

THE REALITY CHECK



DR HEIDI HAAVIK

**A quest to understand Chiropractic
from the inside out**

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To Steffen, Sofie and Glenn, with all my love.



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A special thank you to my personal support team, in particular my best friend and fellow chiropractor, Popsy (Erina Olsen), for the countless hours on the phone and for your amazing chiropractic care over the years. And a huge thank you to the rest of my life support team including Joe Blair, Ngaio Merrick, Stephanie Salvador, John O'Malley, Karen Creagh, Denise Page, my Tai Chi buddies Anna Mannion, Margaret Cummins, Kuini Wakarua, uncle Andrew, aunt Carina, my three awesome kiwi cousins Daniel, Annica and Stefan and the sunshine of my daily life, my dogs Ginny and Ronny. A special mention

also needs to go to those I have lost since this book first went to print. In particular my 93 year old Gran, Nola Calder who up until she passed walked her dog every day. She always put that down to a lifetime of chiropractic care from her father, son, daughter-in-law, granddaughter, and various others. Also I miss my beautiful black Lab Mr Darcy, who was my loving, loyal companion for seven years.

Finally, thank you to my Norwegian family (all of you!) and especially my parents, Kjell and Sally Haavik Nilsen, my brothers Anders and David, my niece Isabell, nephews Eric, Leo, Julian, their mothers, the gorgeous Maia and Veronica, my uncle Helge, my aunt Susanne and my little 'sisters' veslemor Alida and Josefine, you are my true North.

About the Author



Heidi Haavik was born in New Zealand but grew up in Norway. She is a chiropractor and a neuroscientist who has researched in the area of human neurophysiology for the past 15 years. She has used sophisticated brain science techniques to investigate the effects of chiropractic adjustments of vertebral subluxations on various aspects of brain function.

Dr Haavik graduated from the New Zealand College of Chiropractic in Auckland in 1999, and was awarded her PhD degree by the University of Auckland in 2008. She is the Director of Research at the New Zealand College of Chiropractic where she runs the Centre for Chiropractic Research. Dr Haavik is also an Adjunct Professor at the University of Ontario Institute of Technology in Oshawa, Canada, and is a member

of the World Federation of Chiropractic's Research Council. Dr Haavik has received numerous research awards and was awarded Chiropractor of the year in 2007.

She lives in Auckland, New Zealand, with her two children Steffen and Sofie, her fiancé Glenn Arthur, and their dogs.

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Forewords

We are fortunate to be living in a time of easy access to information - that from the ancients as well as from contemporary life. Yet many of us feel like the volume of information is overwhelming. It is like we are trying to drink from a fire hose!

The information is plentiful but a context with which to interpret the information and a guide to understanding the information are often lacking. For anyone hoping to understand more about how his or her body works, and an approach to putting that knowledge to work in a meaningful way for a happier, healthier life, *The Reality Check* is a remarkably powerful contribution to this quest. The power of *The Reality Check* is the product of the cutting-edge information presented, the ease and thoroughness with which it is explained and the usefulness of the insights offered. You will complete *The Reality Check* with a greater appreciation of the magnificence of the human body and your inborn, innate capacity to heal.

Heidi Haavik, D.C., Ph.D. walks us through some basic anatomy and physiology on the way to grasping some of the most current and empowering research on human neurophysiology. In the process she opens our thinking to a deeper understanding of the incredible master coordination and control system in our bodies, the nervous system. She goes

on to detail how the activities of our lives informs the nervous system and causes it to adjust to our every movement and thought. All this is accomplished to help persons, not trained in the human sciences, to understand data that is technical but not too technical and importantly is not dumbed-down. Dr. Haavik demonstrates the skill of a superb teacher and a compassionate guide.

Dr. Haavik brings her background as a practicing chiropractor and as a prolific researcher in neuroscience to help us learn more about how we work, about the remarkable design and control of the human body, and how chiropractic care plays a role far beyond simple biomechanics to influence and reshape the workings of our brain. When we start to grasp the significance of Heidi's research and the implications it holds to allow us to make our lives better, *The Reality Check* has hit home. As you proceed page by page through *The Reality Check* you will find a blend of hard science and compassionate humanism. Pleasantly neither is offered at the expense of the other. Dr. Haavik gracefully discusses health care matters of a practical and pragmatic nature while upholding her passionate commitment to rigorous scientific inquiry and application.

I am a chiropractor. As a youngster I experienced a profound recovery under the care of a chiropractor from a problem with my eyesight (I was declared legally blind and entitled to vocational rehabilitation) that every textbook of the time said could not be. Now over 45 years down the road in my

career, through the work of researchers like Dr. Haavik and her exquisite explanations, I better understand what may have occurred, neurologically speaking, as I received those chiropractic adjustments as a young boy. Through The Reality Check I understand my recovery, my profession and the critical contribution to healing and health that chiropractic care gives us. My hope and prayer, and I think I can speak for Dr. Haavik on this point as well, is that you leave this read with a better understanding of what you can do to maximize your well-being and know who you can call upon to assist you on that journey.

Be well.

Gerard W. Clum, D.C., FICA

President Emeritus,

Life Chiropractic College West, Hayward, California, USA

Director, The Octagon, Life University, Marietta, Georgia, USA

I would like to congratulate Dr Heidi Haavik for her excellent book 'The Reality Check'. It was a great pleasure to read, and in fact, I read the entire book in a matter of a few hours! I must say that Heidi has really hit the nail on the head in describing the processes of how chiropractic care may impact the nervous system, the possible benefits of this health care practice, scientific data supporting these benefits, and also the cautions to be taken. Well done indeed.

In reading this book I am sure that anyone wondering about these 'spinal doctors' will better understand what chiropractic has to offer them, so that they can greatly benefit. I am sure this understanding will come as a surprise to many, as indeed it was to me.

I first met Heidi several years ago at a neuroscience conference through mutual friends. She has a refreshing energy and I quickly discovered we share a curious fascination for understanding how the nervous system truly works. We met again at several other neuroscience conferences and our conversations led to us to collaborate in conducting research experiments involving chiropractic adjustments, both in her research laboratory in New Zealand and in mine in Turkey.

I must say that it has been a great pleasure working with Heidi and her team, investigating the possible effects of chiropractic care on muscle and reflex function. It was amazing to discover first hand that one session of chiropractic care alone generated

so much change in the brain, and especially on the strength of subjects' leg muscles.

Based on my more than 30 years of experience in this field of neurophysiology, I believe Heidi is quite correct in the information she has presented about what is currently known about the workings of the human nervous system, and that the theories and model she has put forward as a hypothesis for explaining the benefits of chiropractic care, is based on sound thinking and research.

I look forward to continuing the collaborative research with Heidi and her team, so that we can together in greater detail pin down the mechanisms underlying chiropractic care.

Kemal S. Türker, BDS, PhD

Professor of Physiology
Koç University School of Medicine
Istanbul, Turkey

Dr Heidi Haavik is a bright light in chiropractic neuroscience research. As a committed practitioner and researcher she helps the profession and patients understand some of the mechanisms that occur with chiropractic care. Her dedication to serious science in the quest for understanding, has advanced chiropractic research more in the past 5 years, then the past 25 years in chiropractic. This book offers a glimpse into neuroscience and the benefits of the chiropractic adjustment.

She is to be applauded and supported.

Dr Brian Kelly

President, Life Chiropractic College West, California

This book will forever transform our understanding of how chiropractic works.

Phil McMaster

DC, President of the New Zealand College of Chiropractic

Preface

“Imagination is even more important than knowledge. For while knowledge defines all we currently know and understand, imagination points to all we might yet discover and create.”

Albert Einstein

Chiropractic is a hard nut to crack. It has developed a thick shell from years of defending itself. But look beyond the politics of health care, and you will discover that chiropractic is full of goodness and love for humanity. It holds within it the potential to dramatically improve people’s health and wellbeing, if only it is allowed the conditions to grow...

Labelled an alternative health care option by many, or even ‘pseudo-science’ by some, chiropractic often exists on the fringe of health care. It is little understood, frequently criticised, and continues to survive by virtue of the overwhelmingly positive results chiropractic patients experience first-hand all over the world. But let’s face it, chiropractors are a little bit weird. I can say that since I am one of them. Chiropractors tend to be the black sheep, the fish swimming against the current. If you know one, you probably know what I mean. They tend to be

opinionated, questioning, and unconventional. Over the course of my career I have had the opportunity to meet hundreds, if not thousands, of chiropractors. And, although I'm sure we have the odd rotten egg in our profession, as with all professions, most chiropractors I have met seem to share my genuine desire to make this world a better place; to help people live fuller, healthier, more satisfying lives. It is why we do what we do, and why we have persisted through some very tough times.

Since 2000 I have had the amazing privilege of working in the field of human neuroscience, specifically exploring the frontier of how the brain processes all the sensory information it receives, integrates this information, and then responds to it. My greatest passion and interest has been (and still is) to understand how the natural healing modality of chiropractic care impacts the function of the brain and nervous system, alters its processing, and ultimately improves or 'tunes' the way our brain controls our daily function. In this book my aim is to share with you what I, and other researchers, have discovered in this area, so that you too can appreciate the immense benefits of chiropractic care.

This book is my gift to you. It is an invitation to look under the bonnet of chiropractic, to understand why and how it works, and to explore how you can function at a higher, more interconnected level than you may ever have thought possible. This book is for those of you who have not yet tried chiropractic care, but who want to experience improved health

and wellbeing, and are looking for solutions. It is for those of you who may have tried it for a short time, but did not fully understand the benefits, or were perhaps discouraged by someone to continue, so that you can take a closer look at what this health care practice has to offer.

And this book is of course for all of you who, like me, do use chiropractic care on an ongoing basis, and would like to better understand the amazing changes you can feel in your body when a chiropractor adjusts your spine.

Dr Heidi Haavik

THE REALITY CHECK

Reality check

n - an occasion or opportunity to consider a matter realistically or honestly

Introduction

A Personal Quest to Understand Chiropractic

To say that the chiropractic profession has had a turbulent history is an understatement. Perhaps it was for the best that I knew nothing of this when I entered the profession. As a fresh-faced chiropractic student, I was totally naive to the historical and ongoing political battles fought between my profession and other health care professions. Nor did I have a clue about the demanding course of study I was about to undertake, or the foreign world of chiropractic language, identity, and professional scope of practice.

All I knew then was that the chiropractic care I received as a young adult was transformative to my wellbeing, and that something about this profession felt ‘right’ for me. The care I received was not what I expected. In particular, I was surprised by the breadth of the approach to health and wellbeing the chiropractor took. My chiropractor would adjust my spine, discuss problem areas and give me exercises, talk about other possible options that would be appropriate for me, and discuss how best to prevent future problems from occurring. This chiropractor took a holistic view of what was going on for me that I really enjoyed and benefitted from.

My motivation to study chiropractic was also helped along by knowing that my great-grandfather, William Charlsworth Lawson, had been one of the first thousand chiropractors ever to have graduated from the first chiropractic college, Palmer College of Chiropractic, in the United States in the early 1920s. He practiced in Wellington, the capital of New Zealand, and my Gran loved to tell stories about growing up with such an ‘odd ball’ father.

So I stepped into the rabbit hole, or so it felt at the time, and what I discovered is that becoming a chiropractor is by no means a walk in the park. Years of academic study, endless hours of technique practice, and a very demanding two-year practical internship lead to a fulfilling vocation, but one that is often marginalised within the health care system. To become a chiropractor is to step away from the acceptance and comfort of mainstream medicine, and to step into the firing line with the knowledge that if you don’t, and others don’t, the world will be worse off.

Luckily, being a misfit was not unfamiliar to me. Growing up in Norway in a little village called Vikersund in the 80s and early 90s, I learned one thing very well, and that was not to stand out. Not to stick my head out above the crowd or to veer off the safe, conventional path. It has taken me most of my adult life to realise that I was doomed to fail at this from the very start. You see, my mother is a dental nurse from New Zealand, she spoke English and did not cook traditional Norwegian dishes. My

father is a medical doctor, with three medical specialties (when in Norway you are only supposed to have one) and was the lead medical doctor in the family owned business, Vikersund Kurbad, Norway's largest rehabilitation centre (established by my other great-grandfather, Hans Haavik).

I therefore spoke a second language better than my English school teachers, ate 'strange' food, and came from an influential family of over-achievers. I was self-conscious of these differences and tried my best to fit in... failing miserably.

I realise now the incredible power that cultural norms have on a person, and on society. They can hold us back from reaching our potential. Yet, our individuality and our life's purpose or mission remains inside us, waiting patiently until we are willing to listen. I knew something was up when I came to New Zealand as a 20 year old. I felt it in my whole body that I was here for a reason.

So as I set out on my path to become a chiropractor, and encountered first-hand the waves of resistance and criticism directed toward my profession, I was on familiar ground. I was able to accept and live with the discomfort of not fitting in, and simply channel my time and energy into improving my practice and understanding of chiropractic. And I have continued on this course throughout my career; taking criticism, debate, and questions into consideration as part of critical thinking, but not losing sight of what is important. It is for you, the receivers of

our care, that I dedicate my time and attention. It is you who makes it worthwhile.

I know the chiropractic profession holds within it an incredible understanding about the importance of good spinal function for your wellbeing and overall health. They should in my opinion be the first port of call for anyone with spinal problems, even seemingly minor problems. In several countries around the world this has been recognised, and chiropractors are integrating into the health care system, to the benefit of you, the public.

I have chosen a vocational path that is not so much ‘hands on’ⁱ as we call it in the chiropractic profession. Instead I have chosen to dedicate my working life to research; to pushing the boundaries of accepted scientific understanding in a quest to enable greater awareness and enlightenment for all those intelligent, open minded people who are willing to think for themselves, and who want the best out of life. Through building greater understanding of the practice and science of chiropractic, I hope to make it easier for you to access chiropractic care. And I hope to provide greater insight into what happens in your brain and body when you do receive chiropractic care.

I am a graduate of the New Zealand College of Chiropractic,

i With ‘hands on’ we in the chiropractic profession mean ‘checking and adjusting patients’ dysfunctional spinal segments’ (i.e. literally with our hands on the patient).

located in the beautiful city of Auckland. I graduated in 1999. My class was the second class to ever graduate from the New Zealand College. Back in those days we were also required to do a Bachelor of Science in physiology or psychology at the University of Auckland as a part of our chiropractic education. I thoroughly enjoyed learning. I did not like the anxiety of exams but I loved listening to the passionate excited lecturers we had. We were very fortunate to have exceptional lecturers who had travelled from all around the world to teach at this enlightened chiropractic college in New Zealand. And there were also many University of Auckland lecturers that had a phenomenal ability to teach, to inspire, and to open my mind to all sorts of new opportunities and possibilities.

Because of this, and due to the encouragement of one of my chiropractic lecturers, I continued studying science, even after I had become a fully qualified chiropractor. So, while seeing patients at my first chiropractic clinic, and with a baby son in tow, I began a Post Graduate Diploma in Science.

Being a perfectionist and loving the process of learning, I maintained a very geeky grade point average and was accepted straight into a PhD programme. I was also awarded a prestigious Top Achievers Doctoral Scholarship from the Tertiary Education Commission of the New Zealand Government. Relative to the average earnings of practicing chiropractors this scholarship was not a lot of money, but it was enough to justify me doing this study. Between the scholarship and the ten hours a week

I practiced, it was enough to pay our bills and survive. What I did not realise then was that I had begun a journey that would take over just about every aspect of my life.

Science holds a great power which I have the utmost respect for. Properly designed, properly executed, accurately and appropriately analysed experimental data can reveal groundbreaking new discoveries about the world we live in. This to me is incredibly exciting. More often than not, scientific experiments lead to more questions than you started with. That is also part of the fun of it. I was captivated by its lure very early on, and this lure has now grown into a great passion.

With this book I want to take a moment to reality-check what the essence of chiropractic is all about. I want to take this opportunity to look at chiropractic through the eyes of a neuroscientist, grounded in the critical thinking of science, and with insights referenced from rigorously conducted studies.

In this book, I have to the best of my ability, presented a fair and reasoned picture of what I believe to be the mechanisms of chiropractic care, specifically in relation to what happens when a chiropractor adjusts dysfunctional spinal segments.

Most chiropractors do far more than check and adjust the spine. Chiropractors are focussed on all aspects of spinal care, including advice on different treatment options, exercises and education about optimal spinal care that you can do at

home. They take into account risk factors for future problems to help you prevent dysfunction from developing in the first place. However, the focus of this book is one core aspect of chiropractic care only. This book’s focus is about what happens in your brain when a chiropractor adjusts your spine. This has been the focus of my research for over a decade. This book is therefore based on my knowledge and insights from 15 years of chiropractic practice, and 15 years of work as a neuroscientist.



Video 1: [Click here to watch “The Beginners Guide”](#)

1 - The Vertebral Subluxation

“The ultimate measure of a man is not where he stands in moments of comfort and convenience, but where he stands at times of challenge and controversy.”

Martin Luther King, Jr.

You may well be wondering what a ‘vertebral subluxation’ is... and why on earth you’re being subjected to this weird terminology in chapter one. And fair enough, as this term could certainly do with a re-brand, or for that matter, a simpler, more straight-forward meaning. The thing is that in many parts of the world, this is the term that chiropractors use to describe the areas of the spine that they adjust. You could say that it is the problem we are looking to correct.

What chiropractors mean by the term vertebral subluxation is a dysfunctional area in the spine that negatively affects health and wellbeing, due to its influence on the nervous system. One key focus of chiropractic care is to detect and correct vertebral subluxations, in order to restore the healthy function of the spine and nervous system. This in turn enables the body to function at its optimal potential. I will to the best of my ability try to explain how this works in this book.

But, as important as this concept is for many chiropractors, I don't think there is any other term that has caused more controversy, debate, or heated discussions within and outside the chiropractic profession than the vertebral subluxation.

The term vertebral subluxation was used by early chiropractors because these dysfunctional areas felt "out of place" and "stuck" when they were palpated. It was therefore described as a subluxation, which actually means a "partial dislocation" or the old fashioned concept of a "bone out of place". With modern science, we now know that the bone is not partially dislocated. We know that a better explanation is that some of the small muscles that attach to individual vertebrae have become tight due to a variety of causes including injury, postural stress and overuse. The tight muscles twist the vertebrae so that certain parts of the vertebrae are more prominent and palpate as "misaligned" or "stuck". They are usually tender to the touch, and often cause pain when the person moves in certain directions, although they don't always experience pain at rest. Some chiropractors prefer to use other terms such as joint dysfunction or joint restriction to describe this entity. However, I will use the original term "vertebral subluxation" in this book, and I will cover this topic in greater detail later on.

I have spent much of my working life investigating and adding to the base of scientific research on this subject. Over the past decade and a half my research group has conducted

a variety of experiments that have significantly contributed to our understanding of the changes that occur in the brain when chiropractors adjust the spine ¹. Chiropractors describe the way that they correct vertebral subluxations as ‘spinal adjustments’. It is important to note however that in some countries and often in the research literature, the term spinal manipulation is commonly used to describe one type of spinal adjustment.

Within this book I will explain many of the studies that we have performed. And you will notice that I have also included the references for you. I have tried to keep the references as unobtrusive as possible, but they are there for you in case you want to follow up on anything I have written. The references are also there for you so that this book, and all of my claims within it, are fully open to scrutiny or formal evaluation.

For now, what you need to know is that most chiropractors don’t just adjust parts of your spine at random. If you have been to a chiropractor you will have noticed that they touch and feel your spine, move it around, possibly test your muscles to see how strong they are, press on parts of your spine to find out if it is tender at particular points, and so on and so on. In the end they very carefully choose specific spinal segmentsⁱⁱ to adjust. The segments that chiropractors choose to adjust will often have corresponding muscle tightness and tenderness if pushed upon ^{2,3}. And the joint will have abnormal movement ^{4,5}. These abnormalities, among others, indicate the presence

ii A spinal segment refers to a spinal motion segment, made up of two vertebrae in your spine and the joints that connect them.

of a vertebral subluxation in a specific location of the spine ⁶,
⁷. Other professions may use different names for the vertebral subluxation such as ‘spinal fixation’, ‘vertebral (spinal) lesion’, or ‘somatic dysfunction’ ⁸.

From a research perspective, I am fascinated by, and interested in, understanding the effects we have on the central nervous system when we adjust a subluxation. I have come to realise that this term, although still used by many chiropractors, does not adequately explain the complexity of how the function of the different spinal structures impact normal daily function. The impact of spinal abnormalities on mobility and control of body function is not adequately explained by any single simple process. This is partially the reason behind this book. I want to share with you a simplified version of this complex process.

On the next page is an image of a spinal segment. A spinal segment consists of two vertebrae and the joints that connect them. There are generally three joints that connect two vertebrae in the spine. The biggest one is the intervertebral disc, or shock absorber, between the two vertebrae. The other two joints are called facet joints. If you have been to a chiropractor it is the release of gas within these facet joints that results in the popping sound you will often hear when you are adjusted ⁹.

The bony spinal column acts as a moveable protective armour for the delicate spinal cord. The spinal cord is like a nerve highway full of information flowing between the brain

and the body. The spinal cord begins at the base of the brain in the skull and extends through the bony canal down the middle of the spine from the neck (cervical spine) to the lower back (lumbar spine). In the lumbar section of the spine it ends and becomes bundles of nerve fibres, a bit like spaghetti. At each spinal segment, where two vertebrae join, there are spinal nerves that exit from the spinal cord and carry information to and from the brain to various regions of the body.

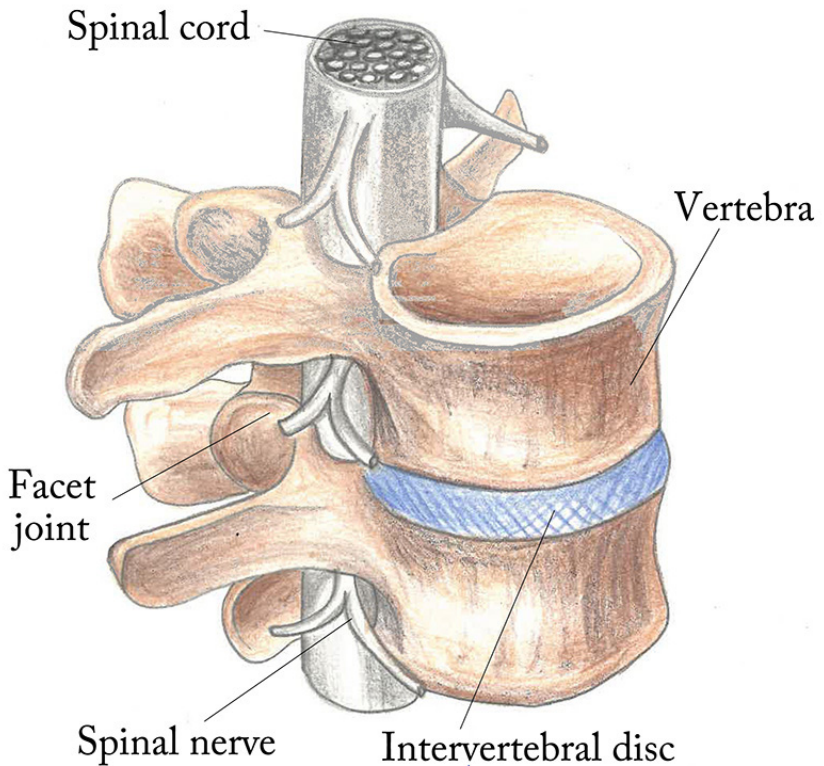


Figure 1: A spinal motion segment consists of two vertebrae

and the joints that connect them, i.e. the intervertebral disc and the two facet joints.

By understanding how the spine and the central nervous system are interconnected, the scene is set for exploring how dysfunction within the spine can lead to impaired health and wellbeing. So, take a deep breath and get ready for a wild ride through the human body!

2 - Discovering the Big Picture of Chiropractic

“Every organ in your body is connected to the one under your hat.”

B.J. Palmer, son of D.D. Palmer

Chiropractic has been around for over a hundred years. It was founded back in 1895 by Daniel David Palmer, somewhat by chance. This is a fascinating story, as Palmer claimed to restore the hearing of a deaf janitor, Harvey Lillard, by replacing a segment in his spine that was ‘out of alignment’. From this he came up with the concept that misaligned spinal segments interfere with proper nerve function, and that ‘adjusting’ these segments back to their normal position restores nerve function. His original theories were based on the idea that dysfunctional spinal segments were ‘out of place’, or misaligned, and that this put pressure on the nerves exiting the spine. We now know that this theory is not really the best way to describe what a subluxation is.

As discussed what we’ve come to understand is that we don’t really put bones back in place when we adjust the spine. A

vertebral subluxation is not so much the condition of a bone being out of place; it is more that a bone is functioning or moving in a less than ideal way – in a manner that is not ‘normal’ for the body. Just how this affects a person’s health and wellbeing will be explored in depth throughout this book. Today, over a hundred years on from that ‘first’ chiropractic adjustment, we know much more about how the brain and the rest of the central nervous system functions. And we are beginning to glimpse the big picture of how chiropractic adjustments really work.

Contrary to earlier beliefs within the scientific community, a recent wave of discovery has quite clearly revealed that the brain retains its ability to adapt to its ever-changing environment throughout life ¹⁰. Furthermore, it is becoming clear to neuroscientists how important it is for our brains to maintain an accurate and up-to-date inner ‘map’, of the location of our muscles and joints in 3D space and relative to each other, and how detrimental a faulty inner map can be for an individual. If you think about it, it’s really very simple. Most of what you perceive as reality is simply what your brain considers reality to be, or your brain’s translation and interpretation of all the information it gets from its sensory receptors (in your ears, eyes, skin, muscles, etc.).

With this in mind, can you be sure that what you see is a complete and accurate reflection of what is in front of you? Neuroscientists know that this is not the case. For example, our eyes interpret the colour of an object based on what colour we

think it should be, which is influenced by the colour of nearby objects. Our brain basically fills in the gaps, as needed, based on past experiences and expectations. You cannot really be certain that any of your sensory experiences accurately reflect what is going on within and around you! Your brain will not provide you with an exact translation of what its sensors tell it, but it will integrate this sensory information with its own expectations from the past, its intent for the immediate future, and in the context of the current situation. So, in reality, there is no one reality. All of your senses send information to your brain, and your brain will compute this information into your very own personal virtual reality. To give you an example that demonstrates how clever the brain is at filling in the gaps for you, try reading this:

“Ceoinsdr the pweor of the hman biran. It dseno’t metatr in waht oredr the lrttees in a wrod are, the olny tihng taht is iproamtnt is the frsit and lsat ltetres are in the rghit pclae. The rset can be a tatol mses and you can sitll raed it.”

It’s amazing isn’t it. One movie that eloquently depicts how these things are possible is ‘The Matrix’. It’s been a long time since it was released, but in this film, reality, as perceived by the characters in the film, is actually a virtual reality called ‘the Matrix’ which has been created by computers. This film struck

a chord with me at the time, and its core message remains true. Your own inner reality may not reflect what is really going on in and around you. But regardless of its accuracy, your inner reality is very real to you. This concept sparked my curiosity about how our brain's own bias impacts our experience of daily life.

As a chiropractor, having taken care of hundreds of patients with a wide variety of complaints, I am often amazed at the incredible changes that many patients experience, and how quickly these changes can occur when patients start to receive chiropractic care. I'm not just talking about symptomatic changes such as reduced pain; sometimes it is as if a patient's entire 'reality' shifts and they almost become a different person. I am greatly humbled to be able to share the gift of chiropractic with my patients, and I am in awe of the way that this gift can change people's lives. Seeing these so-called 'miracles' in practice has fuelled my curiosity to understand what actually happens when I adjust someone. I wanted to be able to answer simple questions, like 'How is this possible?', and, 'Why is chiropractic care not more readily available to people?'. I grew increasingly impatient and frustrated with the lack of scientific knowledge out there. My curiosity and frustration with the status quo provided the motivation for undertaking my PhD, conducting further research and now, writing this book. It has also provided the motivation to create the website therealitycheck.com, a site where the public can go to find out more research-informed information about chiropractic care.

This site is also THE place where chiropractors and keep up to date with the current science of chiropractic.

As scientists exploring new ground, we need to imagine what the complete jigsaw puzzle may look like, and then test it one experiment (puzzle piece) at a time to see if the overall picture is indeed correct. However, along the way the results of our experiments may suggest that the big picture we had in mind is not correct because the puzzle pieces don't fit together in a coherent way. If that's the case we need to recreate or re-imagine a new overall puzzle picture, one in which the existing puzzle pieces do fit. While doing this we also need to keep in mind that sometimes the experiments that have been done may have been poorly designed, and thus inherently flawed, so we end up with a puzzle piece that doesn't really fit our jigsaw at all. As you continue reading, I will not only share with you the experiments or puzzle pieces we currently have in place for understanding the science of chiropractic, but I will also share the overall chiropractic puzzle picture, as I believe it to be, but which is still being assembled. If you are a chiropractor you can learn more about this material, and stay up to date with on-going reviews of a variety of relevant topics at therealitycheck.com.

I wish to be clear that although we have made significant and ground-breaking discoveries over the past decade or so, it is important to acknowledge there is so much more we do not yet know or understand. The full puzzle picture of

chiropractic requires thousands and thousands of individual puzzle pieces that we do not yet have. We are still testing models of chiropractic that are in development and have some way to go before the true 'picture' becomes really clear. We also do not yet fully understand how the brain itself works. What is becoming clear though is that chiropractic care seems to impact our brain's inner reality, by restoring the proper processing and integration of sensory information which alters the way our brain controls our body.

Within this book I have tried to simplify some very complex neurophysiology and reduce the complexities of chiropractic to their bare bones. I have also made some assumptions that are based on our current understanding of the research. Please forgive me if I have oversimplified certain concepts, or if some of my assumptions are proven incorrect by future research studies. That is the nature of science, and is not unique to neuroscience or chiropractic. I have shared with you my understanding of the big chiropractic picture at this time. As we continue to add puzzle pieces to the picture and it becomes clearer, I hope that this greater understanding of the science will help us create a better, healthier world.

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