



**YOU DON'T SEE WITH YOUR EYES,  
YOU SEE WITH YOUR BRAIN**

Research shows that vision is more than just seeing clearly, but current optical treatment plans overlook how vision really works.

Dr. Cameron McCrodan, OD, FCOVD, shares his journey in neuro-visual optimization through the eyes of his patients.

In this book, Dr. McCrodan outlines the impact vision can play in psych-ed evaluations, concussion rehab, headaches and dizziness. He also investigates what your eye doctor might miss in routine eye exams and how many glasses prescriptions contribute to the problem.

**“WE ARE MISSING ONE OF THE MAJOR  
SOURCES OF POST-CONCUSSION  
SYMPTOMS, DIZZINESS, MIGRAINES, AND  
LEARNING DISABILITIES.”**



**Dr. Cameron McCrodan, OD, FCOVD**

Dr. McCrodan's Opto-mization™ Training process has supported patients of all ages and abilities across North America. He also speaks and educates other professionals on neurovisual performance. His popular TEDX Talk has shed the light on the benefits of neurovisual training to audiences around the world.

OPTO-MIZE NEUROVISUAL PERFORMANCE

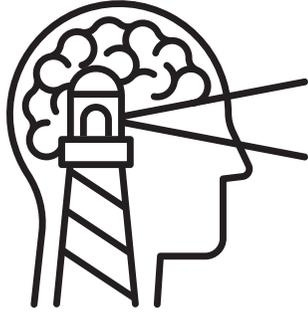
DR. CAMERON MCCRODAN

DR. CAMERON  
**McCRODAN**  
OD, FCOVD



# OPTO MIZE

**A NEW WAY TO LOOK AT DYSLEXIA, CONCUSSION,  
ATTENTION DEFICIT, READING COMPREHENSION  
AND ATHLETIC PERFORMANCE.**



## FOREWORD

I met Dr. Cameron McCrodan during a time I was living with health issues that I thought could not only be the end of my career but possibly the last months of my life itself. A medical doctor friend of mine recommended Dr. McCrodan to me as a possible resource to try to better understand the causes and, more importantly, help to provide solutions for improvement. Working with Dr. McCrodan and his highly skilled team over a yearlong period, my experience surpassed even my highest expectations. The initial understanding of what was happening and why gave me hope. Following the Visual Therapy treatment program customized for my needs improved my symptoms to the level where I have regained full independence and the ability to use my professional skills again.

This book will give you some insight about how Visual Therapy works but, of equal importance, it will describe how the Visual Therapy helps to ease the struggle of people that, for many different reasons, are unable to perceive the world visually in the same way that a “normal” person does. The author is an eager learner with a determined scientific approach and a true kind-hearted human being.

These pages deliver only a hint of his trailblazing work. Dr. McCrodan has been able to link together the scientific knowledge of the dynamic relationship of the eye as information gatherer and the brain as processor and modifier of that information. Many people have been marginalized by the rigid rules of traditional diagnosis because this relationship is not well understood. Dr. McCrodan’s pioneering leadership in this area offers a well-founded reason for hope of improvement.

Dr. Magda M Leon MD

## CONTENTS

Introduction	1
Chapter 1: Reading	9
Chapter 2: Behaviour	23
Chapter 3: Development	27
Chapter 4: Concussion and Head Injury	33
Chapter 5: Dizziness and Balance	45
Chapter 6: Sport	55
Chapter 7: Ergoptics	63
Conclusion	71
Acknowledgements	81
Testimonials	83

## INTRODUCTION

Early in my training, a patient said something that really shook me up. “I used to think I didn’t like to read because I was stupid,” he told me. “Now I realize it was a problem with my eyes.” The man was 50 years old. He’d had an eye movement condition since childhood. After the condition was treated, his whole life changed.

After that encounter, my life changed too. His words really woke me up to optometry’s potential. I realized that the biggest impact I could have as an optometrist was not simply to check eye health and help people see clearly, but to help them learn to use their visual system in the best way possible.

When people hear the word “optometrist,” they usually think of a letter chart at the end of the room and a new pair of glasses. Fair enough. But being able to see street signs in the distance, or the small print up close, is just one aspect of vision. A properly functioning visual system depends on so much more. My work in optometry now concentrates on the communication between the eyes and the brain, and what you can do to get the various parts working together more effectively.

Our visual skills develop throughout childhood, mostly through interactions with the world around us, and those skills continue to be tweaked over our lifetime. But some of us, for whatever reason, do not develop all the skills we need. Others lose some of those skills after a head injury.

Whether the skills didn’t develop properly in the first place or you had them taken away, when your visual skills are impaired, you are operating at a

huge disadvantage. It's as though everyone around you is riding a well-tuned bike, but yours has a bent wheel. So it's not surprising that you're not riding as well as the others, or that you can't ride for as long. Maybe it causes discomfort, or maybe you can't really ride the bike at all. Chances are you don't enjoy bike riding very much.

Your visual system is extremely important. About 50 per cent of the brain is involved in processing vision. The visual system is not just about "seeing" — it also plays a major role in things like balance, attention and communication. When your visual system is working poorly, it can contribute to headaches, dizziness, clumsiness and learning disabilities.

The problem is that, as an individual, you only have experience with the visual system you've been living with — so how can you be expected to know if it's not working right? You can't imagine seeing the world in any other way than the way you've been seeing it. (People who used to have well-functioning visual systems, but have had them damaged through injury, have an advantage here — they know what things should be like.) So a child who sees words moving on the page might not think to mention it, because it seems normal to her. A man who's never been able to catch a baseball might think he's slow. Like that 50-year-old patient, you may just assume that you're not smart, or not coordinated, or not trying hard enough.

But what if we could straighten out that misshapen bicycle wheel? Lubricate the gears? Inflate the tires a bit? This is what we try to do using vision therapy and the right lenses: to get whatever bike you're riding into the best shape possible.

---

I didn't start out knowing I wanted to do vision therapy, or even that I wanted to be an optometrist. In fact, I got all the way through optometry school and had started to practise before I realized I wasn't content doing routine optometry. It seemed like all I did was measure people's prescriptions and confirm that the health of the eye was still fine. I felt like a prescription generator — although, to be fair, I didn't realize at the time how powerful the right one could be.

I knew I wanted more. Maybe it was because I came to optometry via

engineering. I started a general engineering degree at the University of Victoria, in British Columbia, and did two more years of science there before I found my way into optometry at the University of Waterloo, in Ontario. My strength is in applying knowledge — taking information and quickly putting it to practical, meaningful use. There was a place for an optometrist like me; it just wasn't the regular place.

When I first heard of vision therapy, I thought it was complete quackery, but the more I dug into it, the more appealing it became. It wasn't clear cut. It involved tinkering, trial and error, invention. I had to go deep into the system design of how our visual brain works, and I found that extremely exciting. Working in vision therapy drew on all my strengths, and it rewarded me with the knowledge that I was really having an impact on people's lives.

---

Your visual system is important in so many ways. When it doesn't work quite right, the repercussions can be enormous.

Take reading. It may seem like a perfectly natural activity, but in fact it's extremely complex. Many people learn to read relatively easily, but many others struggle to do so. About 80 per cent of all problem readers have visual issues, and these often go undetected and untreated. Not being able to read in today's world is absolutely devastating.

"Before I did vision therapy, I never believed I could do anything post-secondary," says Anna. You'll meet her in Chapter 1, which looks at how vision therapy can help with reading and learning problems. When she first came to my office, Anna was in grade 11. She was very intelligent and well spoken, but she could not really read. She had tried everything the school system had offered, and more, but sadly, nothing had really helped. This was because her vision was the underlying problem. By the time I met her, she was pretty much resigned to not continuing her studies after high school. After about a year of vision therapy, though, her aspirations had changed. Her visual system worked properly, so she could finally learn to read -- and she did. She began to contemplate higher education. In fact, Anna is now in college.

Think about how your eyes move through text. Ideally, they will move quickly from word to word, in unison, and in the right direction. But some

people's eyes, like Anna's, jump around the page when they try to read. I have met kids who actually read words backwards, from the last letter to the first, or in a completely random order. No wonder they can't recognize a word they just learned three lines earlier. These people typically have no idea anything strange is happening — that's just how they read. But I use a device that tracks the eyes to record what they are doing while a person reads, and this can tell me a lot about how accurately their eyes move through a paragraph, and whether their two eyes are working together as a team.

Some kids find it extremely frustrating to not be able to interpret the visual world properly. A fair number of my patients, once they get the hang of reading, and once they get their eyes working better, also change the way they behave. Remember that broken bicycle? Imagine I told you that you had to compete in a tough race on that crappy bike. How do you think that would feel? Would you feel excited? Anxious? Do you think you would tire out more quickly? Would you put up a fight over having to do it at all?

That's what it was like for Jared, who was eight years old when he came in for help. Jared reacted explosively whenever he was asked to read. It was probably easier for him to fight than to actually do the homework that his eyes simply didn't know how to do. After vision therapy, to the surprise of his mom and dad, that all changed. Their angry, explosive, low-self-esteem son became calmer, and stopped hating himself. You'll meet him in Chapter 2.

Like Anna, Samuel didn't believe he would ever read. In his case, all the experts around him didn't believe it either, and they told him so. Samuel had autism spectrum disorder and a number of other developmental diagnoses. Everyone just assumed the diagnoses explained the lack of reading. That's all too common. Well, Samuel's reading now. And playing tennis! Read about Samuel and his three siblings in Chapter 3.

You have two eyes and they are meant to be used together. You have to keep them simultaneously lined up, no matter how you move your head. The brain also has to simultaneously process the information from the separate channels of your individual eyes to perceive things like depth. But what happens when you have an accident that interrupts all that? In Chapter 4, you will hear the stories of a few of my patients who suffered head injuries and lost a lot of their visual function, but worked hard to get it back.

With head injury, sometimes people don't believe you are really ill — which is almost worse than the illness itself. James, for instance, injured on a boat, was accused of faking his symptoms. Ironically, one of the challenges of visual problems is that they are often invisible to most standard testing. James not only fought to get his visual abilities back, he also fought for — and won — recognition of those injuries and the need for his insurer to pay for him to get better.

A common issue after head injury is dizziness. But some people develop dizziness even without a blow to the head. In Chapter 5, you'll meet two people who suffered from dizziness that seemed to come from nowhere. As in James's case, some people had a hard time believing the problem was real. Abby, a 14-year-old figure skater, suddenly became so dizzy she couldn't walk without holding onto her mom. She was told by a doctor that if she could do her eyeliner as well as she had, she couldn't be suffering from vertigo. Talk about adding insult to injury. I was able to determine that Abby's visual system was the cause of her vertigo-type symptoms, and undeterred, Abby worked hard at vision therapy and got better. She's now back to an active life of skating, plus the running, jumping and dancing demands of intense musical theatre.

I am also proud to help athletes who are already stellar but want to be even better. Goalies, batters, football players, race car drivers — you'd be amazed at how a well-tuned visual system can up your game. At my clinic, we develop customized, challenging programs to help athletes take their visual system — and their accuracy, speed and overall performance — to a whole new level. Read about visual systems and sport in Chapter 6.

Our visual systems play a huge role in our ordinary lives — much more than we may think. Vision therapy can help people like Kendra, who was just having trouble working at her computer for extended periods, or Janice, who had suffered from migraines for all of her adult life. You'll meet them in Chapter 7, where I explain general ergoptics — the practice of using carefully prescribed lenses to alter incoming information — and how it can be used to alleviate many everyday problems.

Vision therapy is not easy. It is not for everyone. Each of the stories I tell in this book are about people who made a huge commitment and worked

extremely hard, both in my office and at home. Very often, they felt a lot worse before they started to feel better. But in each and every case they did get better -- which in some instances started out as an impossible dream.

---

At my clinic, we don't deal with eye health. Our work is all about vision therapy and prescribing lenses to improve visual function. Patients come to me only after they have had certain things either diagnosed or ruled out — problems related to the anatomical health of the eye, for instance, to neck issues or to inner ear troubles. We can work on these things concurrently, but I only treat vision.

My initial examination looks at things like how your eyes work together, how well you can focus, how well your eyes track, and if your visual and vestibular systems integrate properly. I will also ask about your history. What problems have you had, and for how long have you had them? How is it a problem for you? It all lasts about an hour. I'm a firm believer that all testing should have a specific purpose, and should only be done if it will give useful information.

From there, we discuss a course of action. Some people just need to be monitored; others need things I don't offer, like surgery. Maybe you need different lenses. Or maybe you need a course of vision therapy. We talk about all the options, and combinations of options.

Doing vision therapy is like giving your eyes and brain the chance to rewrite the instructions on their working relationship. It's as though you have all these index cards in your brain somewhere, and they contain complex instructions for how to do things. You probably don't give a thought to picking a spoon up off the table, but at one point in your life, probably when you were a baby, you did. You concentrated and you learned. Now it's entirely unconscious — but you're still following those instructions. Same deal for tying your shoelaces, catching a baseball or driving your car. But what if your instructions for catching that ball have always been just a little bit off? In the process of practising and mastering visual skills, through repetition and clear feedback, we rework the faulty index cards until they are written correctly.

My team and I design an individual program to retrain your eyes and

brain. It involves working one-on-one with the same vision therapist for an hour every week, and working at home on your own on at least five other days that same week. I oversee and manage the whole process, planning and checking in with you every few weeks. I also make sure you have the lenses that give you the best possible efficiency. Like I said, our program is not for the faint of heart.

---

Vision therapy isn't without its challenges. Like teaching, or physiotherapy, there are many different approaches, and some are more effective than others. I can't tell you how many people have told me that they've tried vision therapy and it didn't work. Some people did meaningless exercises, without proper feedback (which is a critical part of the learning process). Others were simply parked in front of a computer screen and told to play generic games. Or they were never prescribed the right lenses. Real vision therapy is so much more than that.

Some argue that vision therapy doesn't work and I acknowledge that there are ineffective vision therapy approaches out there. But do you stop going to school because of one bad teacher?

We are living in an era where the true potential of vision therapy is only starting to be understood. I too emerged from optometry school with a deep skepticism about the field, mostly passed down from professors' opinions and an outdated understanding of vision. Once I understood the neurology behind visual function, and actually read the research, I could no longer ignore it.

Vision therapy works. It's a training regimen, a reprogramming, a fresh chance to get your brain on track. It gives your brain new strategies for understanding and using vision. Ergoptics works too. It's a way to use lenses to make the world out there and the world you perceive in your brain come into alignment. No matter what else is going on with your body or mind, you will be doing better when your visual system is working better. It's not that everything will be perfect — nothing ever is — but, believe me, you will be in a better place than where you are now.

# 1

---

## CHAPTER 1: READING

Chelsea was a kid who had always struggled at school. She was bright and hard-working, but she couldn't seem to learn how to read. As she moved from grade to grade, teachers always referred to her as an "emerging reader." But her mom knew that was just a polite way of saying "illiterate."

It wasn't just reading — Chelsea had trouble with writing too. When she was younger, she'd refused to cross the midline when writing her own name: she'd write the first three letters with her left hand, skip the L, then write the last three letters with her right. Occupational therapy helped with that, but as she got older, her writing skills remained poor. She would leave whole words out of written sentences, and the words she did write, she usually spelled incorrectly — using the wrong letters, or using the right letters but in the wrong order, or writing letters as mirror images of themselves.

Her mom, Janice, tried everything. She and her daughter wrote in cornmeal or sand, they outlined words in different-coloured blocks, they used phonics, they labelled every object in the house, they spelled out loud. Nothing seemed to work.

By grade 4, Chelsea was still struggling. Her mother could barely make out what she was trying to convey. Chelsea had an older sibling, so Janice knew this wasn't normal. The teachers also recognized that Chelsea was having trouble, and they tried to help. There was a "reading recovery" program at the school, plus individual teachers often gave up their lunchtimes to coach her. But the standard refrain was that all kids develop at their own pace. Maybe Chelsea was just going to come to reading late.

The school modified her homework. If the class was doing 21 spelling words, Chelsea only had to do five. “But to sit down and actually review those five spelling words was a two-hour ordeal,” her mother recalls. Even after an hour of study, a simple word like “love” would end up spelled with a “d”.

It always ended in a blowout. There was screaming, door-slamming, rage. Once, Chelsea kicked a hole in the wall. The family had become used to outbursts like these; Chelsea was an aggressive kid. At home, she took her frustrations out on everyone, but especially her younger sister. At school, she got into fights with other kids, and some parents didn’t want her around their daughters. She regularly threatened to set her mother on fire. “She was hard to live with,” says Janice.

Looking back, Chelsea remembers having a lot of built-up anger. “It was not being able to physically accomplish anything,” she says. “I liked to see progress. I just felt really dumb.”

Janice was looking for an explanation that made sense. In whatever spare time she had, she’d surf the web. One night, at 2 a.m., she stumbled on a blog post by someone with a kid just like Chelsea, who, the blog said, had been helped by vision therapy. Janice had never heard of it.

The blogger described the child before and the child after. “I was reading the ‘before’ and thought: this is my child. They could have just replaced the name in there and it would have been her story too.”

A vision therapy assessment suggested Chelsea’s problem could be fixed. The idea of vision therapy intuitively made sense to the family. A device that tracked Chelsea’s eyes as she read showed how poorly her eyes were moving through lines of text. They heard about how that could be rectified. But it wasn’t cheap and would take about nine months. “This was a complete leap of faith,” says Janice. “I’d never heard of it. But I had this vision of her working at McDonald’s for the rest of her life.”

---

Chelsea started vision therapy with me in May of her grade 5 year. I cautioned the family not to expect dramatic results right away, but in fact, Chelsea did show quick improvement. Her mom remembers a particular incident early in the summer, when they were driving to a softball game. Chelsea did something she’d never done before: she read words out loud, off a billboard. “That moment, oh my goodness...” recalls Janice. It had only been one month.

In the fall, Chelsea started at a new school. As always, her mother went in to give teachers a heads-up about Chelsea’s various difficulties and to set up learning assistance. But this time, the teachers didn’t know what her mom was talking about. Chelsea seemed to be reading pretty much at grade level, they said — not more than half a year behind. And she was scoring well on spelling.

Janice was floored. “I had a kid who went all the way through elementary school as an ‘emerging reader,’” she says, “which means not really reading yet. Now she was suddenly just a little behind.” They hadn’t even done any reading practice over the summer. It was all just vision therapy.

But now Chelsea was reading things everywhere. For novel study, she had to read a chapter a day, something that was suddenly easy. All along, she’d had the ability to read — she just hadn’t been able to get her eyes to do what they needed to do.

It was exciting for the family to see Chelsea suddenly getting great marks. She got comments like “good work” at the top of the page, and her work was posted on the classroom wall. “Man, we’d never seen that before,” says her mom. Chelsea remembers the day her teacher used her earth science project as an example for the class. “It was an iconic moment,” she says.

The fights over homework were now a thing of the past. Her mom would ask if she needed any help, and Chelsea would say she was already done.

Chelsea is a perfect example of how you’ll get this bad behaviour around not wanting to do homework, when it’s really just a reflection of the tasks she’s been given. She didn’t have the tools to achieve them. In our own work here at the clinic, we make sure people acquire the visual skills along the way to be able to learn what we’re teaching. They see improvements in what they’re working on. All of that leads to the end goal.

That doesn't mean we see improvements in real-life reading every week, but we see improvements in what we're working on, and we know these will lead us to better reading. It's like when you're driving along the highway — you don't actually see yourself approaching Vancouver, but you know with every kilometre going by that you're getting closer.

Chelsea made the honour roll in grade 6!

I would be lying if I said they didn't struggle a bit with the vision therapy homework. It can be hard. Chelsea and her family did the work together a lot of the time, and they had a goal of doing about half an hour each day. Chelsea found some of the exercises simple. But others made steam come out of her ears. Monday mornings she'd start something new and it would be tough. By Thursday, it would usually start to click.

The worst for her, she says, was something we call "track letters," which involves going through a page of random, non-sensical text and circling the alphabet in order. The first A, then the first B after that — so you have to track very carefully. It's a timed exercise. She dreaded it, but by nature she was competitive, so she was always trying to beat her former time. We also set it up so she could compete with another one of our patients, who was also competitive. We'd post their scores prominently on the wall so the other could see it.

Chelsea also hated an exercise we call "slap tap." In this one, you have to use your body to mimic certain elements of the letters you're reading. So a lower case "b" involves bringing your right foot outwards, then tapping it against your stationary left foot. An upper case "B" requires both the right arm and right leg to go out and come back tapping. This exercise teaches that a circle on one side of a line is different from a circle on the other, and we use a person's own body laterality to teach that. The point is to hammer home spatial relationships. There are also mirror-image letters that require tapping on the other side of the body. It's easy enough when you do it slowly, but we pace you with a metronome, and it can get pretty quick and challenging.

I can't tell you how rewarding it is to watch a bright kid like Chelsea get the knack of reading and writing — something she was deprived of simply because her visual system didn't work right.

Chelsea is not alone. Loads of children have trouble with reading. It is estimated that up to 10 per cent of students have an individual education plan (IEP) — a school-based plan to help with special learning needs — many of which are reading-related. The average kid who has an IEP for reading is two grade levels behind the norm.<sup>1</sup>

According to the Learning Disabilities Association of Canada (LDAC), people with learning disabilities are twice as likely as non-LD kids to not graduate from high school. They are more likely to not find jobs. They are more likely to report distress, depression, anxiety and even suicidal thoughts.<sup>2</sup>

Then there are the economic costs. Research commissioned by the LDAC found that the annual cost of education for learning-disabled children is roughly double that of mainstream children. Over a lifetime, the extra cost of being reading-impaired could be as much as \$1.98 million per individual.<sup>3</sup>

If there's something we can do to alleviate these problems, shouldn't we do it?

Dr Patrick Quaid and Dr Trefford Simpson, both associated with the University of Waterloo School of Optometry and Vision Science, were interested in pinning down how reading problems and vision problems might be associated.<sup>4</sup> They measured reading problems by looking at reading speed and the way the eyes moved during reading. They were especially interested in the role of binocular vision (how the eyes work together) and refractive error (how the eyes fail to bend light correctly).

They studied 100 kids aged six to 16. Half of them had reading IEPs and half did not. The researchers did a comprehensive eye exam on all of the kids, closely examining things like depth perception, focusing ability, and how well the eyes could look in unison at objects at close-range and in the distance. They asked the kids to answer a questionnaire about symptoms, such as headaches, sore eyes and losing their place while reading.

1. Patrick Quaid and Trefford Simpson, "Association between Reading Speed, Cycloplegic Refractive Error, and Oculomotor Function in Reading Disabled Children Versus Controls," *Graefes Arch Clin Exp Ophthalmology*, vol 251, no 1 (Jan 2013), p 170.
2. [http://www.pacfold.ca/news/03\\_23\\_07\\_en.shtml](http://www.pacfold.ca/news/03_23_07_en.shtml).
3. [https://www.ldac-acta.ca/downloads/pdf/research/5B%20-Economic%20Costs%20of%20LD%20-%20Jan%202002%20RJune\\_2007.pdf](https://www.ldac-acta.ca/downloads/pdf/research/5B%20-Economic%20Costs%20of%20LD%20-%20Jan%202002%20RJune_2007.pdf).
4. Patrick Quaid and Trefford Simpson, "Association between Reading Speed, Cycloplegic Refractive Error, and Oculomotor Function in Reading Disabled Children Versus Controls," *Graefes Arch Clin Exp Ophthalmology*, vol 251, no 1 (Jan 2013), pp 169–187.

Then they used an infrared eye-tracking system, like the one I use, to do some recording of the kids while actively reading. They recorded reading speed — which they could compare to the grade norm — as well as number and type of eye movements per 100 words, and then probed reading comprehension.

They made a number of interesting findings. One was that the reading-impaired kids had a lot of visual symptoms. Another was that they were more likely to have uncorrected farsightedness, which meant that they couldn't see things well up close without a lot of effort.

But the most striking and important finding to me was that the kids who had trouble making their eyes work together (something we call “vergence facility”) also read more slowly and made a lot of extra eye movements when they read. When I say a lot, I mean about eight times more than the control group.

The researchers say, and I totally agree, that kids who are being considered for reading-related IEPs should have a full visual work-up. And that means testing not just acuity — whether the child can see the letters on a chart clearly — but full visual system function. This is not currently done.

There's one other study I wanted to mention, by Dr. Mitchell Sheiman in Pennsylvania and his colleagues.<sup>5</sup> It involved 47 children, all of them with vergence problems — specifically “convergence insufficiency,” meaning their eyes didn't work properly together when looking at things up close. The researchers randomly assigned them to one of three treatment groups.

One group was told to do something called “pencil push-ups.” Broadly speaking, the exercise involved trying to keep a single image of a sharpened pencil tip, as the child moved the pencil from arm's length in toward their nose. The second treatment group got office-based vision therapy — the kind of thing I offer. It involved one hour of vision therapy in the office, plus 15 minutes of practice at home five days of the week. A third treatment group got vision exercises that looked like vision therapy but weren't. This is called “sham therapy” or a “placebo.” All three groups had to do their practices five or six days a week for 12 weeks.

Only the children who got genuine vision therapy showed improvement. In the visual therapy group, 12 of the 15 kids had clinical and statistical

5. Mitchell Sheiman et al, “A Randomized Clinical Trial of Treatments for Convergence Insufficiency in Children,” *Arch Ophthalmology*, 2005, vol 123, no 1 (Jan 2005), pp 14–24.

improvements and eight of them were actually considered cured. In contrast, only one child in the sham vision therapy group was improved and none of the kids in the pencil push-ups group were. This is important, because lots of optometrists and ophthalmologists prescribe pencil push-ups. Maybe that's because it's simple and cheap, but what this study shows is that it's also ineffective.

I'm heartened to see that just 12 weeks of therapy could help some of the kids in the vision therapy group. Often it takes longer, and maybe with more time, all of them could have been helped. But this study is a great proof of principle. I also want to point out that this study was published in *The Archives of Ophthalmology* (now *JAMA Ophthalmology*), a scientific journal read mainly by ophthalmologists, some of vision therapy's greatest critics. So it was exciting on many levels.

In some cases, true, maybe a child's problem will not be visual. But wouldn't you want to rule it out before you invest all this time and money in extra help and tutoring? Because if it is visual, the odds are that your child will not be able to take full advantage of the assistance anyway. Why waste years in programs that a kid simply can't make use of, when you could get to the root of the problem and repair it?

---

Anna came to see me midway through her grade 11 year. She was struggling at school with reading and math. One of the first things I noticed about Anna was that there was a huge discrepancy between her school performance and her intelligence level. She was extremely bright. I couldn't help thinking what a shame it was: it was obvious she had all this potential, but she was being completely sabotaged by her visual system.

She was older than a lot of the kids I work with on reading — she wasn't a kid at all any more, but a teenager, which is the most challenging age group — and by the time she came to see me, she had some real self-esteem issues. She had seriously started to doubt her abilities. The older people get, the more they tend to see their issues as just an innate part of themselves. Unlike Chelsea, Anna also carried a formal diagnosis of “learning disabled.”

Anna had been flagged back in grade 3 as having reading problems. She recalls having to read everything over multiple times before she could understand what it said. She said she would often flip her “d”s and “p”s around.

Later, in middle school, she started having trouble with math. “I maintain to this day that I’m good in math,” she says with a smile. “I just solved the problem that I saw, which wasn’t the problem that was there.” Sometimes that meant the number underneath a division line would appear on the top, or that the digit in one place in a string of calculations would be moved to another place, or numbers would just be flipped around somehow.

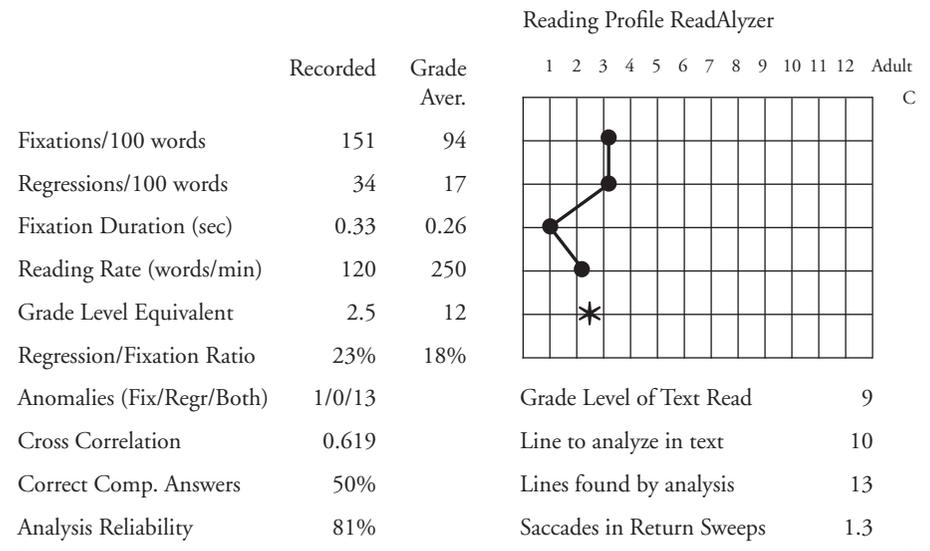
A bunch of eye doctors all told her there was nothing wrong with her eyes, that she had 20/20 vision. So, eventually, Anna was diagnosed with dyslexia. The diagnosis made her feel hopeless. There was nothing anyone could do to help her. “It feels like a life sentence when someone says you’re dyslexic,” she says. “You have this thing, and you’re stuck with it. You’ll have problems the rest of your life.”

She remembers that for a few months, she got some relief with blue-tinted lenses, but that didn’t work for long. She had suffered headaches, for instance, and at first the tinted lenses helped with those. Within a few months, though, the headaches came back and reading got hard again. That’s when she came to see me.

I used the eye-tracking system to evaluate Anna’s eyes as she read. When I played back the results for Anna’s mother, she was stunned. It showed how Anna kept staggering back and forth between words, how she seemed to be looking at the last part of one word and the first part of another — at the same time — and maybe reading the two fragments together as one word. She rarely looked at a single word as a whole.

Anna’s mom looked at her and asked, “How do you read like this?” To Anna, of course, this was totally normal. How could she know otherwise?

Figure 1: Anna’s ReadAlyzer eye-tracking results



ReadAlyzer™ is a trademark of Compevo AB.

Normally, when people read, they move their eyes forward to fixate on something (called “fixations”) and they move their eyes backwards (called “regressions”) to do the same, and there are standard numbers of times a person does this, depending on their age. For example, a grade 11 reader like Anna should make approximately 90 fixations and 16 regressions per every 100 words. Her eyes should pause on a word for a duration of no more than .26 seconds (“fixation duration”). What I saw was that Anna had more than twice as many fixations as normal and twice as many regressions. Her eye movement mechanics were similar to a student in grade 1. And after all that, her comprehension was also very poor — she could correctly answer “true” or “false” only 50 per cent of the time, which was no better than guessing.

Anna had binocular vision dysfunction. I knew I could help. I told her that new lenses for her glasses plus therapy could make this problem go away. Anna says this was the first time in her life that anyone had offered her a solution, and that even though she didn’t believe me, she was willing to give it a shot.

Our sessions are a bit like any other learning discipline — you start simple, with a few exercises, and then you build on them. Instead of increasing mobility or building muscle, though, we are creating new pathways and giving the brain new strategies for vision. I remember the skeptical look on Anna’s face. She even said to her vision therapist, “You’re going to make me play with a ball for six months and I’m going to read after that?” That’s not the whole story, obviously — but, yeah, she did play with a ball and a bean bag for part of those six months.

Anna liked the ball exercises well enough. (She still has hers, attached to the ceiling with a pulley system.) And she tolerated tossing bean bags according to our strange instructions — to move only her eyes and not her head, for instance, or only her nose and not her eyes. But she absolutely hated the “Hart chart.” This was a sheet with a 10 by 10 grid of mostly random letters that she had to read out loud. The trick was she had to read a few letters from the chart at a distance, then switch to reading the same chart at close range, picking up where she left off. The first time she tried it, she had to stop — it made her nauseous. Even today, she hates the thought of that exercise, although she finds it easy now.

Anna says it was about six months in when she realized she only had to read a book chapter twice to understand it. I told her she should only have to read it once. She tried that, and was incredulous that it worked. Previously, she said, if she read something only once, she would only have an impression of what it was about. Now she was able to retain the details. And this was with a reading speed now faster than the average adult!

Math was improving too. Her teacher had noticed and asked if she had a tutor. She told her she was just doing vision therapy. It had completely changed how her eyes worked.

“It felt very freeing,” Anna says, looking back. “It was like a whole new future had opened up.” She had always wished she could go into teaching but she could barely write an essay and couldn’t read anything over. She says she’d go back to proofread, but wouldn’t know if she’d written something incorrectly or was just reading it wrong. So university had always seemed out of her grasp. At the six-month point in vision therapy, it occurred to her for the first time that maybe she could become a teacher after all.

It breaks my heart to think that Anna had to wait so long to have her visual issues resolved. It’s shocking that, even though we can fix these problems early in life, we almost never do.

Part of that might be how hard it is for parents and educators to know what’s at the root of the problem. Parents whose smart young kids struggle with speech, unable to get their brains to use their mouths to produce comprehensible sounds, are referred to speech therapists. No one tells the parents not to bother with speech therapy because they’ve examined the mouth and tongue and everything looks just fine. No one says that because the equipment looks okay and it performs other functions well — eating, laughing, whatever — that the speech issues must be due to something else. No one does a psych test on them before they try therapy. No, we refer problem speakers to provincially funded speech therapy and help those kids speak. As we should.

If only something similar happened with vision. My profession bears some of the blame. Unfortunately, most vision testing only looks at general eye health, major eye turns and acuity — that is, whether they can see clearly — and if everything checks out and they score 20/20, then they pronounce them healthy. Parents are told that the problem is not their kids’ eyes. That sends them on a wild goose chase to find out what it might be.

Chelsea’s mother said it well: “I’m the one tracking this kid through time. When I say there’s something here, there’s something here. Teachers kept saying it will come, it would just take perseverance. You know your kid better than anyone else will know your kid.” As a parent, or as a person who can’t read, you know it does matter. Keep pressing for answers if what you’re hearing doesn’t make sense.

Lara is another parent like that — observant, knowledgeable and tenacious. Her son, Kalan, was slow to walk, and later shied away from things like playgrounds and bouncy castles. As a little kid, he couldn't climb a ladder or slide down a slide. He couldn't kick or catch a ball, or hit one with a bat. He couldn't ride a bike. And despite heroic effort, he could not learn to swim.

He'd had trouble with speech early on too — speech therapy had helped — and in school, he struggled with reading and math. He couldn't seem to remember individual letters and their sounds. He could do fractions but couldn't understand them when they were written on paper.

Lara knew something was up. The special ed teacher in the school suggested he had ADHD, dyslexia and maybe a processing disorder of some kind. Lara was suspicious about the ADHD pre-diagnosis — both her husband and her older child had ADHD and she knew what that looked like, and this wasn't it. And her own father may have been misdiagnosed with dyslexia. An occupational therapist also assessed Kalan for developmental coordination disorder (DCD) and believed he had that too. Again, Lara wasn't so sure.

Kalan was in special ed three times a week, but the school said he would not be formally assessed for anything for several years, unless his parents decided to fork over a few thousand dollars for a private psych ed assessment. Even if he was diagnosed, Lara knew, there wouldn't be any more funding to help him. Still, the family was considering it.

It was around this time that Lara noticed an article that had been tossed into her recycling bin. It was about a girl named Helena, who'd done vision therapy with me and who'd shown dramatic improvement. Kalan had already been to see an ophthalmologist who had assured Lara that his vision was fine, (which wasn't incorrect since Kalan could see clearly and had no eye health problems or eye turns.) But Lara still wanted to find out more. So she brought eight-year-old Kalan in to see me.

Like so many of my patients, Kalan had trouble with how his eyes worked together. They really didn't track well. He had trouble finding where things were in space. With 35 weeks of vision therapy and some very mild lenses,

Kalan's world changed. They put a lot of sweat into it — Kalan's dad, a teacher, worked him three hours a day during the summer and an hour a day during the school year — but now going to school is a positive for him.

“My kid went from C- and failing to straight A's,” says Lara. Kalan now swims, bikes, climbs, reads. Everything. What he no longer does is sob. “I saw it first hand,” says Lara, “a child being cured.”

---

What I'd love to see is proper vision screening in schools — screening that addresses issues like tracking. Even better would be a vision therapy component incorporated into the regular curriculum. Like folic acid in flour or vitamin D in milk, it would enrich everyone, but actually rescue those most at risk.

For people with only mild problems, it could potentially fix them before they even knew they had them. Kids with more serious issues could be identified and given intensive training, right there in school. We do yoga, we do mindfulness — why not do vision exercises? Classrooms would function better if half the kids weren't struggling to follow along. For years to come, teachers would be able to concentrate more on teaching.

It seems to me this should happen in the early years, like pre-K or kindergarten or grade 1. I think of it as a sort of “school-readiness” program. The program could include some vision therapy basics, which all the kids could benefit from. Kids might just think these are games they get to play. (When I have kids, you can be sure I'm going to make them do vision therapy from the time they are toddlers. I'm not going to call it that, of course — I'll call it “ninja training” or something!)

As it stands now, we try to teach kids to read before we even check that they have a visual system that can handle it. That just doesn't make sense. Studies show that kids with these visual issues will score higher on ADD testing.<sup>6</sup> Treat the visual problems, research shows, and the attention problems aren't as bad, or may even go away. We also know that about 80 per cent of problem readers have measurable visual issues.<sup>7</sup> Studies — and clinical experience with people like Chelsea, Anna and many others — show that if you treat the visual problems, many of the so-called “problem readers” can read just fine.

6. Sun Haeng Lee et al, “Improvement of Vergence Movements by Vision Therapy Decreases K-ARS Scores of Symptomatic ADHD Children,” *J Phys Ther Sci*, vol 26, no 2 (Feb 2014), pp 223–227.

7. L. G. Hoffman, “Incidence of Vision Difficulties in Children with Learning Disabilities,” *J Am Optom Assoc*, vol 51, no 5 (May 1980), pp 447–51.

I'm very fortunate that the parents of my patients agree with me on this, and they are going to bat for the idea. Lara, for instance, has been tireless in fighting to raise awareness and brainstorming ideas for funding. She's a key driver of a charity I helped found, called The Visual Process, which is working hard to raise awareness about visual conditions and how they can be treated. Among other things, it advocates for schools to get involved.

But to be honest, I am a little skeptical that vision therapy will hit regular classrooms any time soon. So far, my attempts to craft and finance a pilot project — I would volunteer my time designing it, and our charity would pay for the vision therapists who would execute it inside schools — have been unsuccessful. The idea seemed to threaten some people, especially reading specialists, and a lot of red tape got in the way.

It wouldn't even cost that much money, compared to the amount you'd save down the line. Let's face it, the school system could easily have treated Chelsea or Anna with vision therapy for less than the cost of the reading recovery and extra support (which, by the way, did not produce results).

One dad, Steve, who is an accountant by profession, worked it out for himself. He brought his older child in for treatment when he was 12. Steve had watched him suffer all those years, and, as a parent, had suffered with him. He'd also spent a fortune in tutors, and it didn't seem to have helped. After his son had finished vision therapy, he quickly calculated he could save time, money and misery if he just brought his daughter in right away. She was just seven. "She went from being a grade behind at reading to a grade or two ahead," he says. He figured he could spend the money on tutors, or he could spend it on vision therapy. "You're probably going to pay less for vision therapy —minus the frustration."

Change is hard. But it is needed. Way too many kids suffer through their educations unable to read and participate fully. Vision therapy could help them. It's time we recognized that and made it available.

# 2

---

## CHAPTER 2: BEHAVIOUR

One day, for no reason that anyone could comprehend, eight-year-old Jared ran off the edge of a concrete platform and landed, unprepared, on his face. He spent a week in hospital and two weeks out of school, recovering from a concussion and some broken bones. He explained that he simply hadn't seen that the platform was ending.

Then, just seven weeks after that, while playing tag, Jared ran full-speed into a pole and suffered another concussion. He told his parents that he had seen the pole, but that it hadn't been in front of him, but rather off to one side.

Jared had a long history of vision problems. As a baby he'd had amblyopia, or "lazy eye" — where one eye doesn't develop properly so the brain favours the other — and when he was screened in kindergarten, he needed serious correction plus some eye patching. His mother says he was always a clumsy kid, even after he got the glasses and finished the patching. Pretty much every time he tried to go down the stairs, for instance, he'd stumble and have to grab the railing. He'd walk into walls. He couldn't play sports.

After the two playground accidents, he started to write things backwards, making his already very poor writing skills even worse. So it was recommended that he have vision therapy. Early in the assessment, a question about his behaviour came up. His mom was thinking, "You're an optometrist. Why are you asking about behaviour?" Then she gave the lowdown.

At school and in public, Jared just came across as very shy, or sometimes a little rude. He wouldn't speak much, not even to kids his age, and he avoided eye contact.

But at home, he was a handful. There were epic meltdowns. The family had by this time given up on homework altogether. They'd tried reading recovery, Kumon and private tutors. He hated them all — he'd even attacked one tutor, throwing her books at her. He would yell "I'm stupid!" and bang his head against the wall. He'd rip books up and throw things across the room. The little boy had been seen by psychologists and psychiatrists, had been diagnosed with anxiety and given medication for it, and was suspected of having high-functioning autism. But no one had ever connected the dots between his terrible behaviour and his terrible vision.

---

Poor little Jared couldn't even get through the testing. I sat him down to check on how his eyes tracked but he couldn't get through the paragraph I had asked him to read. His eyes were watering like crazy, and anyway, despite being in grade 3, he couldn't really read yet.

I felt terrible for him. I wondered what his life must be like. From experience, I knew visual problems and behavioural problems can often go hand in hand.

I reminded his mom that when you can't see properly, the world can be pretty frustrating. I mentioned the broken bike analogy — how Jared was essentially riding around on a bike with a busted wheel, yet was expected to be able to ride like the kids on bikes that were in good nick. The world was basically asking him to do things that he wasn't able to do. It was no surprise that he felt stupid and angry and fed up. How would any of us act under those circumstances?

In the end, Jared had 18 months of vision therapy. I'm not sure he said more than six words to me that whole time — he's not a verbal communicator — but that was okay. He took Fridays off school so he could have a quiet time in our clinic and not be doing therapy during the after-school meltdown time. His mom did his nightly homework with him, getting buy-in with bribes of candy.

They had come to me looking for help with his vision to improve his reading, writing and lack of coordination. As expected, his reading and writing improved — he was at grade level by the end. His clumsiness went away too, now that he had depth perception.

But, to his parents' astonishment, his behaviour mellowed as well. He came home after school and didn't go into meltdown. He could do his homework. He still has the occasional outburst, but nothing like before. Now he was a regular nine-year-old boy.

---

Quite often people find that when vision improves, it helps with more than just the reading and writing and math. It helps with behaviour too. Chelsea, from the previous chapter on reading, was another example. It hit her mom one day that it had been a very long time since she'd heard her daughter threaten to set her alight. "It's one of those things you don't realize it until it's gone," Janice says, laughing.

There were no more fights at school, either. Instead of being the kid other parents worried about, Chelsea became the kid who knew how to be gentle when classmates had special needs. Likewise, Jared changed from a kid who had no self-esteem to a kid who accepted himself and even liked himself, says his mom.

It's no small wonder that kids with visual problems have behaviour problems too. They are being asked to do things they simply don't have the tools to do. Of course, they are frustrated. And of course, that frustration is alleviated once they can do what is expected. And this could be way more important than we currently appreciate.

Jared's mom, Kendra, is a probation officer. Before that, for 13 years, she worked with juvenile offenders. She recalled that some of her former clients couldn't read or write. Many dropped out of school. "They get mad at themselves," she says. "Their parents get mad at them. Professionals get mad at them. They start having this negative outlook on life, because they're not doing anything right."

Watching how her son changed after vision therapy made Kendra wonder about her former clients. Could vision problems account for some of their

issues? Maybe they weren't succeeding because they simply couldn't do what society was asking them to do.

Turns out she wasn't the only one wondering that. Dr Paul Harris, an optometrist in Baltimore, wondered that same thing. In a paper entitled "The Prevalence of Visual Conditions in a Population of Juvenile Delinquents," he reports findings on 132 kids aged between 13 and 19, all of whom were attending a special school for kids in trouble with the law.<sup>8</sup> Many of the kids had been arrested multiple times.

Harris subjected them to a battery of tests. One required them to read off, as quickly as possible, three paragraphs full of numbers. Many of them scored abnormally low on this, because they were so slow. Another was a test in which the kids had to identify which letters and numbers were written backwards. Three-quarters of the kids failed. Although their average age was almost 17, Harris found that their average reading score was below grade 6.

He tested the students for things like their tracking abilities and how close an object could get before they saw it double (called "nearpoint convergence"). He also asked the kids about visual symptoms. Did they have double vision? Do they ever cover one eye to see? Do they hold their reading material close? Many of the kids reported multiple symptoms; only four had none.

Harris concluded that a high proportion of young offenders do in fact have vision issues. In his opinion, vision should be considered a major contributing factor in why these kids don't fare well in the world. I agree.

Kendra worries that, for so many kids, these issues will be missed or not treated. Her kid's eyes were so bad that her family was willing to pay for therapy. What if a kid only has a tracking issue? What if a parent has no money? How many kids are in juvenile detention simply because their visual systems have failed them?

8. Paul Harris, "The Prevalence of Visual Condition in a Population of Juvenile Delinquents," *Curriculum II*, vol 61, no 4 (Jan 1989), pp 1–16.

# 3

---

## CHAPTER 3: DEVELOPMENT

Samuel was born to a woman with drug and alcohol issues. Over his childhood, he has been diagnosed with fetal alcohol syndrome, autism, ADHD, developmental coordination disorder, sensory processing disorder, obsessive compulsive disorder, oppositional defiant disorder and a moderate intellectual disability. "He kind of has everything," says his mom, Denise, who adopted him at age one. (In an effort to protect their identities, the names in this chapter have been changed.)

Specialists had cautioned Denise not to expect much — that Samuel would likely miss many milestones. "All along, we were told he'll never read, he'll never be toilet-trained, he'll never ride a bike," she says. Denise admits they were struggling. Samuel had attempted the mainstream school system in kindergarten and grade one. But even home-schooling with a one-on-one educational assistant was getting to him. He was increasingly violent towards his mother, hitting her and even trying to push her down the stairs. She had to restrain him multiple times a day, sometimes for over an hour at a time, she recalls. "The fear was he may have to be institutionalized," she says.

Denise didn't want to give up on him quite so quickly, though. She had watched him get over hurdles that everyone had predicted he wouldn't. She thought he might be able to get past this too. But she also had three other children with special needs to think about. All had been born to drug- or alcohol-addicted women and all were facing significant challenges.

At the point when Samuel was first recommended for vision therapy, around age nine, his mom didn't think he was ready, behaviourally or

emotionally, to benefit from it. He couldn't sit and focus on anything for that long — he couldn't even go on a ten-minute walk with three aides, his mother recalls. So she put it off.

Meanwhile, her daughter, Sophia, who was just a bit younger and had also been recommended for vision therapy, was struggling in school. She had recently been diagnosed with both dyslexia and dysgraphia (a writing disability). It was an hour's drive from their home to the therapy, and Denise decided that if they were going to make that commute, the two kids should do therapy at the same time. She waited for the moment to be right for both.

Luckily, that happened within a year. "It was like she can't wait any longer and I think he can do it. So let's try it."

She wasn't at all sure the therapy would help Samuel, but she decided to give it a go. And it did help. Samuel started the vision therapy program as a 10-year-old operating at a preschool reading level. After a year of therapy, he began to read for real. "He's full-on reading now," says Denise, who estimates he's able to read at a grade 1 level. "It has been so significant for him."

Perhaps even more importantly, he is also now able to do sports — and not just the bike-riding she was told he'd never master. He's now doing intense, hours-long hikes and even playing tennis.

---

Here's the message I most want to get across about developmental disorders and vision: just because there are other things going on doesn't mean vision isn't a part of the mix. Visual issues need to be investigated.

When I test a kid who has a developmental diagnosis, I try not to let the diagnosis distract me. What I need to find out is if there are visual issues. Because if there are and I can alleviate them, then at least I'm improving their visual function, and that's going to help them out with everything else.

The part that kills me the most is that there are so many kids where obvious visual issues get chalked up to something else. Too often people tend to assume a child is not reading or not writing or not playing sports because of their primary diagnosis — people say, "that's just autism," "that's just developmental coordination disorder," "that's just fetal alcohol syndrome."

For instance — and head injury patients can identify with this — often when you have visual issues, it's uncomfortable to make eye contact with

people. The background tends to swim, and it just doesn't feel good, so you kind of avoid doing it. I get a lot of parents who notice, after their kid has had vision therapy, that the child has started making more eye contact with others. All along, that was considered to be a part of the developmental syndrome, and now they realize it was a symptom of poor vision.

Please don't assume there aren't visual issues. You have to rule them out.

To be clear, I'm not going to treat a kid based on the complaint that they're not making eye contact — the same way I don't treat someone because they're struggling with reading. That doesn't fall into line with my testing and treatment. I only treat someone if they have visual problems that might be underlying those symptoms. But as I said, too often these symptoms have been wrongly attributed to a developmental issue and never even looked into.

In my opinion — and not just mine, because the *Diagnostic and Statistical Manual of Mental Disorders* says it too — you should not diagnose a developmental syndrome (including dyslexia) as a permanent disability if a child has untested or uncorrected visual issues. Those should be ruled out first, but that's almost never done. Because — guess what — those visual issues will have skewed your results. If a child can't track a ball or make eye contact, yes, it may be the consequence of the syndrome. But it may be an even more direct result of visual impairment — something we can actually fix. It breaks my heart to see kids just written off this way.

It's especially important, in my view, to be careful when diagnosing developmental coordination disorder (DCD). By its very definition, DCD means a child has not developed proper coordination. But before you can coordinate something, don't you need to know the coordinates? Before you swing the bat, or move your foot, don't you need to know what you're aiming for?

If things aren't working well visually, you can't possibly calculate that. So why are we surprised when coordination isn't great in kids with troubled visual systems? I'm not saying every case of DCD is visual — although I personally have yet to find a single case where that isn't a significant component — or that every kid who fails to make eye contact does so because he has vision issues. But if these are areas they're struggling with, surely we should be investigating them and trying to fix them.

In the end, it wasn't just Samuel and Sophia who came in for therapy — their older and younger brothers, Caleb and Henry, did too. We were able to bump things around a bit so that all four siblings could work with their own therapist on the same day in the same time slot.

Often what happens is that parents decide to treat only the child with the most severe problems. All the parental attention is on that kid, but once those problems are resolved, the other kids' problems become more noticeable. Denise was able to foresee this, and decided to compress all the effort into just one year and have all the kids treated at once. Although they hated the drive, she says, they never complained about the therapy. (They were all amazing.)

Samuel was hands-down the most severely affected, visually. His eyes could hardly converge and his tracking was abysmal. Like a lot of kids with those issues, he described his vision as "jiggly." That's just the brain not being able to process things properly.

With those constraints, it didn't surprise me that he wasn't reading, but I was pretty angry that other professionals had told him not to expect to ever read. Imagine that: a 10-year-old condemned to thinking he would never be able to read. No wonder he was so frustrated.

Samuel's educational assistant came down with the family, not only to help with managing the commute, but also because she was going to be doing the home practice with him all week. Denise did the homework with the other three. All of the kids were being home-schooled that year. She tells me they didn't do math all year, because they were so focused on doing the vision therapy and on jumpstarting reading.

I knew that Samuel was going to do well, but I didn't realize how well. He really exceeded my expectations. He's an example of how a kid's life outcome after therapy can be dramatically different. It's true that he matured a lot that year and that he also felt a lot calmer because his mom had found him a quiet place to do his schooling, and both these things contributed to his improvement. But finally being able to read and finally being able to play sports were major factors too.

Sophia had a lot of the same vision issues as Samuel, but they were less severe. She was such a sweet kid. She was also a really hard worker. I think we caught her just in the nick of time. Like Samuel, she wasn't reading yet, despite being 10 years old. But vision therapy turned that around for her. Sophia is now reading just below grade level, and her mom now describes her reading appetite as "voracious."

Both Sophia and her younger brother Henry went back to mainstream schooling following their year of vision therapy. The oldest boy, Caleb, who started therapy at 12, may have shown the least progress, according to his mother, but he still improved a lot. His reading progressed and his academic confidence improved enormously.

Denise says it was a gruelling year, but worth it. "Getting them as far as they can go academically is important to me," she says. She thinks both Sophia and Henry have a shot at university. Her central goal is to get each child functioning as well as they can, she says, even though she knows two of her boys will likely never live independently. "You want to give them every opportunity."

---

I see a lot of kids with developmental diagnoses. The prevalence of visual problems in kids diagnosed with autism, for instance, is very high.<sup>9</sup> It's no surprise when you think about it. Autism has to do with atypical neural development. With so much of the brain devoted to vision, it stands to reason that vision might be affected.

As I mentioned, I also see a lot of kids who have been diagnosed with DCD. Remember Kalan from the chapter on reading? He was on the conveyor belt to being diagnosed with it. His mom, Lara, halted the process. Instead, after doing vision therapy, Kalan got kicked out of special ed. "He was reading at grade level," says Lara. Importantly, the symptoms of dyslexia, ADHD and DCD all disappeared.

His is a cautionary tale. For one thing, I've noticed that when kids are labelled, they start to own it. Telling someone they have a disability is serious.

9. David R. Simmons et al, "Vision in autism spectrum disorders," *Vision Research*, vol 49, no 22 (November 2009), pp 2705–2739.

For another thing, expectations are sometimes lowered. Instead of pushing a kid to do his best, he may be shunted off to the side and coaxed in a less demanding direction. Finally, if your eyes are messing up your world, of course it's going to hit your confidence.

A DCD diagnosis is made when a child isn't acquiring and using motor skills the way we'd expect for their age. They might drop things or bump into things, have bad handwriting, not be able to use scissors or cutlery, or not be able to ride a bike or participate in sports. But as I said above, the official diagnostic criteria require that visual issues are ruled out. Of course they do. Because how on earth can you do an accurate assessment of a kid like Kalan, who had unresolved visual issues? The answer is: you can't.

Kalan went from failing to straight A's. His parents had to start an RESP! Other kids may show a more gradual improvement. But improving vision can have ramifications beyond what we realize at first. There's one young guy I worked with, and when we treated his visual problems, not only did his reading and learning improve, but he could actually play sports. And not only did he enjoy that, but now all of a sudden he was having social interactions at school. Before, he played alone at recess. No one wanted him on their team. After his treatment, other kids wanted to play sports with him. He developed a friend group.

Yes, he still has autism. But now he's not facing visual challenges on top of that. We sometimes don't properly appreciate how important sports and play — and fitting in — are in a kid's world.

I'm going to say it again: Don't assume all of these problems are just the way things are. Please, please, please, don't just assume nothing can be improved.

# 4

---

## CHAPTER 4: CONCUSSION AND HEAD INJURY

The day Todd decided to head north to open the cabin was sunny and clear. He had just come back from two weeks in Mexico and was looking ahead to a summer of kayaking, water skiing and fishing. He also had some trials motorcycling events lined up and a few hikes in mind. He was an assistant fire chief, and like many in the profession, he liked to keep active.

That all changed about an hour into his trip, when a one-ton truck plowed into him full speed from behind while Todd was stopped at a red light. The impact tore the back wheels off the axle, and the truck bed folded into an accordion. Somehow, miraculously, Todd stepped unbroken from the wreck.

"Next thing I knew, I was standing in the middle of the road," he says. Police, ambulance and fire trucks all rushed to the scene. Todd thought he was okay, so he asked to be dropped off at a friend's cottage nearby, and the first responders obliged. But not long after, it felt like everything started closing in on him. His buddy drove him to the hospital back in town, where they checked him over and sent him home again. But he was back the next morning with excruciating pain in his head, neck, shoulder and lower back. More worrisome, he couldn't think straight and was losing his ability to speak. "Everything tanked," he recalls.

That was just the beginning. Todd fought to retain a foothold in his former life, as his condition got worse and worse. "It was almost like a stroke," he says. There was numbness and tingling down his left side, and his speech was slurred. He stuttered. He shook. His short-term memory was shot.

Not only was water skiing and trials motorcycling out of the question, the 48-year-old found he could no longer even walk. “For the longest time, I would just stand there. I would try to walk, but I could not figure out how to do it.”

His vision was a mess too. He was extremely light-sensitive and couldn’t focus on anything — not a book, not a newspaper, not a friend’s face. Anything with motion made him dizzy and nauseous. When he could finally bring himself to look at a TV screen, all he could watch was a channel that showed still shots of photography from around the world. “It was all I could do for six or eight months.”

“I was in a really bad place,” he says. He cried a lot, something he’d never done much before. Things that used to be so simple now seemed impossible. “I’m a smart guy. I’ve run companies. I was assistant chief,” Todd says. “This rattled me pretty good.”

---

I still remember the first day I saw Todd. He walked into the office like he was drunk, but he wasn’t. His speech was slurred too. He had trouble answering even simple questions. He was really, really messed up.

He said he saw one-and-a-half of everything, like when you push really hard on one of your eyeballs. He described his visual world as being “kicked” — as in kicked off to the side.

A lot of the assessment exam was hard to do. But I got enough to tell that his eyes weren’t tracking and weren’t working together, and his perception of depth, space and midline were just totally off.

That day I was able to find some glasses to help him — they took the edge off some of this — but I knew what he really needed was full vision therapy. To be honest, I had no idea how we were going to get that accomplished, because Todd was really struggling. He cried in the chair three or four times that first day. I didn’t even know whether I’d be able to get him back into the office.

It broke my heart.

I went home that night wondering if I should call the guys at the fire hall. I know a lot of firefighters and they’re pretty tight. But I didn’t want to breach his privacy. Should I talk to his dad? He was the one who’d brought Todd to the appointment and was having to drive him around. I wasn’t sure what to do — so in the end, I just waited.

It was a few months before Todd turned up at my office again. Emotionally, he was in a better place by then, but he was still the most severe head injury patient I’d had up to that point. A lot of his buddies thought he’d never get back to work again, but I had this weird blind faith that he would.

We started off very slowly. And we progressed slowly. He had to do the initial work while lying on his back, since it took too much out of him to just keep himself upright. We had to start by working on the most basic of visual functions, like getting the eyes to smoothly follow a moving object (which we call “pursuits”) or getting them to jump quickly and accurately from one place to another (called “saccades”). Later, we worked on stuff like peripheral awareness by, for instance, getting him to hit targets on a wall with a pointer, while he maintained his gaze centrally.

The whole program had to be done in such a way that Todd could make improvements every week. As far as I’m concerned, if a patient is not showing improvement with what we’re doing, we need to change how we’re doing it.

Still, it was rough going. Here we had a really fit guy, who used to play racquet sports, and, at the beginning, he couldn’t even swat a kiddy sponge ball suspended by a string from the ceiling. He couldn’t draw his way out of a simple maze. He couldn’t walk a short balance beam. It was excruciatingly hard for him, not only physically, but also emotionally.

Todd was really hard on himself. He couldn’t bear the thought of anyone thinking he was faking something, or milking the system. He admitted later that he came in thinking that vision therapy was just a bunch of hocus-pocus. He was only coming because he was so desperate that he was willing to try anything. But once he saw he was improving, he was all in. If anything, Todd worked too hard. We were always having to remind him not to overdo it.

My team and I helped Todd get about 80 per cent of the way back to normal. It took about 18 months of therapy. Todd still talks about how exhausting it was. “I remember each day finishing and needing a nap,” he says. He got terrible headaches from what we asked him to do.

In the end, Todd was off work for over a year. But he did go back. At first it was for just a couple of hours a day. Then, bit by bit, a little more. Now, four years out, he works four days a week, five hours a day. He still has to go home and nap in the afternoon, and he goes to sleep early at night. But he’s got his life back.

It took eight months before he could drive, but now he’s even back on the motorcycle and doing events. The day he was hit in his truck, his car was at home with a sea kayak strapped to the roof. He refused to take that kayak off. He says he looked at it out the front window to remind himself what he had to get back to. The kayak sat there, all summer, all winter — a reminder, an irritant. Finally, 14 months after the accident, he drove her out to the lake, put in, and went out for a paddle. I hear it was quite the day.

---

One thing I like to be absolutely clear about is this: I don’t treat concussions or head injuries. And I don’t diagnose them. What I do is treat the visual complications that arise from concussions and head injuries.

A concussion is a brain injury that you get after your head has been bumped, jolted or shaken. The sudden movement of your brain inside your skull causes biochemical changes in its tissue. Sometimes people lose consciousness, but often they don’t. Just because you didn’t get knocked out doesn’t mean you didn’t suffer a concussion. And this type of injury can have many names — whiplash, head injury, mild traumatic brain injury (mTBI), concussion — but regardless of what it’s called, what’s important to me is whether it caused a loss of visual function.

Most people are familiar with the main symptoms of concussion: balance problems, poor memory, poor concentration, lack of coordination, severe headaches. People may be less aware that visual problems are behind a lot of these concussion symptoms. It’s generally recommended that after a concussion, a person should rest, both physically and mentally, until the symptoms

go away. Most patients with concussion recover within a week or two, on their own. But some don’t recover so easily. This is especially true for people who suffer concussions and head injuries through violent events, like the one Todd went through. They often require treatment before symptoms go away.

As I mentioned above, the symptoms I can help with are the ones caused by visual problems. There can be a lot of these, since around 50 per cent of the human brain is involved in processing vision. In fact, the visual system is one of the most vulnerable to damage in head injury. Not surprisingly, then, vision therapy can be extremely important to recovery.

Much of the damage caused to the visual system during head trauma can’t really be seen using current medical imaging techniques — a real source of frustration for practitioners. This means we have to detect damage by checking how a person functions. Some dysfunctions are more obvious than others, like a sudden and extreme intolerance of light or really bad balance. But more subtle things can also be telling.

I examine things like how well the lens changes its shape when it’s trying to focus. Or whether the eyes move in unison when they are supposed to. Or whether a person can properly judge where “right in front of your nose” actually is. Many of these basic abilities can be jumbled after a head injury. We call these issues “post trauma vision syndrome” — which is really just a fancy term meaning your visual issues were caused by your head injury.

Here’s one way I like to explain what’s going on. Imagine your brain has all these recipe cards with instructions written on them for how to do the things you need to do in life. Before you ever drove a car, for instance, you didn’t have the instructions to do that. You didn’t know how, and you had to learn. Eventually, your brain got it and filed it away. Now, every time it needs to drive, it refers to that instruction set, and each time you do it, the action strengthens the ability. Once you’ve got it down, the instructions kind of run in the background and you don’t have to concentrate on them as hard as you did at first.

The sheer force of a concussion can destroy these instruction cards. It’s as though they got cut into hundreds of pieces. Now you’ve got to put the pieces back together again. In vision therapy, we’re giving the brain a chance to essentially find, pull and piece together — or even rewrite — those instruction cards.

The tricky part is that all these little cards also point to each other in various ways. If these cards had actual recipes on them, the one for carrot cake would have to tell you where to find the one for cream cheese icing. Head injury also disrupts a lot of those sorts of interconnections.

So vision therapy also has to help make sure that any card that's connected to the one you're working to restore is also fixed and pointing to the right places. You can redo your carrot cake recipe, but if the cream cheese icing card got damaged and your icing tastes like sour milk, the completed cake is not going to taste right. Or if you rewrite both cards correctly, but they each point back to the old, cut-up recipes, that's not going to work either. That's why just purely isolating some of these visual issues without properly integrating all the repairs often doesn't help much.

Going through the therapy, you're basically re-forming your brain's algorithm on how to use information coming from the world and also how to use it in sync with other algorithms. As with any learning, it also matters that you get good feedback. Vision therapy has proper feedback loops built in, to help the brain adjust how it's doing things as it's recreating these instructions. That is one of the big differences between just trying to do things again and again, and genuine therapy.

Our goal is to get back as much function as possible. To get your brain interacting correctly with the world again. To get your life back.

---

Todd's issues were clear to him and clear to us. We worked on them. We resolved a lot of them. No one contested what he was saying. His other medical folks agreed that vision therapy was needed. He was in a horrific accident; he lost a lot of function; he won much of it back.

But sometimes people are in accidents and suffer concussions and post trauma vision syndrome, but it's not so obvious — or at least, it's not acknowledged. That was what happened with another patient of mine, James.

James was a heli-logger — making his living logging mountains only reachable by helicopter. They harvest trees from up there that are gigantic and worth serious money. But it was a dangerous business. Guys were injured all the time. Ironically, it wasn't in the course of his work, but on the way to his work, that James got hurt.

Usually James would fly into camp, but there was a storm that day, so they decided to take a boat in. The weather was bad enough that BC Ferries vessels were turning around, but his crew's little 20-foot boat kept going through the 15-foot swells.

James was sitting in the front, next to the captain, when a huge wave hit the boat and tore his seat right off its base. James went flying. His buddies would later tell him that he hit his head first on the roof, a second time on his way down, and again on the ground. He was out cold for a bit, then came to. It took them a couple of hours to make it back to a town that had a small hospital.

James was dizzy, his head was throbbing and his vision was blurry. The hospital released him but he threw up all night, so he went back in the morning. He was sent by ambulance to a larger facility further south, and after doctors confirmed a concussion, his family came to pick him up.

I first saw James about a month after the accident. Like Todd, before his injury he'd been a very active guy — hiking, kayaking, going out all the time with friends, going to the beach every day. Now he was spending most of his days lying in bed, in the dark, alone with his dog.

He was having major problems with his vision. He couldn't stand any light. He had to wear sunglasses and a hat anytime he went outside. And inside, where he spent most of his waking hours, he kept any artificial lights turned off at all times. He said that being exposed to light sapped him of all his energy.

He continued to have double vision. Everything seemed blurry, and it was painful for him to focus for too long. His depth perception was off too. A simple thing like reaching for a glass of water on the table was beyond him.

And James had terrible headaches. He had migraines every day. He said it was like an axe in his head, splitting it in two. He couldn't be around people. They tired him out. Some of his friends disappeared. He says he slowly pushed his girlfriend out of his life too.

I knew he needed vision therapy. But, shockingly, the workplace insurer, which was responsible for keeping him safe and helping him get better if injured, would not even recognize that he had visual issues at all, let alone accept that they needed to be treated. They flat out refused to pay for vision therapy. So James put it off.

I felt for him. He was young, just 20 years old, at the beginning of his adult life. Here he was stuck at home all day, in pain and unbelievably bored. I assured him that things would get better. I dropped off a syntonix set up, a machine that produces selective tints of light, to try to help with his light sensitivity. Even though he couldn't sign up for vision therapy at that point, I didn't want to leave him without any hope at all.

Over the next year, we kept in touch. I'd suggest a few exercises for him to try just to keep the momentum. I'd shoot him a text every now and then. It was outrageous what was happening to him.

He was doing everything his insurer told him to do — physio, acupuncture, job coaching, counselling. But so much of it was just out of the question because of the unresolved visual issues he was struggling with. I mean, the guy couldn't stand artificial lights, so how could he sit in a room and talk about job hunting? He couldn't tolerate being around people and noise and motion, so how could he do any group work at all? Many of the therapists assigned to work with him agreed he needed to fix his vision first — even his neuro-ophthalmologist prescribed vision therapy — but still his insurer refused. A whole year after his accident, the only thing James had convinced them to pay for, vision-wise, was a pair of glasses with lenses that blocked blue-spectrum light.

Over those months, he got really depressed. He felt irritated with all his friends, all his family. While his symptoms kept getting worse and worse, his insurer was convinced he should be back at work. That's what their formula told them.

About a year after his accident, while he was still suffering the after-effects of his head injury, they decided to cut him off altogether. Can you imagine? No more pay and no more coverage for therapy of any kind. No more migraine meds. It turns out that when he'd totally failed a test they'd given him, rather than taking it as evidence that he was still sick, they concluded he was faking. They stalked him with a camera for a month, then claimed that he was a malingerer. They argued that because he could occasionally walk his dog or get a haircut, that he was fully recovered.

It was brutal. He developed severe anxiety and didn't even want to leave the house after that. At one point he started thinking about suicide.

Talk about creating a mental condition. Here's a dude who wants to be better! They won't help him, won't believe him, and he gets worse. They treat him like a liar, a faker. No wonder he was in such a dark place.

Quite frankly, the reason he failed the exam was that his visual problems were so bad. The exam was on a computer. The guy could not even look at a computer screen at that point. Because his insurer couldn't understand this, they thought he was deliberately trying to fail the test. Then, when they got honest results — which showed severe visual problems — they didn't know what to make of them. But because the results didn't fit with what they expected, they accused him of getting the answers wrong on purpose. It's like putting someone with a knee problem on a treadmill and berating him for not running fast enough — accusing him of being lazy!

James decided to appeal the ruling. He wanted them to recognize that he had these visual issues and to pay for the therapy that would treat them. I wrote what was, under the circumstances, a politely restrained letter, supporting his case. I explained to them that James couldn't look at a computer screen up close without extreme discomfort, that his eyes weren't able to track text on a page, that they weren't even aligned properly. I told them that what their client needed was vision therapy.

Luckily, he made the decision around this time to just go ahead with vision therapy, with or without the insurer's blessing. He was desperate to get his life back. He had no money, no job, no prospect of earnings — but I told him we'd figure the money out later. I saw a guy with no other way out. I saw the state he was in. I saw what they were doing to him. I didn't see how else he was going to get better.

James made great progress. We were seeing some nice improvements within the first three months. He came along really well. Eventually, the light sensitivity was gone. There were no more headaches. The discomfort was gone. It took about nine or 10 months to get him better.

In the end, James also won his appeal. A court overturned the use of the insurer's video. And they reimbursed him for all his vision therapy.

James says his life is back.

But he does have one regret — that he didn't start vision therapy sooner. He believes that if he'd started right away, he would be back logging today.

During his dark days, he lost confidence in his abilities, he says. “When you’re logging up there, you’re walking on fallen trees all the time. There’s no such thing as ground. You’re running around the woods like a monkey.” If he’d had vision therapy right away, he believes, the psychological issues wouldn’t have become so prominent.

James says he still thinks about logging every day. “You’re in the most beautiful places — places nobody’s ever been,” he says. “I’m stepping foot where only animals have ever been. The views are incredible. You’re at the top of a mountain. You’re free. There’s nothing like it. I would have done it for the rest of my life.”

---

Most of our concussion patients are not as severe as Todd or James. With both of them, the injury went well beyond mere vision. But for many of our more typical concussion patients, vision is the most significant aspect of their problem, and once that’s been fixed, they can often get right back to their former lives.

That’s what it was like for Diane (not her real name). She came to us several months after a minor car accident, complaining of headaches, light sensitivity, balance problems and memory loss. She also had difficulty following conversations or multi-tasking. Her doctors had chalked it all up to “stress.” Luckily, her physiotherapist suggested she come see me.

As with Todd, I started with lenses. With proper use of lenses, you can change perception of depth and space, the efficiency of how the visual system is working, and the interaction between the visual and vestibular systems. (For more on ergoptics, see Chapter 7.) The lenses made a huge difference right away and the vision therapy slowly did the rest.

Unfortunately, just two days after she finished with us, she was in another car accident. Her symptoms came right back. After all that hard work and accomplishment, she found herself back at square one.

She had already made arrangements to return to work — something both she and her employer both desperately wanted — and so she did. That’s a bit like doing rehab for a bad back but shovelling the snow every morning. Like Todd, she tended to push herself too hard. With her, we actually had

to use a pacing system — one that allocated points to certain activities and capped the number of points per day — to keep her from overdoing things.<sup>10</sup> Luckily, after a bit of a fight, her physiotherapist and I convinced her to give herself the time she needed for recovery. She finally agreed, and I’m happy to report that she’s now back to her old self.

It’s amazing how hard it is sometimes to convince the powers-that-be that symptoms are genuine. Symptoms need to be treated. They aren’t just all in your mind. Luckily, there is evidence to support this. A paper in the journal *Brain*, for instance, compared the eye movements of 36 people who had post concussion syndrome and 36 others who reported having recovered from concussion. All the patients were about five months out from their injuries.<sup>11</sup>

Lo and behold, on four separate eye movement tests, the ill patients performed measurably worse. They also did worse on tests of memory, attention and something called executive function. The authors say that their findings indicate there is ongoing brain impairment. I agree with them. Because this performance is beyond conscious control, the authors also argue that this is evidence that post concussion syndrome is not psychological, but physical. I agree with that too.

It would be great if patients, like James, or Diane the second time round, could be objectively evaluated like this. But not every medical centre has the expertise to do it. In the meantime, every concussion patient whose symptoms persist past the first week or two should, as a matter of course, be evaluated for vision issues and, if found, they should be treated. Self-resolving issues usually go away within that time frame; lingering ones tend to require intervention.

We still have a long way to go. I see so many people who are told that this is just the way it’s going to be for them now. Other times, as with James, they’re told they must be faking it because the doctors can’t find anything wrong. So many medical appointments and so much time is wasted because of our ignorance about one of the most important systems in the brain. This failure of ours is not without costs. For one thing, it costs taxpayers dollars. But more importantly, it costs individuals their quality of life. It’s just wrong.

10. The Pacing Points Program® is a self-management strategy developed by Parkwood Institute

11. Marcus H Heitger et al, “Impaired Eye Movements in Post-concussion Syndrome Indicate Suboptimal Brain Function Beyond the Influence of Depression, Malingering or Intellectual Ability,” *Brain*, vol 132, no 10 (Oct 2009), pp 2850–2870.

# 5

---

## CHAPTER 5: DIZZINESS AND BALANCE

The only remarkable detail about the day in May when 13-year-old Abby first felt dizzy was that it was hot. In the evening, she started to feel lightheaded, like she was going to fall over. She went to bed dizzy, and when she woke up the next day, the dizziness had not let up. It followed her through end-of-year camp, through graduation and into the summer. Abby was a competitive skater and had signed up for intensive training in July, but she had to abandon that when she couldn't get through more than an hour on the ice without having to lie down.

With the help of a physiotherapist, who thought she'd suffered a viral infection affecting her inner ear, the dizziness eventually started to go away. By September, she was back to school, back to her six-hour-a-day training schedule and back to competing. In mid-November, she won a gold medal in a regional competition. She landed two axels that day and pulled off a spin that consisted of more than a dozen consecutive tight rotations. But four days later, after an intensive school gym class, Abby suddenly felt dizzy again, and for a few moments, she even lost consciousness.

It would be the beginning of a very long, dark chapter for her and her family. Between that day in November and the following May, there would be no time when Abby didn't feel dizzy. The former figure skater could now only walk by bracing herself against a wall or holding onto another person. She attended only half days at school, when she was able to attend at all.

Over the course of the winter, Abby saw a pediatrician, a neurologist, a cardiologist and a biochemical geneticist, but no one could explain what had happened or offer a solution. The family doctor suggested it was psychiatric — that she was a stressed-out teen who didn't want to go to school anymore. But Abby insists she did want to go — she just couldn't get from class to class or keep herself upright. Mental health workers who assessed her agreed with Abby that it must be physical.

Then, one morning in April, Abby woke up and said, "Mom, I can't see." She suddenly had double vision so bad she could not read. Her mom called a doctor friend, who advised the family to stop wasting time locally and head straight to Vancouver. The next day, Abby's 14th birthday, they made the three-hour trek by car and ferry.

The ER doctor at the hospital there was dismissive. She wondered why they thought she'd know more than a neurologist. Then she asked who had applied Abby's eyeliner. Abby told her that she had done it herself. The doctor replied, "Anyone who does eyeliner with that precision can't be sick." They sent her home.

The family was at wit's end. Her mom was worried it was a brain tumour. Abby continued to suffer from dizziness, nausea and double vision. She was no longer going to school at all. She just stayed at home, in her room, in bed. Her mom took her back to the local emergency room and begged for a referral to an ear, nose and throat (ENT) specialist and for an MRI. A few days later, the ENT ruled out a vestibular cause in less than five minutes and called out, "See you at the Olympics!" as the teenager struggled just to walk out the office door. In the elevator, Abby's mom broke down in tears. "That was our last hope. That was our last chance for a specialist to say, 'Hey, this is what's going on.' That was supposed to be our answer." At that point, it occurred to her that her daughter may never again walk on her own. "I'm going to have a 40-year-old living in my house, holding onto my shoulder."

Abby's optometrist had noticed that, although she'd never had a head injury, her symptoms were uncannily similar to those of a concussion. So he referred Abby to someone who could help with concussions. That appointment was scheduled to take place right after their appointment with the ENT, but now Abby's mom just wanted to cancel. The treatment could cost

thousands of dollars, she'd been warned. "I'm not paying that kind of money to a concussion doctor," she was thinking, "if she doesn't even have a concussion." But Abby convinced her to go, since they were already downtown.

Abby shuffled into the office, with both hands on her mother's shoulders. They filled out paperwork and then there was some testing. "I was skeptical. If something's that expensive, my husband and I don't go individually. But this was so not going to happen, it wasn't even worth him taking time off work." When the doctor started talking about changing Abby's glasses prescription, after she'd just got new glasses the month before, Abby's mom rolled her eyes.

It wasn't until the doctor put a pair of lenses in front of Abby's eyes and she said, "I feel less dizzy," that Abby's mom perked up. After six months of slow deterioration, it was the first improvement of any kind to come Abby's way.

---

I still remember the day Abby and her mom came in. I was standing in the reception area and watched as an adolescent girl, literally clinging to her mother's back, made her way across the parking lot. I had never seen anything quite that severe in someone so young. My heart went out to them.

Like all the other medical specialists they'd seen, I had no clear idea about what had triggered this saga of dizziness. But what I did know was that, regardless of whatever else was going on, any visual problems she might have would be making it worse. Alternatively, the visual issues may even be at the root of the problem. Either way, if I could help fix the visual issues, then her condition might not be so devastating.

We take balance for granted, but it's a complicated interplay between three separate bodily systems. One is the vestibular system. This includes a complex apparatus in each inner ear, which allows us to detect gravity, linear acceleration and rotation. Another is our muscles and joints, which play a role in what's called proprioception. They send feedback to the brain about where our body parts are. The neck can be particularly important. Last, but definitely not least, is the visual system. Not only is this the system most interesting to me, but it's also extremely important for balance and dizziness. Vision takes in information about what is around us in space, relative to our

eyes. The separate strands of information sent to the brain from these three sources have to line up. If they don't, the sensory mismatch can result in dizziness and loss of balance.

I can create this dizzy sensation in my office with special goggles that, while allowing you to see clearly, distort the signals that your eyes send to your brain and consequently change how you perceive depth and space. Sometimes that helps parents or caregivers understand what the patient is going through. (We call them the “goggles of empathy.”) When I make you wear these goggles, I'm not altering any information coming from your joints and muscles or from your inner ear. I'm only toying with information from the eyes. But that is enough to muck up the brain's ability to keep you feeling balanced and stable and standing comfortably upright.

My initial testing on Abby showed me that she had no concept of what was straight in front of her. If I asked her to put her finger right in front of her nose, it was way off to one side. We call this a “midline shift.” It was also clear that her eyes could not stay lined up with each other, something known as “unstable binocularity.” It was evident she had a poor sense of depth and space.

Once I was testing her, I started to feel excited about the prospect of being able to help. I could tell her mom was not convinced, however. I couldn't blame her. They'd been absolutely everywhere and no one had been able to help.

But even that first day, I was able to alleviate some of the dizziness with a set of lenses. They had a small plus prescription, prisms embedded in the glass to bend the light in a desired way and — I'm not kidding — bits of semi-opaque tape in the areas near her nose. (For a bit more on lenses, see Chapter 7.) Taping the lenses like this is called “bi-nasal occlusion,” and it reduces the overlap in information coming from her two eyes. In general, the more overlap, the more your brain has to sort out, and the less overlap, the less potential for confusion — though, in truth, getting occlusion wrong can actually make things worse. Once I put together the right lenses for Abby, her brain was able to make more sense out of her visual world, meaning that it had more reliable information to integrate with her vestibular and proprioceptive systems. That's when she told her mother that she suddenly didn't feel as dizzy.

Abby went home that day with a prescription for the altered lenses. Typically,

eye doctors are taught that prisms should only be used to correct a misalignment of the eyes, and that, used in the wrong way, they can make the eyes dependent on them. But prisms can be used to do other things too, like change perception of space, which is how I was using them here. Throughout her treatment, those lenses changed four times, in keeping with how her perceptions changed and improved.

I suggested Abby work with me for 25 weeks of vision therapy. Again, I didn't know to what extent vision was the source of her problems, but I could tell it was at least a significant contributor. I knew her visual problems were hindering any recovery.

She started her therapy the very next week. Abby thought most of what we were doing was weird — dropping golf balls on different tees and answering strange questions about what she was seeing through an array of lenses. But although she didn't always know why these things were helping, she admits that they were.

Abby's mom describes her daughter's progress as gradual, but looking back, I think it was pretty quick. Usually, we start to see improvement anywhere from week 6 to week 15, depending on a person's response to lenses. But within four weeks, Abby was walking on her own again. Not long after, her mom remembers seeing her go to the bathroom on her own and not needing to touch the wall as she went. Abby had started treatment in May and, throughout the summer, she felt better and better. By September she was no longer dizzy at all. She was back at school full time and, believe it or not, she was skating again. I didn't realize how quickly she would rebound once vision was addressed. We actually ended therapy early, because her improvement was so much faster than expected.

Sometime near the beginning of her treatment, Abby's family doctor had called the family to say she knew they were doing vision therapy with me. She wanted them to know that she did not support them in this decision. It was interesting, given that this kid had been suffering from a debilitating problem and was getting worse, and no one had been able to help her until now.

This is a surprisingly common reaction. I have had a lot of doctors express their disapproval of vision therapy. As I said earlier, I understand where they are coming from, since I used to think the same thing: I was taught in

optometry school that vision therapy is essentially quackery. It wasn't until later, when I actually dove into the underlying neurology and research, that I changed my mind. A lot of doctors I know have come around in the end, too, after witnessing the improvements first hand. Some are even my patients now. But we never did hear if Abby's former doctor ever changed her views on vision therapy. I would hope she would at least take another look at it, review the science and give it a chance.

---

Among the many possible causes for dizziness are head injuries, neck injuries, vestibular system problems, heart problems, diabetes, complications from medication and, of course, problems with vision. All these things need to be considered when a person presents as dizzy. That last one — vision — is the only thing I can really help with, but it's an important component of balance and so often a major contributor to dizziness.

Ironically, vision is seldom fully investigated. That's despite the fact that there's been quite a lot of scientific work showing that we rely heavily on our vision to keep us upright. Even 19th-century doctors noticed that we have a harder time keeping our balance in the dark or when we close our eyes.<sup>12</sup>

More recent studies have shown that vision is our rock when information is conflicting or uncertain. One study looked at balance in older people while they stood on hard floors versus foam mats. On hard floors, they were able to keep their balance even if they had poor vision. But on the foam, when information coming from the feet was less reliable, people needed good vision to keep themselves steady, and if they didn't have it, they swayed more.<sup>13</sup>

Then there was a delightful study that involved movable walls. Back in the 1970s, experimental psychologist David Lee and his colleagues at the University of Edinburgh wanted to find out just how critical vision was to maintaining balance. So he built a little room where the floor stayed still but the walls could be silently and stealthily moved.<sup>14</sup>

12. Penelope S Suter and Lisa H Harvey, *Vision Rehabilitation* (Boca Raton: CRC Press, 2011), p 363.

13. SR Lord et al, "Postural Stability and Associated Physiological Factors in a Population of Aged Persons," *Journal of Gerontology*, vol 46, no 3 (May 1991), p M69.

14. David N Lee et al, "Visual Proprioceptive Control of Stance," *Journal of Human Movement Studies*, vol 1 (1975), pp 87–95.

In a series of experiments, the researchers moved the surrounding walls of the room just six millimetres back and forth while people stood in various stances. They used an instrument called a "sway meter" to measure how people's bodies reacted. They found that, even though all the mechanical evidence from people's ears, feet and bodies was telling them that they were not moving, they still swayed as though the floor under their feet was shifting. In short, when there was conflict about balance, the information from their eyes won out. "The subject is like a visual puppet," the authors wrote. "His balance can be manipulated by simply moving his surroundings, without his being aware of it."

The reaction was due to something called "optical flow" — that is, the way the pattern of light entering the eye changes when we move — say Janet Powell and Nancy Torgerson, writing about the study in the book *Vision Rehabilitation*.<sup>15</sup> (By the way, I highly recommend this book. I keep a copy handy at all times.) Optical flow helps us figure out where we are in space, whether or not we're moving, and if we are, whether we're going toward or away from the thing we're looking at. Vision is used to give advance notice of what action you might need to take in response to your changing environment.

---

Not that long ago, I got a call out of the blue from Alex, who had been my bookkeeper back when I first started out. She was a self-employed, single mother of two in her 40s. For about a year, she told me now, she had been suffering from severe dizziness.

It had started the morning after a strenuous game of tennis. Lying in bed, she noticed the world was spinning around her. When she stood up, it felt like the floor was moving up and down under her feet, almost as though she was on a boat.

What started as annoying and irritating quickly progressed to debilitating. Within weeks, she could not get off the couch. The TV had to be turned away so she wasn't exposed to motion, because motion made her throw up. Her kids had to speak one at a time, and in quiet voices. She had unrelenting

15. Penelope S Suter and Lisa H Harvey, *Vision Rehabilitation* (Boca Raton: CRC Press, 2011), pp 351–396.

headaches, neck pain, tremors and tingles in her arms and legs. She often stuttered and at times was unable to speak at all.

Doctors had ruled out infection, a brain tumour and multiple sclerosis, but at the time she came to see me, she was still living under the shadow of a Ménière's disease diagnosis — a degenerative inner ear disorder that involves dizziness and eventually leads to total hearing loss. (That too was eventually overturned — but it's worth noting that Ménière's patients can also often be helped by vision therapy.) She had a long history of both migraine and hypothyroidism, which had both worsened during her ordeal. But no one knew quite what this was. One doctor actually told her that she shouldn't expect to feel good all the time; another lectured her about what it meant to be an aging female.

By the time she came to see me, she was feeling hopeless and scared. She'd given up driving and could barely leave the house. If she managed to walk a few paces down her road, someone would have to pick her up in the car and bring her back. Her parents had sold their house up island and moved nearby in order to help. She'd cut her business to the bone. "You're sitting on the couch, staring at the walls," she says, looking back on that time. "You're seeing your life disappear."

I felt awful for her. It was bad. Part of me was annoyed, though, because all the signs indicated that visual issues were messing up the integration of her visual and vestibular inputs. How had no one noticed? There was her extreme sensitivity to all kinds of motion. There was her nausea. There was her difficulty looking at a computer screen. She reported knocking things over a lot and dropping things, like her keys. On my assessment, she had some extreme responses to some tests, including the "pattern glare" test,<sup>16</sup> which is a set of black and white lines that reveals a lot about vision's role in headaches. As well, her eyes over-converged, she couldn't find her midline and her two eyes didn't work well together.

The first thing I did was prescribe new lenses. The prescription she had for distance wasn't working for her at the computer, because it was making her eyes turn in too much, or "over-converge." It was as though her eyes were pigeon-toed. And just as feet that turn in too much cause problems in the knees and hips, eyes that turn in too much can cause problems with balance and motion sensitivity.

16. To find out more about the pattern glare test and if you are affected, see [isitvision.com](http://isitvision.com).

My aim in changing Alex's lenses was to place the least possible strain on her already over-taxed visual system. I wanted her to have a good visual "posture" — to make sure the eyes were in the right position relative to one another. She had been using moderate distance lenses, but I decided to prescribe bifocals for use at the computer, with the top of the bifocal ideal for using at her screen, and the bottom ideal for reading and near work. That way, she could change back and forth at her desk without causing symptoms. I had to explain that the symptoms don't always come on right away, but often accumulate over the course of the day, like a sunburn.

I knew that some of her other problems — like not being able to go out on her own and not being able to watch things in motion without feeling sick — might have seemed more immediate and daunting. But I also understood that she had to be able to work and support her family, and it was something I felt I could improve pretty much on the spot. Taking care of what was happening at her computer was also essential to treating the whole problem — the equivalent of telling a patient with back pain that they had to start sitting correctly at their desk. In other words, if how she was using her eyes was contributing to the problem, then every time she looked at her computer, she could be undermining any progress she might make with vision therapy.

The funny thing about Alex was that — even though she knew me, even though she had sought me out for help — she was such a hard-sell on vision therapy. She left after that first appointment, crossing her fingers that the glasses alone would do the trick. But a few months later, she came back in. She was still incredibly suspicious, but was thinking about giving vision therapy a try. In the end, I made her a bet, promising that if she didn't get better, she wouldn't have to settle her bill.

I was very confident I would win. Sure, I couldn't do anything to fix the inner ear, but I wasn't sold on the idea that all her symptoms were due to an inner ear problem. Visual problems are often mistaken for vestibular problems. It looked to me like her visual system was feeding garbage into her brain — just as though she was wearing a set of my trick goggles. So of course, her visual and vestibular systems weren't calibrated well. If we could straighten that out, a lot of her balance issues might go away.

For Alex, there's no question that treatment made her feel much worse before she started to feel better. The word she uses to describe that early phase is "grim." She says she felt 10 times worse during therapy. She remembers that there were some exercises she simply couldn't do at first, like peripheral work. She'd get a migraine aura and crippling head pain. She thought quite seriously about quitting, but a former patient of mine counselled her to stick with it.

It took her a full three months to turn the corner. Even then, she played down her progress. I remember at one appointment, she sat there complaining that her life still sucked. Her mom was there that day, too, and called her on it. She rattled off all the things that were better: Alex was now able to go to the grocery store without her mother's help; she was able to go out in the world for longer stretches; there were more days when she felt she could do something rather than nothing. Her mother told her that maybe she just couldn't notice because the improvement was so incremental, but from the outside, it was obvious.

It's surprisingly common for patients to not recognize their own improvement, because they are focused on the fact that there are still symptoms. But family members and co-workers can often see what the patient can't see: that the symptoms are fewer and less severe, and that the capabilities are greater.

Alex's recovery took nine months in total. Yes, she still gets a very occasional dizzy spell, but it never lasts long. She still gets migraines, too, though many fewer. But when asked to compare the self that first came in to get help with the self that walked out at the end, she says the former is "unrecognizable."

# 6

---

## CHAPTER 6: SPORT

Griffen was already a successful goalie in the Western Hockey League, the highest level of junior hockey in the country, when he started to think about vision therapy. He'd heard of other goalies who'd done vision therapy, especially ultra-high-performing ones in the NHL. So he asked for a referral.

He was 18 years old, in excellent health and without any obvious problems with his vision. He was a high-performing goalie who just wanted to be better. "I wanted to up my game," he says. "Obviously I need to be able to see well — I need to see the puck." Pucks can travel at more than 150 kilometres per hour.

Testing revealed that his two eyes worked fairly well together — almost as well as an ordinary person's eyes. But he needed it to be better than ordinary. So he signed up for 12 sessions.

He wasn't sure what to expect. His training consisted of a variety of activities. In one, he had to quickly tap dots that appeared randomly on a screen. At first, he says, he was able to tap just 60 dots a minute — but after training, he could tap around 140. Another exercise was catching a beanbag while wearing "strobe goggles," which obstructed his vision a few times each second.

He says that the exercises have made his vision more consistent and reliable. He is better at seeing what's going on in his periphery, as well as better at seeing what's in front of him. Most importantly, it has made him measurably better at following the puck. His stats say it best. In the first half of the season, before vision training, his save percentage was .913, meaning he kept 91.3 per cent of the shots out of the net. In the second half, after training, it was .917.

It took him more than the expected 12 weeks to complete his sessions because he couldn't do homework on game days — it would cause fatigue. But he still uses a selection of vision therapy exercises as warm-ups before a game. He ties a long string to the bottom of a pole, for instance, and holds the other end at his nose. Looking at the string that way, you don't see a straight line, he says, but rather an "x" at the point you're focusing on. Part of his warm-up is being able to mentally move that "x" smoothly up and down the string.

He plans to continue with more vision therapy. "Your eyes are your most powerful tool," he says, "so why wouldn't you want them to be efficient?"

---

When Griffen first came to us, he was already an awesome goalie. But he reported sometimes having difficulty tracking the puck or telling if it was on the ice or just slightly above.

The testing showed very minor deficits with binocularity. But really his visual system was in pretty good shape. The thing is, to be a great goalie, pretty good isn't good enough. To keep the puck out of the net, his vision had to be on the extreme high end, and our shared objective was to get him there.

Some athletes are spooked to learn about any shortcomings in their visual systems and so are reluctant to undergo testing in the first place. Others believe that they are just "naturally gifted" and don't need to train in something as basic as seeing. Griffen, on the other hand, was unfazed. For an elite athlete, he was an incredibly humble guy. He knew vision training would help his game and he was willing to work hard at it to see improvement.

The underlying principles of vision training for athletes are similar to what we do for people who come to see us for other issues. The difference is we are shooting for a finer level of discrimination and forcing athletes to make even tougher judgments regarding space and depth. We may do many of the same activities, but at a higher, more complicated level. For instance, we might still hang the little ball from the ceiling and the athlete may still have to bat it back and forth, and read what's written on it. But whereas a concussion patient may be lying down and batting slowly, an athlete might be balancing on one foot while counting up by sevens and batting the thing epically fast.

In vision training for athletes, we are still working on moving the eyes

accurately in response to a target, just to a higher level and at faster speeds. We want to load them up while they're performing, so the skill remains automatic even under duress. A goalie doesn't have a lot of time to react and he needs to react correctly every time. Another person I work with is a race car driver. The faster he can focus his eyes on the road — and then refocus — the better. He needs to see his markers; he needs to not be visually fatigued. He says the combo of lenses and therapy is working. The average person may get little benefit from this higher-level visual ability — but for a goalie, for a race car driver, for all sorts of elite athletes, it's essential.

---

Griffen is coming back for a second season of training, so we can keep him performing at a high level, and maybe get him even higher. But while Griffen and I may be convinced of the benefit, there are still plenty of doubters out there.

Fortunately, there is now some science to back up how valuable vision therapy can be to sports performance. A study on baseball published in 2012 found that vision training improved the team batting average of the University of Cincinnati's baseball team, both compared to itself the previous year and compared to the average of other teams in the league that year.<sup>17</sup>

Here's how it worked. All players on the Cincinnati baseball team got both pre-season vision training and in-season maintenance training. The pre-season training consisted of three 30-minute sessions per week for six weeks. The sessions used many of the same exercises we use in our centre. For instance, they used the Brock string — the device Griffen described above when he was talking about trying to get his eyes to see smooth "x"s up and down a string. They also used strobe glasses, a variation on that dot-tapping exercise and a variety of other vision training exercises.

The results were impressive. The team batting average increased from 0.251 in 2010 to 0.285 in 2011, and they went from being ranked 12th in the Big East to being tied for fourth place. The study authors note that the US Air Force Academy saw similar results after it introduced a comparable visual training regimen way back in 1994. They too increased their batting average, from 0.319 to 0.360.

17. Joseph F Clark et al, "High-Performance Vision Training Improves Batting Statistics for University of Cincinnati Baseball Players," *PLoS One*, vol 7, issue 1 (Jan 2012), pp 1–6.

While we can never be certain, the authors are assuming — and I agree — that the training is what made the difference for their team. Batters have only 0.17 seconds to decide whether or not to hit a ball, and if they do, how to swing. One of the exercises they used specifically works on hand-eye coordination, and another hones the ability of the eyes to focus at various distances. Others fine-tune the tracking of a moving object.

Anecdotally, I have witnessed a case that fits with these findings. Chelsea, who you might remember from Chapter 1, happened to be a really good softball player. She'd been playing since kindergarten and, by the time she came to see me, she was playing on a rep team.

She had started her vision therapy in May, just before ball season began. Her mom, Janice, who was one of the coaches, says that before vision therapy, Chelsea struggled to evaluate the speed and location of the pitch and to get her bat to where the ball would be. She was one of the most inconsistent hitters on the team.

Batting average is calculated by dividing the number of times a batter gets on base by the number of opportunities she has to hit. Chelsea started the season batting at .200, but within four weeks of starting vision therapy, her batting average had risen to .425. And after six weeks, it was at .600. Chelsea, her family, her coaches — everyone was surprised. “I love the batting story because it was so easy to see the relationship between the problem, the vision therapy exercises and the outcome,” says Janice. “And it was so quick!” More recently, her team won the Little League Junior Softball Nationals, and Chelsea led the team with her .588 batting average!

I'm excited to be doing some work with a high-performance baseball program here in Victoria. As part of that program, the teenage athletes get extra coaching, intense fitness training, some game prep and — new this year — vision training. I'm psyched for them.

These are mostly kids whose parents know that the cost of a special program like this is likely to pay off in scholarship money down the road. A lot of people still see the cost of vision training as a huge barrier, which sort of surprises me, considering how much parents are already spending on all the other training for the sport. Somehow vision remains the overlooked piece.

There's another University of Cincinnati study I want to mention. This one looked at using vision therapy for harm reduction — specifically, reducing the damage caused by head injury in football.<sup>18</sup> Almost all of the efforts towards reducing concussions in football focus on tinkering with the equipment, and that strategy hasn't been very effective. This study raised the question of whether vision training can give added protection.

In this study, all University of Cincinnati football players from the 2010 to 2013 seasons did vision training. They did two intensive weeks of pre-season work — six days a week, 40 minutes per session — and then a once-a-week maintenance during the season.

As in the baseball study, athletes did a variety of exercises, including things like that tapping-the-target game and catching things while wearing strobe glasses. In this study, though, exercises were tailored to the specific position, so that quarterbacks did one set of exercises and linemen did a different set.

The researchers compared how many players suffered concussions during the four seasons where they did vision training to how many suffered concussions in the four seasons immediately before, when they didn't do training. They found that vision training is associated with a significantly lower concussion rate. It was, to be clear, dramatically lower: 9.2 concussions in the untrained group versus 1.4 concussions in the trained group, per 100 player seasons. The improvement held true across different years, different coaches and different players. It happened at a time when other universities were reporting an increase in concussions. In other words, although we can't know for sure, the lower concussion rate for their team likely had something to do with the vision training.

The University of Cincinnati researchers think that concussions went down because players were more visually aware, and so they had fewer collisions. They knew there had been improvements in peripheral vision reaction time — they could measure that, and it got better with the training.

Although that's very possibly the whole story, I wonder if there was an additional component. Namely, did the training also help fortify the players' brains against injury when they did happen to collide? The theory behind that is that vision therapy strengthens connections in the brain. Concussions

18. Joseph F Clark et al, “An Exploratory Study of the Potential Effects of Vision Training on Concussion Incidence in Football,” *Optomtry and Visual Performance*, vol 3, issue 2 (April 2015), p 116–125.

and head injuries are caused when a force disrupts some of those connections. Do people who have more developed pathways due to vision therapy fare better after a crash? It's a question worth studying.

Whatever the reason, if vision therapy reduces incidence of concussion in football players, I do wonder how any serious football team could afford not to make it part of their regular training.

---

Here's what baffles me. Athletes get the importance of strength training, motor skills development and nutrition. A player can be strong and still work hard to build muscle. A player can control a ball well and still work on ball-handling skills. He or she can be well-nourished, but still see the point of protein or supplements. For some reason that I can't quite figure out, vision is left out of the equation.

People seem to think that if an athlete can see anything at all, then there's no improvement to be made in vision. That's like saying if a sprinter can run fast, she doesn't need to work on her calf muscles or her stride. Or if she's well-fed, she doesn't need to pay attention to what she eats. That's ridiculous. Vision is no more binary than anything else in the body. Just because you can see — or even see well — doesn't mean you can't use visual information even more effectively, to see even better.

I'm not sure how we came to view vision in such simplistic terms. But I want to be clear: for serious athletes, it's naive to neglect your vision. As with everything else, visual ability has a spectrum. And performance can be enhanced, through targeted training, to move you up on the spectrum, just like anything else.

Think about it. If a basketball player is always just slightly misjudging where the hoop is, he'll always be wasting time and energy compensating — maybe shooting just a little harder or aiming just a little to one side. If a softball player just slightly misjudges how close the ball is, he might be swinging just a bit early, unintentionally hitting the ball on its downward trajectory. Wouldn't it be better to hit it exactly as you intend to? In sports like baseball, hockey, soccer and volleyball, awareness of depth and space and your periphery is key.

You could be the hardest hitter, have the best spike or take the most deadly shots, but all of your motor abilities depend on your visual system for the right calculations of where the target actually is, or is going to be. Why not train yourself to be the best you can possibly be?

# 7

---

## CHAPTER 7: ERGOPTICS

Janice had suffered headaches her whole life — but in her 20s, when she started working on a computer all day, they got even worse. Sometimes she'd have two or three headaches a week. Sometimes she'd have one every single day.

These headaches were migraines, often accompanied by visual disturbances called “auras.” “It was like trying to focus through rippling water,” she says. Sometimes she got an aura, or a cluster of them, all on their own, without the pain. “They were bad enough to make me pull over when driving,” she recalls.

She took to always wearing sunglasses. She learned to recognize her triggers. Patterns of light and dark were particularly bad — window blinds, for instance, or trees casting shadows on the side of the road. For years she took medication to control the headaches, but the drugs were expensive (about \$20 a pill) and she didn't always have insurance.

When her daughter started doing vision therapy, Janice noticed an irritating diagram of white and black stripes displayed in the office. She actively avoided looking at it. “I would shield it from my view every time I walked in. If I looked, it was a full-blown migraine in 15 minutes,” she says.

As far as she was concerned, she had learned to cope with her problem. But towards the end of her daughter's treatment, Janice agreed to be assessed herself. To her surprise, after changes were made to her lenses, the headaches disappeared. “I haven't had an aura or a migraine since. I've used

no meds. Nothing in over a year.” She no longer lives behind sunglasses or hides from patterns of light and dark. With a single appointment, she says, 30 years of migraines were suddenly over.

---

Janice is Chelsea’s mom. You met Chelsea in Chapter 1. I remember how she used to come in to the office and protect herself from the pattern glare test grid. It’s really just a picture of alternating black and white stripes, but her reaction to it was a big clue that I could do something to help her. If just looking at a pattern of dark and light gives you a headache, something about the act of seeing must have a hand in bringing on that headache.

I was able to help Janice simply by changing her lenses. She’d been prescribed lenses that allowed her to see clearly, but they were causing a mismatch between her visual and vestibular systems, impairing how her eyes worked together and causing eye strain. She was over-focusing, so at first it felt like I took away some of the distance acuity. She’s still 20/20, meaning she can still see all the letters she’s supposed to see at 20 feet away, but her vision is not as super-crisp in the very far distance as it was. I also added a bit of prism and altered where the centre of the lens was.

The point of all this tinkering was to make the whole system work better. I wanted her visual system and vestibular system to align better, and I wanted her eyes to team and track better. I believed this would help resolve her headaches, and I was right.

---

Janice is a perfect example of how lenses can solve problems. (She is also a perfect example of how they can create problems.) Simply by altering the way light was coming into her eyes, with lenses, I was able to dramatically reduce her headaches.

The brain uses the information that comes in through the eyes to help it formulate ideas about depth and space. That in turn helps it figure out how to move the eyes in order to track properly. You can’t move your eyes to a point in space without first calculating where they need to go. The brain has

its own established equations for how to do this. Much of what you’ve read in this book so far has been about the therapy I do to get the brain to properly use what comes in — tweaking its equations, so to speak. But sometimes, the solution, or at least a part of the solution, is to physically alter what the inputs are.

I call this “ergoptics”: ergonomic prescribing. I carefully alter the incoming information to improve how well a person can function visually. Sometimes it means figuring out how to alter inputs so they line up better with what the vestibular system is perceiving, so that you don’t get dizzy. Sometimes it means altering inputs so that the eyes can work together better when reading. Sometimes it means altering what comes in to help the eyes do a better job of following a moving object.

It’s a style of prescribing glasses that is different from what you might be used to. Probably most of your glasses have been prescribed for clarity — to see *clearly*. My aim is to prescribe the glasses that will help you see more *efficiently*. Sure, I want you to see clearly too, but I want to do more than that. I want to give you the most efficient visual function possible.

The lenses I prescribe act as a sort of intermediary between the external environment and your brain, and as a kind of supplement to the original intermediary of your own eyes. Whereas therapy tries to change the equation inside the brain, ergoptics changes the equation before it gets there. Same goal, different point of intervention.

There are three main things I want to tell you about lenses. The first is that there is a ton that optometrists can do with them. We optometrists are masters of eye glass, and we can do much more than just make your vision sharper. The second is that most optometrists don’t use these superpowers — either they don’t bother or haven’t been trained how to do so. The third is that getting the right lenses is vitally important.

---

Let’s start with what we are able to do (or at least should be able to do.) Like your eyes’ own lenses, prescribed lenses change how light bends. Corrective lenses are just pieces of glass or hard plastic, but depending on

how they're made, they will alter the light differently. That's important, because the information conveyed in this light is what your brain uses for depth perception, hand-eye coordination, integrating with the vestibular system, calculating movements for eye tracking and coordinating the two eyes, among other things.

Here's a secret you may not know: lenses are more than the prescription you hold in your hand. How that prescription is actually configured can completely alter how effective it is. Labs often make their own adjustments or have their own lens designs. The same prescription can turn out many different ways. I take an active interest in how they are configured.

As an example, let's take the progressive lens, which can seem like having three prescriptions together into one piece of glass. But that lens actually features a graduating blend as it changes from top to bottom — the top part for distance, the bottom for reading and a narrow strip down the middle for the midrange. These lenses often have some distortion in the periphery, which can cause dizziness and nausea in some people, and can make it difficult to adapt. Even worse, if you're a person who works at a computer, you are spending most of your work day straining to see through that narrow strip of correction in the middle, which is almost never the correct prescription for seeing what's on your computer screen. It also makes you tilt your head backwards. In my opinion, there isn't a single person routinely using a desktop computer who should be wearing progressives for work.

I just don't understand this obsession we have with jack-of-all-trades glasses. You have multiple coats — a coat you wear in the rain, a coat you wear in the cold, a coat you wear when you step out of the shower. You have multiple shoes — for running, for working, for wining and dining. Imagine how great your all-purpose shoes would be! I don't know why people think glasses should be any different. They aren't, and people are paying the price not only in poorly corrected vision but in extra headaches, lost work, dizziness and distraction.

But even if you do decide on a pair of dedicated computer glasses, you still have to be on guard. Most of the time they are created from a generic calculation deduced from your distance and reading prescriptions. But how far is your computer from you actually? Did anyone ask you? What you really

need is a lens based very specifically on your own work set-up and your own visual system.

And those are the easy cases.

---

Often the problems go well beyond needing to see “clearly.” Sometimes a person is seeing blurred or, in extreme cases, doubled images due to binocular vision dysfunction, and the right lenses can often be a part of fixing that.

There are a number of tools in my toolbox to help with complex issues like these. Earlier, we talked about blending different prescriptions. Manipulating the prescriptions — by strengthening them, weakening them or combining them carefully — is one of the tools I can use to make the eyes work more efficiently.

Another is prisms. Prisms, which are really just wedges within a lens, are used just to shift light to help with a misaligned eye. However, prisms also change your depth perception. Sometimes, especially with progressive lenses, the way the lens is made can result in a prism being added without being prescribed and with unintended results. In fact, I had a patient who experienced both dizziness and balance issues so severe she would fall off of her horse. Then we discovered a prism had been automatically added to her progressive lenses. Once it was fixed, so was her dizziness.

In my office, as I mentioned earlier, I sometimes pull out my special prism goggles. In some cases, these “goggles of empathy” are used to help parents or caregivers experience what their loved ones are seeing. I do this by deliberately distorting things with the prisms. In other cases, they're to check if I can solve a problem, using prisms to adjust the inputs. In both instances, I am essentially inserting a new equation between the external environment and the brain.

You'll remember Todd from Chapter 4. I prescribed glasses for him because, when I put the correct prism lenses on him, he wasn't seeing double anymore. He'd had major double vision and headaches. He couldn't read when I met him — he was skipping lines and losing his place. The glasses helped with all of this, and made it possible for him to start on vision therapy. Yet another tool is occlusion, where I put little pieces of tape on the glasses. When I put a piece of tape on just one side of the nose, I can change how

a person perceives the midline — that is, of what’s straight ahead of them. When I place it correctly on both sides of the lens near the nose, it’s called bi-nasal occlusion. I spoke about this in Chapter 5. Doing this correctly can reduce symptoms like dizziness, nausea and headaches by changing how the binocular fields overlap.

Let me say a word about a tool I use sometimes, but not often: colour-tinted filters. Undoubtedly, they help some people with symptoms. I’m not a fan of permanent filters, because people habituate to them. And my clinical experience bears out research<sup>19</sup> which has found that the underlying issues are the very ones we’ve talked about in this book. So, given the choice, I’d rather get to the root problem and solve it — the way we set a broken arm, rather than medicating it with Tylenol.

Maybe it’s just the engineer nerd in me, but in my opinion this stuff is critically important. I have an entire practice in Brooklyn, New York, based on getting prescriptions and lenses just so, because my clients there understand how important that is. I myself wear reading and computer glasses, even though my clarity needs no correction. For me, it’s about work efficiency. I went through school reading several pages at a time, then changing tasks and coming back. Now I sit and read entire books. Again, if you’re the kind of person who recognizes the need for specialized footwear, ask yourself why you don’t care as much about your eyes as you do about your knees and feet.

---

This chapter started with Janice and her headaches. I had another patient around age 60 who had been taking a migraine medication for over 20 years. In the two years since I changed his lenses, he hasn’t had a single migraine. Headaches are a real red flag for me. I mentioned the “pattern glare” test.<sup>20</sup> If you suffer chronic headaches and looking at this pattern really bothers you — if it makes you think it will bring on a headache, makes you nauseated, makes you uncomfortable — that tells me, clinically, that a huge proportion of your headache trigger is coming from visual stimuli. Again: all you are doing is *looking* at a simple static image.

19. <http://www.mccrodanvision.com/vision-development-education-centre/irlen-lenses/>.

20. To find out if this is happening to you, go to the pattern glare test on [isitvision.com](http://isitvision.com)

You briefly met Jared’s mom, Kendra, in Chapter 2. It was while Kendra was bringing Jared in for treatment that I heard her routinely complain about headaches. She blamed the computer and the bright lights in her office. I told her flat out that she shouldn’t be getting so many headaches from that.

This modern world of up-close work is a challenge for many of us. Truth is, humans didn’t evolve to spend so much time this way. Lenses can help to reduce the negative effects of this unnatural visual strain.

Kendra had never worn glasses, but I asked if she would just let me check her eyes. I found that her eyes really strained to work up close. I prescribed glasses that she could wear at her desk and while reading. With the new prescription, the chronic headaches went away.

And it wasn’t just the chronic headaches. She also stopped making embarrassing mistakes in her reports — like forgetting to type a period at the end of a sentence or getting the file number wrong — things she couldn’t always process before.

“I had struggled with academics all my life,” Kendra says. “I felt stupid. I had low self-esteem.” Now that the headaches had stopped and she could see better, she found that she was performing better too. She applied for a promotion from bail supervisor to probation officer. “I never would have gone for it,” she says. But after her vision issues were resolved, she says she had more confidence in herself.

Ergoptics uses lenses to change the light information coming through the eyes, so that the brain can use it effectively, instead of being confused by it. What I want for my patients is the best visual efficiency possible, so they can have the best possible quality of life.

By the way, she got the job.

## CONCLUSION

Nothing is more frustrating to me than seeing people struggle with unresolved visual problems. They have tried many different approaches, seen many different professionals, and continue to suffer.. What can I say to these people? How can I ask them to trust that what I'm talking about might be different, and might actually help?

Other times, the naysayers are medical professionals — family doctors, ophthalmologists or even other optometrists. For some of these people, it's nothing more than a squabble over territory. For many more, though, it is lack of knowledge. Medical schools, and many optometry schools, teach a model of vision that makes it seem passive: vision just *happens* to you. So these people are not only not educated about vision therapy, they are implicitly educated against it. In the end, they are reluctant to offer to help with something they don't believe they can treat, or don't know how to treat — or don't even realize needs to be treated. They don't even know to be interested. Some of that is just old-fashioned pigheadedness: lots of docs believe that if they didn't learn it in school, it can't be true. But competent doctors understand that medicine evolves.

I often hear skepticism from insurers as well. They say they don't want to pay for something that they don't know anything about. Ironically, of course, they often end up paying for all sorts of other things that can't work before a person's vision is set right. Physiotherapy, psychological therapy, job search training — all sorts of programs depend on a functioning visual system if

they're going to work. So in the end, the entrenched beliefs of insurers not only hurt patients, they also hurt the insurers' own bottom line. It's the same story with school systems, which happily pay for reading recovery — even in cases where it's doomed to fail — because it hasn't taken into account the actual visual skills a child requires in order to read, but won't pay to fix or even test the eyes and brains that are struggling.

To be fair, I started out as a skeptic too. I got all the way through optometry school convinced that vision therapy wasn't something worth doing. Early on in my career, I even told a patient who was inquiring about vision therapy that it was quackery, that she shouldn't waste her money. Like everyone else, I had just accepted what I'd been taught.

What turned me around was a combination of things. One was meeting someone whose life had been completely changed by it. Another was the advice and mentoring I got from some awesome vision therapy doctors, and the training I got from the various bodies that support the field. Yet another was digging a little more deeply into the science behind it. And the last, and maybe the most compelling, was watching vision therapy transform lives in my own clinic.

---

I remember when I first heard about vision therapy. It was during a university lecture given by Dr Patrick Quaid. He casually mentioned convergence disorders and their treatment. Later, after I was done optometry school, I shadowed him at his clinic for a few weeks. It was there I encountered the patient who'd blamed himself for not liking to read, when in fact he had had a lifelong vision disorder.

About a year later, I decided I wanted to know more, so I attended courses given by Dr Paul Harris and Dr Robin Lewis. They were describing vision as a dynamic process, not something static — and that model of vision piqued my interest. What I learned was that much of a person's willingness to consider vision therapy is a function of their beliefs about how vision works. In a passive, acuity-only model, vision therapy can't possibly be effective. But I no longer thought about vision that way, so I began to change my views about vision therapy too.

I started to read up on specific types of vision problems. The underlying neurology made sense to me. As we develop from babies into children and into adults, we use our experience of the physical world to fine-tune our sensory systems, including vision — the most important of them all. The experience of reaching out and successfully grasping a flower, for instance, helps a young brain calibrate depth and space. Walking forward, spinning around, bending over — they all teach the brain, day by day, how the eyes need to interface with the natural world.

It's not a simple process, however, and not based entirely on inherited default programs. That's why sometimes our brains get things wrong. And tiny errors, where vision is concerned, can amount to life-changing limitations. Not being able to instruct your eyes to accurately track a moving object can mean a life on the sidelines. Not being able to detect where objects are in front of you can mean serious injury. Not being able to move your eyes in an orderly way through the symbols of our language might condemn you to illiteracy.

The sad thing is these are fairly common problems. After conditions like short-sightedness, the most common vision problems in the general population are vergence disorders. About seven per cent of adults and children, for instance, have convergence insufficiency, which means they can't make their eyes work together properly at close range. Over half of patients seeking the help of an eye doctor have these problems.

Some of the issues can be fixed through innovative lenses. Much of the theory behind that field, which I call ergoptics, is based on physics and optics. There's no magic, just science. And a lot of tinkering. Most of the troubleshooting I do is just working with theories of light, how light bends, and how a person perceives and uses the eyes to experience the world.

Other kinds of problems, I learned through my reading, training, mentoring and practising, can be rectified through vision therapy. Changing the interplay between the brain and the eyes through carefully designed exercises, with clear feedback, is backed up by what we know from neurology. It made sense to me.

Best of all, it works. When 12 weeks of real vision therapy was compared to either sham vision therapy (which acted as a placebo) or pencil push-ups (a set of exercises that involve focusing on the sharpened tip of a pencil as you change its distance from your eyes), only vision therapy produced

improvement. And some of the kids in the vision therapy group, who'd started out not being able to get their eyes to work effectively together, ended up, even after just that short time, cured of their problem.

What was excellent about this particular research, known as the CITT study, is that it assigned people to different treatments, so that their own choice had nothing to do with the outcome. It also compared real vision therapy with something that felt like, but was not, real vision therapy. That made it possible to conclude that the improvement wasn't somehow due to the mere attention of a doctor or therapist, or the commitment of all that time, or the simple belief or hope that something would work, or the random moving around of the eyes. It was the vision therapy itself that made the difference.

When I first started out, I figured I'd run a small clinic with just one assistant. That sounded pretty good to me. But it wasn't long before I came face-to-face with the scale of what was out there. Children who couldn't read. People who'd been in accidents and who now couldn't go out in daylight. People who were so dizzy they couldn't walk a straight line. Almost all of them were abandoned by mainstream medicine, often blamed for their own symptoms. I felt for all these people.

It was lucky for me that when I started out in vision therapy, I was young, unattached, with no kids and no mortgage. I didn't need a ton of money. I had lots of time. I did a lot of training, travelling all over North America, and was really able to try things out and fine-tune them. It allowed me to develop the basis for the program I have now. I'm still working on it. I suppose I always will be.<sup>21</sup>

I owe a lot to the educational bodies that got me started down this path. The Optometric Extension Program (OEP) gave me a deep introduction to vision therapy. Both the College of Optometrists in Vision Development (COVD) and the Canadian Optometrists in Vision Therapy and Rehabilitation (COVT&R) kept advancing my understanding and my education, by providing awesome courses and resources. Dr Harris ended up mentoring me through my lengthy COVD fellowship.

21. We named our clinics Opto-mization NeuroVisual Performance to highlight how we optimize the way vision works. Today, our clinics include optometrists, opticians, vision therapists, managers and support staff who work together to create one of the most inspired work environments I could have ever envisioned.

Like anyone, I had to learn a lot along the way. I discovered what worked and what didn't. I let the underlying neurology guide me. I approached vision therapy from an engineering perspective. At each point, I stopped and asked myself: does this make sense, logically, given what we know?

Even now at our clinic, we continually test and retest, and then apply what we learn. We don't just blindly accept what has been proposed; we keep questioning. My vision therapists are a big part of that. They come from backgrounds like kinesiology, teaching and psychology. Every week, we take an hour or two to discuss how things are going and how they could be improved. Much of the learning process now comes through them and through our shared experiences in the clinic.

Obviously it would be great if we had larger, longer-term studies. Lots of them. I am totally in favour of further scientific studies. Bring on the double-blind, placebo-controlled, prospective studies: studies in school children, studies in older people, studies confirming exactly what's best after concussion.

But to date, there aren't a lot of them. Complex, long-term studies are very expensive, time-consuming and, in some cases, ethically challenging to carry out. (A study on children and reading, for instance, might require children in the control group to undergo a year of sham treatment — which could be very harmful in the long term for those kids.) So for now, it's up to people on the ground, in the clinic, like me, to make careful observations and judgments. Academic opinions are all fine and well, but in vision therapy, the real progress is still in the trenches. Vision therapy doctors aren't formulating their opinions simply on what they've read, but also on what they see, every day in the clinic, in their patients.

---

We are at a point in time when vision therapy has not yet become truly mainstream. Unlike speech therapy or physiotherapy, doctors don't regularly prescribe it, insurers don't routinely cover it, public health bodies don't endorse it or provide it. That will change — but not quickly enough for the kids and head injury patients of today.

There are several reasons we are not there yet, but one of the most important comes down to how we are taught to think about vision. We optometrists are taught a static model of vision that doesn't pay much attention to

neurology. Similarly, ophthalmologists — medical doctors who treat eyes — are mostly taught to be concerned with the physical health of the eye and its socket. Many of them learn that if the eyes are straight, and in apparent alignment, then they are fine. For reasons I can't quite understand, none of us are encouraged to think about the function of the visual system as a whole — you know, eyes plus brain. It's like giving an accelerator pedal a good inspection and declaring the vehicle fine, even if it can't accelerate over 40. What about the engine, people?

It doesn't make sense. You'd expect more from your mechanic. You'd expect him to look under the hood — and to know how the pedals work *with* the engine as an integrated system — and you'd expect him to ask intelligent questions and to probe. At the very least, you'd expect him to admit it if he didn't know what was wrong. Too often, though, we eye doctors assume that if we don't know about something, it must not matter. It's how we were taught.

Sure, vision therapy was mentioned in optometry school, but it was only in passing. It wasn't something we focused on at all, something to be taken seriously. It was never made to sound like an avenue we young optometrists ought to consider pursuing. So a lot of optometrists didn't pursue it.

The ones who do are sort of left on their own. This raises another issue: consistency. The words “vision therapy” can mean different things to different practitioners. For some, it is entirely computer-based. For others, it's a series of simple exercises, like pencil push-ups. For others, like me, it's an intense program, lasting months. We need consensus on what treatment actually involves. Practitioners need to know what they should be offering. And the public deserves to know what they're signing up for.

What I really hope to see in the coming years is more dialogue and collaboration on this. I'd like to see a group of optometrists come together to set standards and guidelines for the field. That's not to say we should settle or stagnate — not at all. We need to keep improvising and testing and growing the field. There will be variability, for sure, because there are different schools of thought. One of the beauties of variability is that it keeps the profession moving forward. But we need to start moving forward in unison, not in opposition. We need to optimize vision therapy as a team, as a profession.

Only then will we get vision therapy to the places it desperately needs to be. Three particular areas stand out for me.

*Elementary schools.* You've heard me rattle on about this, but I firmly believe we need a comprehensive program in all our elementary schools. We need to provide very basic vision therapy to all kids, the way we provide iodine in our salt and vitamin D in our milk. Sure, some kids won't need it, but they won't be harmed. Other kids will be rescued by it, without even knowing. And the most at-risk kids will stand out as needing special help, and they will get that help. And, with luck, they will be spared the years of agony and stigma and lost learning that so many of my patients and their families have suffered through.

It's hard to understand why healthy visual functioning is not part of what we regularly screen for in the early years of school. There's no excuse for not making sure kids can function visually to a basic level before we undertake the challenge of teaching them to read. It's just basic school readiness. I just don't get that. Let's turn that around.

*Post-head injury treatment.* It's essential that vision therapy is recognized as an integral part of treatment following head injury and concussion. Medical professionals need to recognize this. Insurers need to recognize this. Schools and sports teams need to recognize this. Employers need to recognize this.

Many, many people, after head injury, cannot benefit from the other treatments on offer until they get their vision issues looked after. The light sensitivity, dizziness, nausea, headaches, inability to look at faces, inability to walk — these symptoms need to be dealt with before people can be expected to move forward in their recovery. And trained optometrists should be providing the treatment. This is just such a no-brainer that I feel silly having to emphasize it here.

*Headache care.* It may seem less urgent than the aftermath of concussion or not being able to read, but in terms of number of people affected and number of hours of work or school lost, headaches are a huge burden on our society. So many of them are caused by visual systems that are not coping with the demands placed on them. For some, it is the long hours in front of a computer screen. For others, it is the way they process light. So long as the reason for the headaches is the visual system — and it very often is — vision

therapy and ergoptics can help. Yet people with headaches are almost never offered vision therapy and special lenses. Rather, they are prescribed pharmaceuticals — which only mask the symptoms, instead of eradicating them.

Everyone is doing the best they can with the information they have. I get that. But we have to improve the information that they have. There are people who need our help.

---

True confession: my sister had vision issues as a kid. Growing up, she had trouble with how her eyes tracked and how they worked together, and she struggled with reading. She was often agitated and was super-frustrated with school. Because no one could find anything wrong — she went through all the regular visual testing and was cleared — we all just assumed she was lazy and needed to try harder. Little did we know that the root of the problem was a faulty visual system. She was effectively working with Windows 98, while everyone else was on a new Mac. Even though I've since treated her (and she now has her MBA!), I can't tell you, looking back, how bad I feel about this.

I also feel regret about that patient I steered away from vision therapy all those years ago. I have lost touch with her, but who knows how her life might have been different had she asked an optometrist less ignorant than I was then, who could have given her the advice she needed and deserved. There are thousands of patients just like her, all over North America, still being told not to pursue vision therapy. Just knowing this is like a weight on me.

Then there are all the patients, or their doctors, who contact me asking for the name of someone in their own community who can offer good quality vision therapy. Often I can't think of who to recommend. So few people actually do vision therapy — and even when you find one, the approaches can be very different. We need to change the culture at optometry school, so that this is a real and supported option for young optometrists. We need to build the country's network of doctors, so that when patients come forward, they have someone to help them.

I am confident all this will change. Kids like my sister will be identified and treated early. Optometrists and medical doctors will learn in school what vision therapy is, why it works and how to do it. Many more optometrists will choose this path. That day is coming. I sincerely hope that this book and my commitment to vision therapy are helping, in whatever small way, to speed it along.

## ACKNOWLEDGEMENTS

Many have helped me in making vision therapy and neuro-visual performance my life mission. I'd like to start by thanking some of the leaders in the field. Dr Patrick Quaid was the first to introduce me to the idea of vision therapy, and he encouraged me to think of it as a genuine possibility. I will always be indebted to him. Thanks also to Drs Paul Harris and Robin Lewis, who have really challenged me and nurtured my curiosity.

The OEP, NORA, COVT&R and COVD have provided amazing support and resources, and their members have been treasured colleagues. Our profession is incredibly lucky to have multiple educational bodies with varied approaches.

I can't say enough good things about the excellent book *Vision Rehabilitation* by Drs Penelope Suter and Lisa Harvey. I'm so grateful that the authors put this together. It's one of the best vision resources out there. I keep one copy at the office and one copy at home.

To the physiotherapists (especially Bernard Tonks, who teaches some of the best courses on vestibular rehabilitation), occupational therapists, lawyers, doctors and other professionals who have been supportive — thank you. I realize that it is not always easy.

To the whole Visual Process Charity team, thank you for believing in the mission and giving your hours and your expertise. I am honoured every time we get together.

Clyde, Brian, Joseph, Agnes and Arthur — the Brooklyn clinic would not be possible without you. It truly takes a wonderful team and I'm humbled to work with all of you.

To my amazing team of vision therapists — you show empathy, kindness and skill every day in working with our patients. I have learned so much from you. To my optical team, your dedication to ensuring the prescriptions are 100% accurate and our patients are treated like family is a key part of the results we achieve together. Peggy, my office manager extraordinaire, you glue the entire clinic together and keep us all on track. Our amazing front desk team are scheduling wizards and I am forever grateful.

A special thank you to my patients for allowing the opportunity to share in your journey. I'm so honoured to be able to play this role in your lives. The hardships you have faced inspire me to change the system, and the success you experience fills me with purpose. I look over your cards and letters all the time.

Many thanks to my parents who helped me develop the compass that allows me to stay the course in the face of adversity. They have encouraged me to fight to help others. To my sister, Carolyn, I had no idea, back when we were kids, that you had visual issues. Nobody did. I'm sorry we assumed you just 'weren't trying.' You are the reason why I cannot let another child struggle needlessly.

And finally, thank you to my beautiful wife, Morgan, who listens to me talk vision therapy in my sleep, reminds me to take downtime and helps to ground me when I get frustrated with our current system — I couldn't ask for a better person to be in my life.

## TESTIMONIALS

### READING

*"With a learning disability, you're not expecting a cure. So this was really quite remarkable. He said, 'I know what's wrong and I can fix it.' And it happened."*

— Janice, Chelsea's mom

*"It's never too late to ask for help. I got help in grade 12. I now have the rest of my life to use my eyes to their full capacity."* — Anna

### BEHAVIOUR

*"Cam had better insights into Jared than any psychiatrist. He got Jared to do things, not ask questions of him. He gets it."* — Kendra, Jared's mom

### CONCUSSION AND HEAD INJURY

*"Dr McCrodan gave me my life back."* — James

*"If there was anything I could do different, I would have done vision therapy right away, instead of waiting."* — James

*"I had a hard time discussing things with people, but he always made me feel I was understood. I felt heard by him."* — James

### DIZZINESS

*"I would have sold my house so that she could walk again."* — Abby's mom

*"I couldn't get up on a witness stand and swear that what Cam did made me better. I think it may have been a combination of things. But some were startlingly obvious — that it was what Cam did."* — Alex

