhood. And so if it was damaged or diseased or didn’t develop properly, there was nothing significant that could be done to heal it. So the only change the brain underwent was degeneration, basically. We could never drive positive change. And now we discover this notion that the circuits are unalterable is not true, and there are ways of sculpting our circuits through mental experience and activity.

In my latest book I’m interested in how this can help us to heal the brain. And remember, as with other kinds of healing—say of the skin, the healing at times can be complete, and other times it can be partial. And sometimes, say with burns, it can fail. But what I am describing is moving from a view of the brain that says it can’t heal, in principle, to one where it is a possibility. And that’s a big change.

Right.

So in The Brain’s Way of Healing pretty much every person I describe was told, often at major medical centres, they would not get better. And what I do is show these cases getting better with neuroplastic interventions. Now, people sometimes say, “Well, these are miraculous improvements,” but the burden of my book is to show this is not miraculous, that if you understand the laws of neuroplasticity, change is not only possible throughout life, but that the brain works by changing its connections: forming, unforming and reforming networks. And if this is understood, it can sometimes be used for healing, and even self-improvement.

Now, I don’t deal with curing cancers or cellular problems. But I deal with conditions where function is lost—some strokes, brain injuries, learning disorders, Parkinson’s, MS, autism, chronic pain. In one case, a woman had a cancer removed, and the surgery saved her life, but she was left with deficits from the lost tissue, and she was helped. So it’s a long list.

And you write about the plastic paradox—an amazing concept. That the very plasticity of

our brains makes us both perfect candidates for change, and simultaneously vulnerable to creating stubborn habits and rigid behaviours.

Yes. The plastic paradox is that the same plasticity that allows us to have flexible behaviours can also lead to behavioural rigidity.

Plasticity is like snow on a hill in winter. If you are a skier you can take many different paths down that hill on your first run, because it is pliable, plastic, modifiable. It's human that if you had a good run, you may be tempted to take the same path over and over, with few modifications. And so soon you develop tracks in the snow, and soon ruts that are hard to get out of. The same applies in our lives: if we repeat things, they become habits.

We look at the rigid behaviour and project that rigidity back onto our brains. We say, "My brain must be rigid." But the behaviour actually repeats because your brain made very strong circuits for them! Some "disorders" are a product of our plastic brains changing in a negative direction: habits, chronic pain, aspects of depression, anxiety, OCD, Post-Traumatic Disorder, Parkinson's and many more kinds of problems.

So how do you access the positive possibilities while keeping in mind the flipside negative potential? Because people can be very disappointed when the techniques you're saying are here, real and useable don't cure all circumstances.

Nothing in medicine, as far as I know, except maybe for a cast on a broken arm, cures everything. Actually not even a cast can cure some fractures. It's a psychological question of how one handles uncertainty. Every serious illness puts us into a state of increased uncertainty about our future. And as the philosopher Spinoza said, "Human beings, when faced with uncertainty, swing between hope and fear." And to fear, I would add despair. So I never feign certainty.

If a patient seems to fit a profile that might be helped, I explain why and say, "This may be worth a try." So I spend a lot of time with people explaining principles behind the treatments, and that just because we can help people who some thought couldn't be helped doesn't mean we can help all people all the time.

That said, it's ridiculous to be silent about the remarkable improvements I have seen, or to withhold what I have learned by "reverse engineering" how those improvements occurred. I think one reason people mistakenly assume that a treatment that helps one person with an illness will help another is that we have for too long assumed there is a one-to-one relationship between illness and treatment. We go on the internet asking, "What is the correct approach to autism or MS or a learning disorder?" The problem is there's a tremendous amount of variation in all of these conditions.

At times we physicians are at fault for perpetuating this idea because there is a direct relationship between an illness and a treatment. For centuries we have known that certain poisons have certain antidotes that almost always work. But this is the low hanging fruit of medicine. When we deal with the illnesses we've yet to make progress on, we are often dealing with high levels of complexity. For instance, no two brain injuries are exactly alike. People are hit in different parts of the head. One person had a high IQ and never did drugs, the other person had a low IQ and smoked a lot, never exercised and did a lot of drugs. Neuroplasticity helps to explain a lot of that variation.

A seasoned clinician knows that most of the time we don't treat an illness, we treat a

patient with an illness, and each patient varies.

So I might say, “Why don’t we try to see if it works?” And since these interventions are non-invasive and have either no side effects or hardly any, the people will often say to themselves, “What do I have to lose?”

So we’re entering a new field, and it’s worth knowing about and integrating it— there’s hope here, but it is not a guarantee. It’s not a guaranteed cure.

Well, my clinical stance is equally wary of both false hope and false despair. My ideal physician doesn’t pretend to predict the future, but he is willing to travel into the uncertain future together with his patient, because he cares enough to try everything he can, and leave no reasonable stone unturned. So, even if the treatment has helped the last nine out of 10 patients, I’m still somewhat agnostic about prognosis because there’s so much variation between people. But I also observe that some people don’t react to agnosticism as though it’s agnosticism; they still may react, as Spinoza predicts, either hopefully or fearfully, depending on their psychology.

There is a lot of pressure on doctors, both internally from themselves, and externally from others, to play the role of “the expert” and “the one who knows the future” and god forbid one should admit uncertainty. The expert is the person who doesn’t miss a beat when asked a question, because he has a ready-made answer. But when dealing with complex systems, like the brain, and brain problems, which vary from person to person, there are no ready-mades, and expertise is best shown by the doctor’s ability to be a student of the patient’s unique problem.

One thing you must learn as a psychoanalyst is that when someone walks into your office, and you think you understand them, you probably don’t.

They use the word “love” and you think you know what they mean; but with time you realise what they mean by “love” is nothing like what the previous patient meant by the word “love,” or what you mean. They say the word “father” and they think of a tyrant and a vicious undermining competitive person, but the last person who was in your office thinks of “father” as guide and sage, and hungers for that as what has always been missing in his life.

And also what I’ve found fascinating is that you talk about this fixed neurological nihilism, this paradigm in which we have viewed the brain for many centuries: the brain as machine.

Yes, so modern science begins with very great thinker-scientists like Galileo and Descartes. And they replace an ancient model. The ancient model was that the whole universe was like a vast living organism, and the human microcosm reflected the macrocosm. The planets were seen as alive too: Mars, Venus, Jupiter were gods with a human form. Rivers, and even some rocks, were seen as sacred and alive—as was anything that moved. These ancient views are well documented in ancient creation myths. In China, people asked, “Where does this world come from?” It’s born out of a vast cosmic egg—an organism. In South America the myth said that the world comes out of the body of a serpent—an organism. Same in the Ancient Near East. The entire world was enchanted.

With Galileo there’s a new great idea of nature that emerges. We go from the idea of nature as one vast living organism to one vast mechanism. Galileo takes a child’s toy, a

telescope, and he aims it at the heavens and he doesn't see the gods Mars, Jupiter and Venus, who are all depicted as divine humans, as the ancients did. He sees merely matter in motion, moved about by forces. And these are the forces of the new physics. And the universe is described as "a clockwork universe," it is seen mechanistically. And very soon for something to be scientific means it has to be looked at mechanistically, in a machine-like way. Our animated, enchanted universe was disenchanted.

Galileo lectured in Padua, Italy, and not very far from where he lectured, William Harvey dissected bodies and was able to show that the heart was a pump, which is like a machine. And shortly after that Descartes described the nervous system as a pump-like machine, and the nerves were seen as empty vessels, and a substance called "animal spirits" moved up the nerves and then was bounced back to cause movement and so on. And this mechanistic metaphor for the brain took hold.

And as each age since has come up with new and more fantastic machines, we've described the brain as one of those machines.

Descartes described it as a hydraulic machine. With the discovery of electricity, it was described as an electrical machine, and the idea was that the circuitry of the brain was hardwired. We still use that word "circuitry" to describe the brain. And now the master machine analogy for the brain is that it's a computer, a form of hardware. So it's a dramatic shift away from the first great idea of nature of the ancients—nature as one vast living organism.

This ancient thinking would be incredibly useful to us today.

Well, it sneaks back into some New Age thinking too, in some ways.

But it's "hippy dip" and it's New Age thinking as opposed to an essential practical perspective.

Yes. Well, the ancients saw so much more of the universe as being alive than we do. And you could argue that they saw too much as alive, you know, leading to superstition. But that all was challenged with Galileo and others who started to say, "No. The world is made of matter in motion, the planets move not because they're alive, but because there are these forces acting upon them," and so on.

That's all good too!

Both of them have something to offer and both of them have limitations— and I'm dealing with the limitations of one of them. Luckily, there was a third great idea of nature. With the discovery of fossils, we realised for the first time that animal forms were changing, and we started to realise that nature has a history and it's changing too. This is summed up in the idea of natural history. The natural history movement in some ways was a critique of the idea that nature is one vast mechanism. And Darwin comes out of that. And Freud has a foot in both camps. So he's very, very interested in Darwin and development and change. But he's also interested in mechanisms. He speaks about "defence mechanisms," and the "psychic apparatus." But he opened us up to the idea that we, as individuals and a species, pass through critical periods of psychological development. This is part of a natural history mindset. So Freud was one of the first attempts to bridge these two ideas in nature, and they're both present in modernity and they're both competing and they both have rough edges sometimes.

Now, those trapped in the mechanistic model have a huge problem in explaining the mind. The mind seems so ethereal, not readily explainable in mechanistic terms. Yet, that is what they try to do, since that is all they know. The main point of view embraced by most, though not all, neuroscientists is that the mind is merely what the brain does, and we know this, they argue, because if we change brain structure—with drugs, disease or in experiments—mental experience changes. Mental experience is produced by the material brain, and that is all there is to it. And if you say otherwise you're thought to be unscientific.

So what do you think?

Well, that view is basically called "the reductionist view." That the mental can be reduced to the product of the play of electrons and the activity of matter. But the discovery of neuroplasticity poses a real problem for a thoughtful neuroscientist, because what we see over and over is that mental experience can actually change brain structure. The mind isn't simply what the physical brain does; the mind also changes the physical brain. And precisely how this happens nobody knows.

And then there is the work being done on the gut, and the brain of the gut, and how that similarly affects the mind and they're all interrelated.

Yes, they're all interrelated. But the key philosophical problem here is it's just no longer completely satisfying to say that the mind is what the brain does—that thoughts are merely secretions of physical matter as it were. Now we see that these thoughts can change the physical state as well. We don't even know what a thought is. I've never seen a really good definition of one. There are certain words like "mind," "life" and "the universe" that are placeholders for questions.

The reason we keep asking, "What is mind?" "What is consciousness?" "What is life?" "What is the universe?" is because we don't really know the answers. And if we don't know the answers to those questions, it also means we don't know the boundaries of what mind or life or the universe is.

And that is okay! We need placeholders for the things that we don't completely understand. One of the dangers of modern neuroscience, because it's had so many fantastic accomplishments, is that it can get arrogant and forget there are certain basic things we still don't understand.

So now we know both the brain produces mind alterations, and mind produces brain alterations, I find that it turns out to be very useful in dealing with some very serious illnesses. With the discovery of neuroplasticity we're going beyond the realms of classic psychosomatic medicine, where you're angry at your teacher, say, and she gives you a homework assignment, and you get a headache. What I'm writing about is successful instances of using an understanding of the mind to improve some very serious illnesses like stroke, traumatic brain injury, aspects of multiple sclerosis, aspects of Parkinson's, autism, learning disorders and so on.

And what about the psycho-emotional landscape as it bridges into this work?

Well, we're now understanding that in the first two years of life most of the brain development going on is in the right hemisphere. And it's only by the end of the second year that the left hemisphere really starts huge postnatal development. And one of the things that develops in the right hemisphere is the capacity to regulate emotion and read

the emotions of other people. Because the right hemisphere is very involved in our emotional lives. And if you don't get proper emotionally-nurturing input, as you see for instance with very neglected orphans, those right hemisphere processors don't develop. And it's not just that the children have psychological conflicts later on—they don't have the cortical real estate that other people do. So some colleagues are trying to work on relational treatments that intensively develop the processors that didn't develop in early periods, so that the brain can play catch up.

In the pre-neuroplastic model, if a person had a stroke, and they lost 90 percent of the function of their right arm, we assumed that the person had lost 90 percent of the neurons that govern movement in the right arm. We assumed they were dead, and nothing could be done to bring them back. We didn't encourage them to even try to move the arm past about six weeks to six months.

Based on reviewing a lot of the scientific and clinical literature, and the cases I describe, I propose that something else frequently occurs. When there's damage and a person loses 90 percent of function, some of the neurons actually are dead and there's nothing you can do with those. Nearby are neurons that were getting signals from those formerly living neurons and they're suddenly bereft of signals. So they're not doing anything, and they go dormant. Some of the neurons are not dead but they're basically what I would call "sick neurons" and they're firing irregular noisy signals that are not good for functioning. Other neurons are completely healthy but they're getting all these noisy signals as input. Junk data. And the result could be that the person loses 90 percent of the function of his or her arm, but really only a small number of the neurons are dead.

So a lot of the interventions that I describe stimulate the brain to help sick neurons resynchronise so that they fire meaningful signals, and you can do this a number of ways. You can do this with sound input, light input, electrical input, vibrational input. It doesn't involve surgery or chemicals. So if we can resynchronise firing in the brain using sensory experience, we can often get improvements.

I've seen this work in MS, I've seen it in Parkinson's, stroke, brain injury, autistic kids, learning disordered kids, and EEGs start to normalise with these synchronising approaches. And the beauty of all these interventions is they're non-invasive and they're based on energy. If you are driving down the street for instance and someone pulls up to you in a sports car and the windows are rolled down and there's this pounding beat that's just almost bone-rattling: if I was to do an EEG on you at that moment, your neurons are firing right in sync with the beat of that music.

It's fascinating. And like you said, it's possible we're getting into New Age territory. So I want to talk about how we bridge these thought processes. Science and New Age.

I will try to stick to the science, first. But I do find it amusing that if one talks about energy in clinical practice that some people devalue this, and say it is New Age, because it doesn't seem physical and material enough and doesn't involve surgery or medication. They typically say, "I will only believe it if you can show it on a brain scan." This is just hilarious, in two ways.

First, all brain scans work only with energy! X-rays, EEGs, even functional magnetic resonance imaging (fMRIs)—they don't show you the physical brain, but patterns of energy absorption, use or release by the brain! Second, they speak as though energy isn't

a core concept in physics and biology. The brain is a signalling system that uses patterns of energy to do that. And of course, all the energy approaches I describe use forms of energy that can be meticulously documented with equations.

But the sense of New Age comes because energy is invisible and works over a distance. When scientists have wired up jazz guitarists on EEGs, and ask them to improvise with one another, at a certain point we see that their brainwaves synchronise. They say they're "in the groove." And there are studies now on mothers and babies, both wired to EEGs, and they synchronise with each other. So this language that we had in the '60s, "We're on the same wavelength," which seemed to be metaphoric, may be literally true.

So what does this mean? Norman! I know you're trying to stick to the science of it. Which is great. And of course that's why your work has had such a profound impact in the world, because you're coming from this incredibly rigorous, deeply immersed thinking from a practical mode. And it's not New Age. I know that emotionally people have responded to your work incredibly strongly with the hope that it has raised. But what does it mean to you? And what should it mean to all of us, what you've discovered?

There's a lot of potential here. You know, it's a revolution. Neuroplasticity is not just an area of research within neuroscience. It's a series of findings that requires a paradigm shift, a rethinking of the basics within neuroscience. And whenever there's a new paradigm it means that it has obstacles to face because most people have been trained in another earlier paradigm. This paradigm shift has already occurred in basic neuroscience, with very few holdouts. But it is only beginning to happen in the clinical disciplines affected. It's happening in parts of psychiatry but not others. It's happening a lot in psychology. It's happening in physiotherapy. It's also allowing us to discover that there were other techniques which we thought didn't make sense, like certain kinds of body work influencing the brain, that now do make sense. It's beginning to happen in terms of the developmental psychology of later life.

The conventional understanding of the brain was there's this tremendous growth period early on and you have these windows of plasticity where you can learn a language and do a lot of things. Then you hit your twenties and thereafter brain development is over and it's really a slow deterioration.

But now we know that the brain is neuroplastic from cradle to grave, which means that people have to rethink their own lives and the role of middle-aged development and late-age development.

So from all that you've learned about the brain, what does it tell you about how we should be living?

Well if you go back to the plastic paradox, if you keep doing the same thing over and over, those things get grooved in, and you will think your brain is more rigid than it is. It is a self-fulfilling prophecy.

Personally, once I realised that one can develop new kinds of circuitry at any point, I found reason to expose myself to many new experiences. Both mental and physical exercise triggers brain growth factors. So if there was one thing I had to say just to put your brain into a more plastic state—and I don't believe in one thing—but I'd say, "Start doing exercise. Just fast walking." Because we now know that fast walking triggers brain growth factors and it also triggers some new cells in the memory system of the brain. The reason for that is because when animals do a lot of fast walking, it's usually when they leave

their known territory because there are new predators around or they have run out of food. So they're going to a new territory which is unexplored, which means they're going to have to learn. So the learning and movement are connected in evolution.

Wow.

When we do lots of movement, the brain anticipates we're going to be doing a lot of learning. And so that triggers the growth factors and even some new cells to help us lay down memories.

It's so interesting. My eldest son learns by moving. He is bright, but in the school environment sitting down and having to face the front is almost agony for him. He likes to be moving when he is taking in information.

Yeah, there's a whole list of problems we get into when we normalise the idea of a highly sedentary school life. We probably did not evolve to sit for long hours doing abstract concepts. Some of us learn how to do it well, but we forget to factor in a number of things. We know also there are differences between boys and girls developmentally. Boys seem to require more rough and tumble play—they seem to seek it out more than girls in the course of their development—and they develop later cognitively.

There are also some children who are by nature highly playful. But playfulness is not equally distributed, and some people's high playfulness requires movement. Then there are children who have trouble sitting because they have psychological issues about aggression or trauma at home, and others have ADD and still others have low level learning disorders so they just can't take in certain subjects, and get restless. We've industrialised learning and seated people constantly. And it's hard to find a chronic disease that in some ways isn't made worse by a sedentary lifestyle. By the way, I don't know if you can see this but…

Oh wow. Yeah. What is that?

I'm actually on one of these treadmill desks right now.

Sitting is the new smoking.

It is as bad for you. So you can see that I'm walking but I'm not coming closer to the screen because I'm on a treadmill desk. And this is one of the ways I'm trying to deal with this problem. Just an experiment.

Yes, tell me, what is a day in the life of Norman Doidge? I want to know.

Well, these days I'm working on a novel, so in the morning I do that. But not on a treadmill desk, because that might activate the nervous system too much for the kind of novel I am writing. And then I might do email and speak to scientists, or clinicians. And when I'm doing that I might be on this treadmill desk. Then I see patients in the late afternoon and early evening.

When we last spoke you were talking about tai chi. Have you continued to do that?

Yep. I take tai chi classes twice a week. I'm trying to do it about five times a week. I also lift weights in machines just once a week, very intensively for half an hour. I think that's helpful. That and the walking to and from work. The tai chi is for flexibility and it's

my form of meditation, it's a moving meditation. I also do an elliptical. So those are four things. So there's a lot of movement trying to maintain overall health and brain health. And there's just a tremendous amount of reading.

I wanted to tell you, I've actually got this incredible book here. You need to note this because it's really amazing. Peggy Freydberg. She is a poet in the United States. Her poetry is remarkable. And I know you're a poet as well. She started writing poetry at 90.

Wow.

And she died at 107.

Interesting.

And what we're talking about, that idea that we can experience the limitless options for a life lived meaningfully, that's continually nourished and evolving. That's what I get out of your work at this point. And it's made me think a lot about open and closed minds. I think you are a prime example of a profoundly open mind. You used the word "agnostic," I would use the word "open." You're open to uncertainty, and you're able to hold and contain uncertainty while you continue to move forward.

In some ways the openness and an agnostic attitude can go together. One of the things that's been researched to death—in other words, very, very carefully examined—are the so called "big five." They're temperamental factors in human beings. They can be summarised as Ocean, O-C-E-A-N. O is for openness versus closedness. Open people are not rigid thinkers, but can think outside the box. And they can think very laterally. They don't get boxed in by all of their associations. And the closed person can't do that kind of lateral thinking. Then there's C, for conscientiousness versus impulsivity, then there's extroversion versus introversion, then there's agreeableness versus disagreeableness, and then there's neuroticism, which is high negative emotion, usually anxiety and depression, or absence of that.

And so these things seem to be related to temperament. But to some degree they can be cultivated as well. Let's take medicine. Once upon a time medicine seemed to welcome open-minded people. Like Chekhov, who became a writer, or Conan Doyle. Once upon a time, professional schools favoured people who had a good liberal education, before turning their attention to the professional school. Now, increasingly, professional schools and higher education institutions are not so much selecting for openness, they're selecting for conscientiousness, hard work, intelligence and CV cosmetics. But openness is usually a feature of innovators.

Now, there's a view out there that science is the thing that settles questions once and for all. We live in a relativistic age, where people say every opinion is merely based on values and those values are all relative, and one can never have any absolutes. People are taught to be cynical about the idea of capital "T" truth because it's relative. But that leaves a hunger in most people for something that will settle big questions about how to live. And it seems in our time that people have a handful of non-philosophical, common secular options to deal with that relativism and uncertainty that they fear is all there is. They can despair, and become nihilistic. Or they can become hedonistic and distract themselves from the abyss with pleasures and technology, and the virtual reality fantasy it creates. Or they can become ideological, and embrace a simple-minded, righteous approach that reduces all problems to a few issues, which often leads to a totalitarian mindset. Or they can turn to science, as a consumer, in the hopes it can settle things,

solve problems, end the uncertainty, and close the big questions.

But the great scientists and clinicians I've met don't avoid uncertainty. They are drawn to it. They love to open questions, not just close them.

How are you personally so open to questions? Were you always? And how do we cultivate openness?

I think that some of it's probably temperamental in me. I'm a strange combination of openness and hyper-conscientiousness. And the two of them don't always go together very well. So to some degree my problems with the existing view of the brain came about by taking it really seriously, in a very conscientious way, and then finding that it just broke down. Weirdly, my conscientiousness ultimately made me more open.

And the other thing is, my background was poetry, which involves lateral linguistic thinking, and helped me not get as trapped as I might have when thinking about science. I can smell a metaphor a mile away. So when people would use these metaphors and say the brain is a computer or machine, I tried to figure out, "What do they really mean by that?"

Oh my god, I'm seeing now that I'm super open and, like, not conscientious.

Well, conscientiousness is a burden too. You can get stuck on things. So if I saw an anomaly and it didn't fit, it really bothered me. And because I was working with patients whose futures were on the line, I took these anomalies very seriously. If I heard of someone who got better in a treatment that made no sense to me, I didn't roll my eyes, I tried to reverse engineer it, to figure out what might be happening in the brain.

The original problem is that I was treating a lot of people who were stuck in life. And I realised they were adults with undiagnosed learning disorders. And this was at a time where people didn't talk about adult learning disorders very much. And the treatments for them were compensations and we were told they were all wired in. And yet I knew from some of the lab experiments that the brain wasn't totally hard-wired. So I started to mix my clinical observations and what was going on with my patients with what I knew about in the lab.

I would say that is, like, so extraordinarily rare. To really care about whether what you said is true. That it is has been rigorously analysed, thought about, examined. You really live the examined life in every way.

Just enough to know that what I don't know exceeds what I think I know. But as a philosophy student, the philosopher I cared about most was Socrates, the source of the idea that the unexamined life is not worth living. When you're a serious philosophy student, you see that civilisations rise and fall based on certain assumptions. When I first got into medicine and I was given these machine-like models of the brain and the body, and it was clear that they applied more to some parts of the body than others. I mean, there are aspects of arms and legs that are like levers, and the heart's like a pump.

But it just seemed presumptive of me to assume, even if I had some questions about it, that these people who argued the brain is a kind of computing machine could be wrong before I had a number of years to master how these ideas were used.

Wow. So, growing up, we haven't talked about it much. But you obviously had quite a nourished home life growing up. I say "obviously," I've just made assumptions. But tell me about your family life.

Yeah. I had a very, very wonderful mother. She was a psychologist. But actually both of my parents died when I was reasonably young. My father was a Holocaust survivor, he was in Auschwitz for two years, and he was in concentration camps the entire war. Then he was killed in a freak elevator accident when I was 17 months old. So that was a terrible loss. And then my mother unfortunately when I was 20. By all accounts my father was an absolutely wonderful guy and a survivor in the most serious way. And my mother was a remarkable woman, very, very bright. Very nurturing. But as a young man I had to fend for myself to some degree.

I had a different experience than a lot of people growing up; it fostered some independence of mind. But you know, I talked about the big five. I'm actually not remotely contrarian. I don't admire disagreeableness in any way. And I am incapable of selling anything. If you told me that I had to sell table salt to people who didn't need salt, as an example from the Platonic dialogues, I couldn't do it. A good salesperson has to be able to sell anything. I can't. It just completely goes against the grain. But if I see that people are vulnerable and they might be helped by something, I will speak up about that, and that probably comes in part from my childhood.

It's so fascinating to me that you've talked about your early life as coming from tragedy and that adversity actually had an impact on how you framed your thinking, and how you walked in the world of course.

Well I think that's true. I think of what my father went through as a young man, and I think it enhanced my empathy— it certainly made me cherish my family life and be very grateful for it.

Your children are grown up now.

They are grown up. Yes, I have to remember that. Our daughter actually has three children. She trained as a lawyer, has remarkable people skills, and she's working for an NGO right now. And our son has got a gift in dealing with children, and he's in a clinical developmental psychology program right now.

You must be so proud. It's exquisite hearing everything you've been saying, and it's sort of blowing all of my synapses out. I've heard these ideas before but to think of living open-ended questions as the way of moving through the world in a state of permanent glorious uncertainty, as you were saying before, that's really hard. Because I think anxiety definitely drives the need for certainty and for there to be walls around the world and who we are. And that's what God does of course—religion—it creates certainties for so much anxiety.

It does. But there's another view of God which is that God is a placeholder for the idea that there's just far more in the universe than we as individuals understand right now. It's almost like an acknowledgement of that.

That's nice. I like that!

That's not the only way to think about God, but it can be thought of as a reminder that

there’s something much bigger out there. And you cannot understand everything. You know, we have such big plans for ourselves. We want to rival the gods in the heavens like the builders of Babel. But we just don’t know enough to bring it all off. This concept of God reminds us to be wary of our arrogance. Now of course there are many other ways the word “God” is used, I’m just talking about one way.

We’re going to have to do a whole series Norman. The “Norman Dumbo Feather Interview Series.” The next instalment is going to be spirituality. We have to do it [laughs].

Okay! I’m not sure that I’m spiritually mature enough to do that, but I would welcome any guidance in that direction.