MIKKEL HOFSTEE

PRIMAL HUMAN 2.1

HOW YOUR ANCESTRAL GENES AFFECT YOUR BEHAVIOUR TODAY

Uitgeverij Lucht

First English edition, July 2019
Second English edition, February 2021

Graphic design: Sander Pinkse Boekproductie
Photo Jane Goodall: Paul Bellaart
Photo author: Robert Verhoeve

ISBN 978 94 92798 88 6

Table of contents

INTERVIEW

Dr. Jane Goodall Ph.D, D.B.E.

Founder of the Jane Goodall Institute & UN Messenger of Peace

There are few women whose lives are portrayed by her name. 'Jane'. The purity and strength of this name depicts the lady I am interviewing on a summer evening, sixty years after she left as a 26-year-old for the Gombe forest in Tanzania to study wild chimpanzees. Jane Goodall became famous worldwide after discovering that chimpanzees used tools to 'fish' for termites. Her discovery was presented as the 'missing link' between man and primates. Her mentor, famous palaeontologist Dr. Louis Leakey, the man who sent Jane to Tanzania, even spoke of 'redefining man'. Jane Goodall left her research in Tanzania in 1986, after attending a conference in Chicago where she learned how much chimpanzee habitat was vanishing and that if we did not change the way we treated the chimpanzees' environment, we would not be able to save them. At that moment, she began her ongoing travels to share her message and to educate and motivate people to take better care of the environment we share with so many species. The Jane Goodall Institute (JGI) works in several chimpanzee range countries in Africa and empowers the local community to become JGI partners in conservation. They fund programmes including two sanctuaries for orphaned chimpanzees, the ongoing research at Gombe in Tanzania, Roots & Shoots and TACARE.

I met this persistent lady through the Jane Goodall Institute in 2019 and was immediately touched by her spirit. In 2020, I was planning to organise a fundraiser for her institute but that got cancelled as a result of the COVID-19 crisis. But I did get the opportunity to interview Jane via Zoom. The interview can be found at www.oermens2.nl/interview. My enthusiasm and respect for her are evident, looking like a little boy meeting his long-time idol. Do forgive me. But the interview is incredibly special and I learned a lot from Jane. Please find a transcript of the interview below:

'A few minutes after 7.30 p.m. my screen lights up and the name Jane Goodall appears. A petite woman with clear, open eyes and long silver hair sleeked back in a ponytail looks at me from her study. Two pictures of chimpanzees behind her, as if they were close family. When I ask her how she is doing, she tells me that she has had a busy day. I apologise and mumble that I hope I am the last obligation of the day, but she replies that she has another interview at 9 p.m. It exemplifies the life she lives. This remarkable woman who has devoted her life to making sure mankind and animals live with respect for each other. The good news coming out of the COVID-19 crisis according to Jane, is the fact that modern technology has enabled her to reach hundreds of thousands more people than through her usual lecture tours. It immediately strikes me how resilient she is and how quickly Jane has embraced new opportunities.

'It was like I was following an ordained path'

Jane answers my first question, referring to the film *Jane* which I saw on Netflix, about whether she was either naive or courageous, when going to Tanzania aged 26.

'I don't think it was either. From the age of 10, I had wanted to go to Africa, live with wild animals and write books about them. So, it was as if I was following an ordained path. I don't think I was naive, I had read as much as I possibly could. Was it brave? It wasn't brave, because it felt that that was what I was meant to be doing. I was amazingly lucky it worked out, people told me that I couldn't do it, I didn't have the right educational background, but the opportunity came and I saved up the money by being a waitress in Bournemouth and living at home, as my short-lived typing career in London didn't pay enough.'

'The curiosity, asking questions, finding things out by yourself, making mistakes, not giving up and learning to be patient'

In our conversation it becomes clear how wonderfully supportive her mother has always been. She told Jane that if she really wanted to do this, she had to work hard and cling to every opportunity and then if she didn't give up, she would find a way. The first time Jane went to Africa (Kenya), was when she was 23 and it was then that she met Dr. Leakey. Looking back, she finds it quite remarkable that her mother let her go. The freedom she felt and the confidence her mother gave her, shaped Jane's character. And she tells me it is the same with chimps—the ones that have good relationships with their mothers and feel supported, are the most likely to be successful in their adult lives.

I ask Jane about her monumental patience, something that is rare in this fast-moving modern world, where everything has to be quick and efficient. In the film you see Jane studying the chimps day in, day out, for hours at an end. She tells me that

1

Our incredible body

Why we are the CEO of our own bodies, how we have a mega computer at our disposal, why we have addictive hormones, why we like to cuddle and touch, why we are always hungry—with a default preference for the sweet, the salty and the fat, why we dislike change and why it's perfectly fine to hold onto our child-like traits.

You can skip this chapter. Perhaps this isn't the best opening line, but it actually increases the chance that you are going to read this text. That's just how we work: as a species, we're naturally curious. If you tell us that we're not allowed to do something, we at least want to know what it is we're not allowed to do.

Curiosity was an important survival mechanism in our history. It provided our species with discoveries, and helped us learn about danger and how we could adapt to it.

Genetically speaking, we're still close to the human from over a hundred thousand years ago. It's a good thing to check and see what's under that thin layer of varnish from a few thousand years of civilisation. We're all successful mutants: products of evolutionary processes.

Our DNA has adapted itself successfully, for millions of years,

from generation upon generation. That's why it's useful to look at how we evolved and to really examine the functions of those adaptations. This chapter is about you and your body: your DNA, your hormones, and your brains. I'll limit myself to the 'parts' that influence your behaviour, without trying to include everything. If you want to know how you're being tempted into unhealthy behaviour every day, it's useful to have some basic knowledge of your body. What you want to avoid is that feeling you sometimes get when you take your car in for repairs: that the garage owner could tell you anything and you wouldn't know whether it was true or not.

SUCCESSFUL MUTANTS

I must confess I am a fan of *Star Wars*—the multitude of strange beings is wonderfully portrayed in George Lucas' films. It turns out that fantasy films containing other intelligent beings that can also speak are popular.
On Earth, we're the only successful human mutants. But it takes hundreds of generations before a successful mutation or genetic variation has finished evolving. Only the reproductive cells pass on hereditary properties, which can contain characteristics that determine not only variation, such as your eye and hair colour and shape of your nose, but also genetic properties. The genetic properties that are passed down are there first and foremost to increase the chances of reproduction and not specifically to keep us healthy. Health is a prerequisite for successful reproduction: since healthy humans were more successful with reproduction, the healthy genes of those humans have been passed down through evolution and we are their descendants. Natural selection.

The most complex factory in the world

Our bodies consist of about 40 trillion cells, about 160 billion of which are brain cells—an incredibly large amount. All these cells are tiny machines where chemical processes are continuously taking place. When you look at videos of them, you'll see that it truly looks like a real factory: something is constantly added to, produced, and carried off in each cell. Look for *The Inner Life of the Cell* on YouTube and you'll see an incredible animation by Harvard University about the activities within a cell. You'll be amazed! Watching this, you could say that there are all sorts of self-directing teams with a lot of connection and communication between them. We're always astonished by ants and how all those little creatures work together and communicate—but that pales in comparison with the operation of our cells.

How those cells work depends on our DNA, our genetic code. Our DNA consists of about 25,000 genes that are responsible for all sorts of functions in our bodies. Biomedical doctor Mark van Mil expertly explains exactly what DNA is in his videos for the Universiteit van Nederland (search for 'Mark van Mil and DNA' on YouTube). He compares our DNA to a music roll in a barrel organ: the holes in the paper create a certain melody. This is also how our DNA (our body's music roll) works. The genes in our DNA have a certain code—the holes in the music roll—and these are read by the cell they're located in, as it were. This way, they control the production processes within the cells in order to produce certain proteins which, in turn, lead to characteristics or behaviour.

This is how our DNA gives orders to our cells: for them to make muscles contract, convert oxygen, or burn glucose. But also, in an earlier stage, what type of cell they should become: a brain cell, blood cell, or lung cell. But beware: the type of 'barrel organ' and the speed with which the music roll is being passed through it will determine how the music sounds. It sort of works the same way with us humans.

ALL IN THE FAMILY

Our DNA deviates only a mere 0.1% from other human beings, and as little as 2 to 3% from that of our primate kin, the chimpanzees. Apparently, this slight deviation is enough to create numerous differences between us humans, as well as between us and other closely related creatures. This knowledge indicates there is only one human race and not several, as has been claimed in so many wars. That makes us unique, because animals have all sorts of subspecies, as is the case with for instance apes and dogs. And the fact that we're 99.9% the same also seems to indicate that we could all be traced back to about 600 original ancestral mothers: we're all related to some degree.

The most impressive computer in the world

Neuropsychiatrist Theo Compernolle illustrated it best, in my opinion, in his book *BrainChains* (2014), exactly how astounding our brain is. He calls the world wide web 'peanuts' in comparison to our brain. Our brain has about 80 billion neurons (nerve cells) that all work like tiny computers and send chemical signals to other cells through neurotransmitters, the messengers of these signals. At the same time, the nerve cell also receives all sorts of information. In addition, neurotransmitters can activate all sorts of hormones, which I'll expand on later.

Apart from nerve cells, we also have around 80 billion glial cells in our brain which assist in cleaning it, something that's especially important while we're asleep. Scientists also believe glial cells play an important role in transferring information.

Those 160 billion brain cells all have between roughly 1000 and (over) 200,000 connections. This leads to a network of 80 trillion (80,000,000,000,000) 'continuously changing connections', as Compernolle describes it. He also indicates that, 'if we were to build a real-life model of our brains as a computer, it would be as big as the largest airplane hangar, weigh 40,000 tonnes, and would use the electricity of three to four nuclear plants. This computer force in humans only weighs 1.5 kilos and uses 30 watts.' This comparison touches me deeply because we often treat our brain so carelessly, and think it's normal that everything just works the way it does.

Let's look at how this amazing brain has developed, and how it has adapted over time.

From reptilian brain to a brain with a cockpit

Approximately 200,000 years ago, we emerged as human beings (*Homo sapiens*) from the *Homo habilis* (2 million years old), the 'handy man', a reference to the fact that this species of hominin was able to use tools. Also see our 'family tree' on page 11.

We were more successful than the Neanderthals, who became extinct. Nonetheless, the Neanderthal had a slightly larger brain than we do (1,500–1,600 cc vs. 1,400 cc). So, it seems like a larger brain isn't necessarily a smarter brain, which we already know from looking at animals (an elephant has a brain volume of 5 kilos). Although more intelligent is naturally a definition used by us, human beings, it seems that it is especially the structure of our brains that has led us to become the dominant species on this planet at this moment in time. I am saying 'at this moment' on purpose, because compared to the origin of the Earth (around 4.5 billion years ago), as a species we're still only just a mayfly.

Despite this comparison: we now act like the rulers on Earth, and that is thanks to how our brain is structured. Our brain is made up of three layers that show a direct link to our development as human beings. I'm following an old theory here from 1949, from the American neuroscientist Paul MacLean, because his theory about the structure of the brain includes the link with emotions. For this book that seemed fine to me, but other scientists sometimes use other terms.

MacLean poses that our brain consists of three layers. The first layer, the layer that is located most deeply in our skull, he calls the reptilian brain. This brain lives in the here and now and is a reactive brain—it reacts strongly to sensory stimuli: what you see, hear, smell, taste, and touch. This 'brainstem' takes care of several basal functions such as sleeping and breathing, but there are also basal emotions surrounding pain and pleasure; it dates back about 500 million years.

On top of the reptile brain is the old mammalian brain, or the limbic system, which is hard to date. In this mammalian brain, there are several brain structures and brain centres (hypothalamus, amygdala, hippocampus) which process emotions and are also home to social emotions such as love and attachment. Through evolution, we then developed the third layer, called the neocortex. The neocortex is active in cognitive functions such as languages, taking decisions, suppressing impulses, strategic thinking, and cooperating with others. This part of our brain allows us to assess complex situations and also to think about the future.

In comparison to other animal species, we have the largest neocortex. Ours also needs a lot more time in order to reach maturity. The grey brain cells ('grey matter') are mostly produced between 4 and 12 years of age. The 'white matter', which is in charge of the connections between brain cells, doesn't reach maturity until after puberty.

Our brain has and retains more plasticity than that of other species: even as we get older, new connections can be created. Our prefrontal cortex—the front part of the neocortex—is relatively large. It could be described as the control mechanism of our brain, because it has all sorts of connections to the rest of our brain. The prefrontal cortex has a very important filtering function: it decides which information we store, what we pay attention to, and how we deal with emotions and take decisions.

When we get tired, the filtering function gets impaired. In a way, we drop down lower into our brain: the prefrontal cortex can no longer hit the brakes and our mammalian brain and emotions take over. Those are the moments when we often take 'irrational' decisions: we end up buying something after all, eat the ice cream we were trying to avoid, and get into arguments more easily. The filtering function works like a muscle: when it's tired, it gives in more easily. Imagine that a special offer comes along right at that moment. You won't be able to resist it, especially if you have been turning down all sorts of other special offers all day.

So, as humans, we possess a complex cell factory and a very complex computer for a brain. Apart from that, there is an array of regulating mechanisms which have helped us survive. Let's start with our hormones.

Driven by hormones

Our brain cells activate hormones in our organs through neurotransmitters. Hormones are substances that are created in different parts of the body, including our brain, kidneys and reproductive organs. Hormones have a big influence on our behaviour because basically they put organs and tissues to work. About a hundred different types of human hormones have been identified. Let's examine a few that have been important in the light of evolution.

First of all, our reproductive hormones: testosterone and oestrogen. Both men and women produce these hormones, but men have higher levels of testosterone and women higher levels of oestrogen. These hormones are responsible for the development of our typically masculine versus feminine characteristics. Men with higher testosterone levels have more masculine facial features, as well as a more masculine body type and take more risks than men with lower testosterone levels.

Oestrogen plays an important role in the development of female characteristics, as well as secondary sex characteristics and fertility in women. The oestrogen level increases during puber-

ty and reaches its highest point during ovulation. Somewhere between 25 and 30 years of age, oestrogen levels start to drop in women (and men!), which for women will eventually lead to menopause.

High testosterone and oestrogen levels also increase the desire for sex, as we'll see in the next chapter.

Fear hormones

Once we have reproduced, it is kind of a good idea to stay alive too. Our body has also found a solution for that: hormones that allow us to recognise danger. The hormones cortisol and adrenaline are released in situations of fear and stress.

Adrenaline provides an adequate fight or flight response. In order to calm the body down again—seeing as the stress response leads to a loss of energy—the body also produces the hormone known as cortisol. Cortisol is often described as 'the ultimate fear hormone'.

In chapter four, we'll elaborate on this, but without the production of adrenaline and cortisol (activated by our brain!), we would have become extinct as a species a long time ago. Cortisol is produced throughout the day, and the amount will depend greatly not only on the situation, but also on the time of day. To this end, your cortisol levels are higher when you wake up, play their part in your appetite in the morning, and ensure that you get up to work through the tasks of the day.

Enjoying a warm hug

The hormone oxytocin is also known as 'the hugging hormone'. It's released through contact with others and plays an important role in social relationships: parent-child relationships, love, sex and friendship. This hormone contributes to feelings of trust and connection. It's important for children's development. You've probably heard the story of the nurse that touched babies in the intensive care unit, despite being told not to do so, for fear of contaminating them with an infection; it was precisely the babies that received this extra attention that had an increased chance of survival.

This hormone reduces stress, makes you less prone to addictions, makes you more creative, and strengthens your immune system. You can feel it too. A good example is the YouTube video about free hugs (search for free hugs campaign). A depressed man who had just lost his job as well as his girlfriend, goes out on the streets holding a sign that says free hugs. Finally, after a slow start, it becomes a raging success and he gives away hugs to thousands of complete strangers.

The question is, are we, in our current society, producing as much oxytocin during virtual contact as we do with real contact? It has been shown that we do produce oxytocin with internet friendships and virtual interactions, but whether it is just as powerful as with real contact remains unclear. Oxytocin also plays a role in trust. That's why in the working environment it is sensible to keep having meetings in person and be able to look each other in the eyes.

INFLUENCED BY THE WORKING ENVIRONMENT

With my company, Lifeguard, we have now supported tens of thousands of employees in achieving a dynamic life. It is clear that the working environment has an influence on the health of employees. One of the most striking things—which truly affects people—is that we're making less and less 'real' contact in the workplace. We superficially shake each other's hand (in Japan they bow) and we send each other emails, even if we're sitting next to one another. During meetings, half of the attendants are glued to their smartphones and we often have lunch at our desks. It almost seems like you're not allowed to make real contact